

Type 459 IC

Safety Relief Valves



CATALOG

LESER

The-Safety-Valve.com

General Information

Overview

LESER Compact Performance Safety Valves are the first choice solution for all industrial applications for steam, gas and liquid.

Compact Performance safety valves (LESER India Type 459 IC) are threaded and flanged safety valves with compact dimensions for economical protection of small and mid sized capacities.

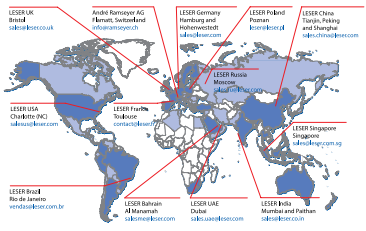
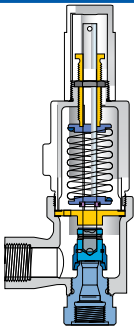
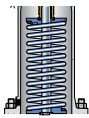
- ✓ Compact dimensions with high capacity
- ✓ Threaded and flanged connections
- ✓ Pressure range: 0.2 up to 850 barg
- ✓ Temperature up to 538 °C

General design features

- One design for steam, gas, liquid and multi-phase (single trim)
- Self draining body design, avoids residues and reduces corrosion
- Designed to meet API capacity of 'D-F' orifice
- Opens rapidly within an overpressure maximum 10% to full lift
- Developed in consultation with users from plants, OEM and service specialists
- High capacity compared to valve size
- Available with flanged and threaded connections

Advantages

LESER Type 459 IC is a globally proven safety valve with German technology and it is available in a configuration especially for Indian requirements (Indian Configuration, IC). It represents an advanced design concept for safety valves with the benefits shown in the table below.

	Feature	Function	Benefit
Worldwide global references			
	Recognition in the market	LESER safety valves are used by leading companies worldwide	Satisfied users are proof that LESER fulfills the demands of leading companies for quality, delivery and price.
"Approved"	Approved by customers	LESER safety valves are listed on the Approved Vendor Lists of more than 100 End Users and EPCs	
Reliable valve function			
	Durable Design	<ul style="list-style-type: none"> • The body is designed to be self-draining to avoid residues • Straight Alignment with one-piece spindle and 2-point-guiding • Low minimum set pressure due to optimized design 	Durable Design ensures the long-term reliable function of the safety valve and can lead to extended maintenance intervals
Low lifecycle costs			
	Single Trim	<ul style="list-style-type: none"> • Use of identical trim parts for gas, steam and liquid services. • Lower number of springs because of wider pressure range per spring 	Reduced number of spare parts
Services around the safety valve			
Quick supply	Quick and reliable supply chains	6 weeks delivery time ex works Paithan	Quick availability in India

Type 459 IC

Applications

For all smaller capacity applications of steam, gases and liquids Type 459 IC provides protection against undesired overpressures.

Typical applications are:

- Thermal relief applications for Oil and Gas
- Utility steam
- Air / Gas compressors
- Pump discharge
- Mobile tanks (transport system)
- Chemical equipment and piping
- Pressure vessels
- LPG / LNG terminals, carriers etc.
- Cryogenic systems and oxygen applications

Available options

- Valve size ½" (inlet) to 1½" (inlet)
- Threads according to different standards available (e.g. BSP, NPT, BSPT)
- Female thread also possible at inlet on special demand
- Weld joint connection Balanced Bellows for variable back pressure on special demand
- Flanged connection acc. to ASME B16.5 [CL 150, to CL 2500 Inlet]
- Lifting device, H4
- Test gag
- Soft seal O-Ring disc
- NACE Compliant

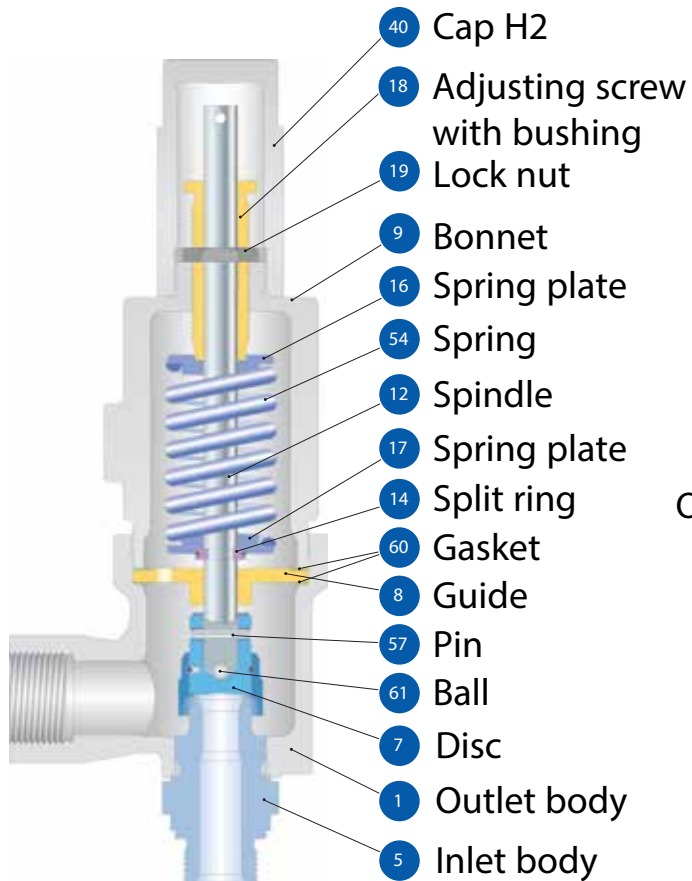
Approvals

- UV stamp acc. to ASME section VIII Division 1,
- National Board certified capacities
- IBR Certificate Form III C (without attachment 8)
- Chief Controller of Explosives [CCoE/PESO]
- Third party inspections possible

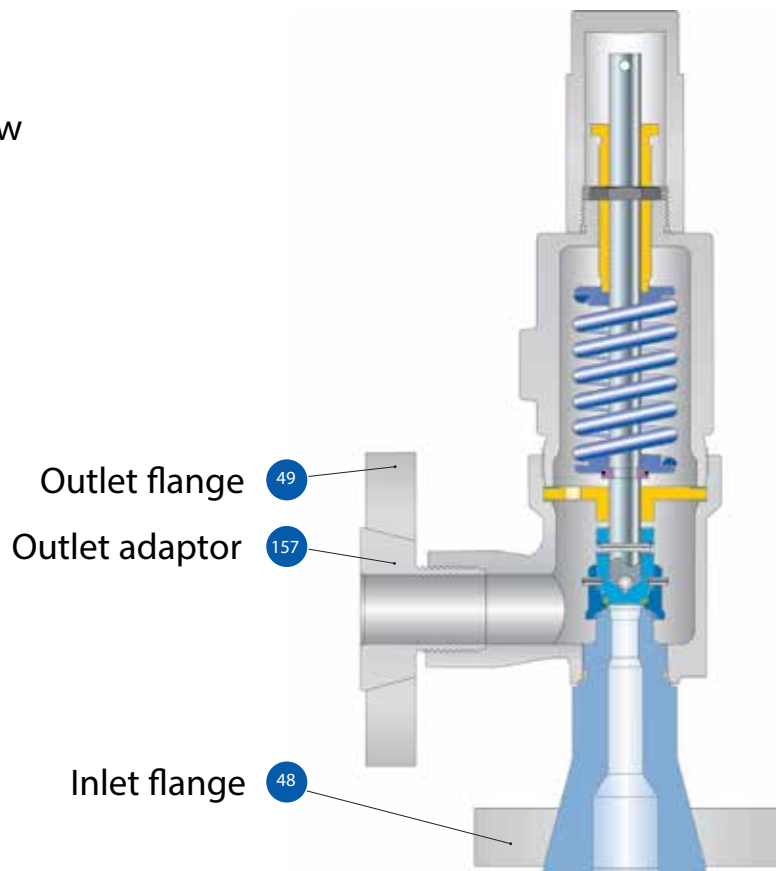


IBR CCoE

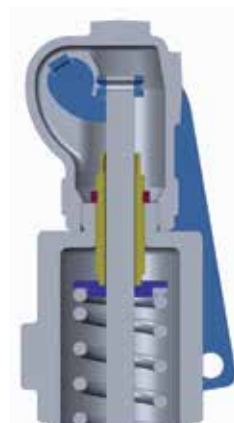
Type 459 IC
Available designs



Conventional design
Threaded connection



Conventional design
Flanged connection



Conventional design
Lifting device, H4

Type 459 IC
Available designs
Materials

Item	Component	Remarks	Carbon Steel Version		Stainless Steel Version	
1	Outlet body		SA 216 WCB	SA 352 LCB	SA 351 CF8M	SA 351 CF3M
5	Base / Inlet body	Threaded connection Flange connection	SA 479 316L SA 479 316L		SA 479 316L SA 479 316L	
157	Outlet adaptor	Flange connection	A 479 316		A 479 316	
49	Outlet flange	Flange connection	A 105 / A 479 316		A 479 316	
7	Disc		A 479 316L		A 479 316L	
8	Guide		A 479 316		A 479 316	
9	Bonnet		SA 216 WCB	SA 352 LCB	SA 351 CF8M	SA 351 CF3M
12	Spindle		A 479 316L		A 479 316L	
14	Split ring		A 479 316		A 479 316	
16/17	Spring plate		Carbon Steel	A 479 316	A 479 316	
18	Adusting screw with bushing		A 479 316 PTFE		A 479 316 PTFE	
19	Lock nut		A 479 316		A 479 316	
40	Cap H2		SA 216 WCB	SA 351 CF8M	SA 351 CF8M	SA351 CF3M
48	Inlet flange	Flange connection	A 105	A 479 316	A 479 316	
54	Spring	Standard Optional	Carbon Steel / Alloy Steel Stainless Steel / Inconel X750		Stainless Steel Inconel X750	
57	Pin		A 479 316		A 479 316	
60	Gasket		Non Asb./Graphite/316L		Non Asb./Graphite/316L	
61	Ball		A 479 316		A 479 316	

Please Notice:

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

Type 459 IC

Article number

Pressure temperature ratings

Disc type	Metal to Metal				Soft seal O-Ring			
Actual Orifice diameter do [mm]	6	9	13	17.5	9	13	17.5	
Actual Orifice area Ao [mm ²]	28.2	63.6	133	241	63.6	133	241	
Article no.	4590.0011	4590.0021	4590.0031	4590.0041	4590.0061	4590.0071	4590.0081	
Set pressure range p [barg]	420-850	1.5-420	0.2-200	0.2-100	0.2-350	0.5-180	0.2-92.5	

	Carbon steel version						Stainless steel version							
Actual Orifice diameter do [mm]	9		13		17.5		6		9		13		17.5	
Actual Orifice area Ao [mm ²]	63.6		133		241		28.2		63.6		133		241	
Disc design	Metal	O-Ring	Metal	O-Ring	Metal	O-Ring	Metal	O-Ring	Metal	O-Ring	Metal	O-Ring	Metal	O-Ring
Minimum set Pressure p barg S/G/L	1.5	0.5	0.2	0.5	0.2	0.5	420	-	1.5	0.5	0.2	0.5	0.2	0.5
Maximum set Pressure p barg S/G/L	420	180	200	180	100	92.5	850	-	420	180	200	180	100	92.5
Temperature min. [°C]	-29	-29	-29	-29	-268	-268	-45	-	-268	-45	-268	-45	-268	-45
acc. to ASME max. [°C]	+425	+150	+425	+150	+425	+150	+538	-	+538	+150	+538	+150	+538	+150

Type 459 IC

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"	1" X 1½"	1½" X 2"
Actual Orifice diameter d ₀ [mm]		9	9	9	13	13	13	17.5	17.5
Actual Orifice area A ₀ [mm ²]		63.6	63.6	63.6	133	133	133	241	241
Weight	[kg]	4.2	4.2	4.2	4.2	4.2	4.2	5	6
Balanced bellows	[kg]	5	5	5	5	5	5	5.8	6.8
Required installation diameter d	[mm]	165	165	165	166.5	165	165	165	165

Inlet thread female

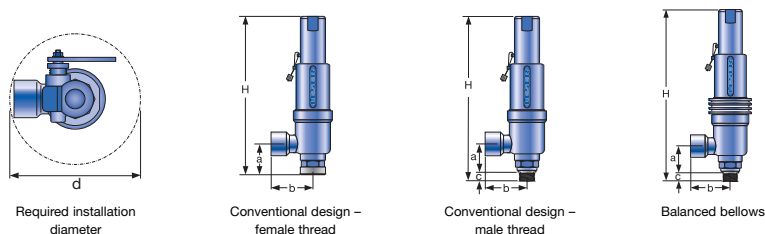
Size outlet body		½" X 1"	¾" X 1"	1" X 1"	½" X 1"	¾" X 1"	1" X 1"	1" X 1½"	1½" X 2"	
Actual Orifice diameter d ₀ [mm]		9	9	9	13	13	13	17.5	17.5	
Center to face / Height										
DIN ISO 228-1 ASME B1.20.1	G (BSP) NPT	Inlet a	53	56	62	53	56	62	66	73
		Center to face [mm]	Outlet b	75	75	75	75	75	75	75
Height [mm]		H max	283	286	292	283	286	292	293	305
Balanced bellows		H max	315	318	324	315	318	324	325	333
ISO 7-1/BS 21	Rc (BSPT)	Inlet a	53	56	64	53	56	64	68	-
		Center to face [mm]	Outlet b	75	75	75	75	75	75	75
Height [mm]		H max	283	286	294	283	286	294	295	-
Balanced bellows		H max	315	318	326	315	318	326	327	-

Inlet thread male

Size outlet body		1" - 1½"	1" - 1½"	1½"	2"	
Actual Orifice diameter d ₀ [mm]		9	13	17.5	17.5	
Center to face [mm]						
DIN ISO 228-1	G (BSP)	Inlet ½" - 1" a	52	52	-	-
		Inlet 1" - 1½" a	-	-	56	56
		Outlet b	75	75	75	100
ISO 7-1/BS 21	R (BSPT)	Inlet ½" - 1" a	49	49	-	-
ASME B1.20.1	NPT	Inlet 1" - 2" a	-	-	53	53
Outlet b		75	75	75	100	

Height [mm]										
			Conventional design				Balanced bellows			
Size inlet thread			½"	¾"	1"	1½"	½"	¾"	1"	1½"
DIN ISO 228-1	G (BSP)	H max.	296	298	301	305	328	330	333	337
ISO 7-1/BS 21	R (BSPT)	H max.	298	299	303	305	330	331	335	337
ASME B1.20.1	NPT	H max.	301	301	307	308	333	333	339	340

Length of screwed end c [mm]									
Size inlet thread		½"	¾"	1"	1½"				
DIN ISO 228-1	G	14	16	18	22				
ISO 7-1/BS 21	R	19	20	23	25				
ASME B1.20.1	NPT	22	22	27	28				



Type 459 IC

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"	1" x 1 1/2"	1 1/2" x 2"
Actual Orifice diameter d_o [inch]	0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689
Actual Orifice area A_o [inch ²]	0.099	0.099	0.099	0.206	0.206	0.206	0.374	0.374
Weight [lbs]	9.3	9.3	9.3	9.3	9.3	9.3	11	13.2
Balanced bellows [lbs]	11	11	11	11	11	11	12.8	
Required installation diameter d [inch]	61/2	61/2	61/2	61/2	61/2	61/2	61/2	

Inlet thread female

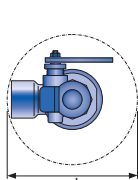
Size outlet body	1/2" X 1"	3/4" X 1"	1" X 1"	1/2" X 1"	3/4" X 1"	1" X 1"	1" X 1 1/2"	1 1/2" X 2"		
Actual Orifice diameter d_o [inch]	0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689		
Center to face / Height										
DIN ISO 228-1 ASME B1.20.1	G (BSP) NPT	Inlet a	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₁₆	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₁₆	2 ¹⁹ / ₃₂	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	3 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 ¹⁷ / ₃₂	13
Balanced bellows		H max	12 ¹³ / ₃₂	12 ¹⁷ / ₃₂	12 ³ / ₄	12 ¹³ / ₃₂	12 ¹⁷ / ₃₂	12 ³ / ₄	12 ²⁵ / ₃₂	13 ¹ / ₈
ISO 7-1/BS 21	Rc (BSPT)	Inlet a	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₃₂	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₃₂	2 ¹¹ / ₁₆	-
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	-
Height [inch]		H max	11 ⁵ / ₃₂	11 ¹ / ₁₄	11 ⁹ / ₁₆	11 ⁵ / ₃₂	11 ¹ / ₁₄	11 ⁹ / ₁₆	11 ⁵ / ₈	-
Balanced bellows		H max	12 ¹³ / ₃₂	12 ¹⁷ / ₃₂	12 ²⁷ / ₃₂	12 ¹³ / ₃₂	12 ¹⁷ / ₃₂	12 ²⁷ / ₃₂	12 ⁷ / ₈	-

Inlet thread male

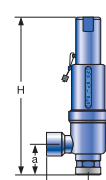
Size outlet body	1" - 1 1/2"	1" - 1 1/2"	1 1/2"	2"		
Actual Orifice diameter d_o [mm]	0.354	0.512	0.689	0.689		
Center to face [mm]						
DIN ISO 228-1	G (BSP)	Inlet 1/2" - 1" a	2 ¹ / ₁₆	2 ¹ / ₁₆	-	-
		Inlet 1" - 1 1/2" a	-	-	2 ⁷ / ₃₂	2 ⁷ / ₃₂
		Outlet b	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
ISO 7-1/BS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

Height [mm]		Conventional design				Balanced bellows				
Size inlet thread		1/2"	3/4"	1"	1 1/2"	1/2"	3/4"	1"	1 1/2"	
DIN ISO 228-1	G (BSP)	H max.	11 ²¹ / ₃₂	11 ²³ / ₃₂	11 ²⁷ / ₃₂	12	12 ²⁹ / ₃₂	13	13 ¹ / ₈	13 ⁹ / ₃₂
ISO 7-1/BS 21	R (BSPT)	H max.	11 ²³ / ₃₂	11 ²⁵ / ₃₂	11 ¹⁵ / ₁₆	12	13	13 ³ / 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	13 ¹ / ₈	13 ¹ / ₈	13 ¹¹ / ₃₂	13 ³ / ₈

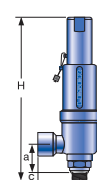
Length of screwed end c [mm]		Size inlet thread			
		1/2"	3/4"	1"	1 1/2"
DIN ISO 228-1	G	9 ⁹ / ₁₆	5 ⁵ / ₈	2 ²³ / ₃₂	7 ⁷ / ₈
ISO 7-1/BS 21	R	3 ³ / ₄	2 ²⁵ / ₃₂	2 ²⁹ / ₃₂	3 ³¹ / ₃₂
ASME B1.20.1	NPT	7 ⁷ / ₈	7 ⁷ / ₈	1 ¹ / ₁₆	1 ³ / ₃₂



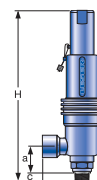
Required installation diameter



Conventional design - female thread



Conventional design - male thread



Balanced bellows

Type 459 IC

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 Orice diameter d_o [mm]	6	6	6	9	9	9
Actual Orifice area A_o [mm ²]	28.3	28.3	28.3	63.6	63.6	63.6
Weight [kg]	4.2	4.2	4.2	4.2	4.2	4.2
Balanced bellows [kg]	5	5	5	5	5	5
Required installation diameter d [mm]	165	165	165	165	165	165

Inlet thread female

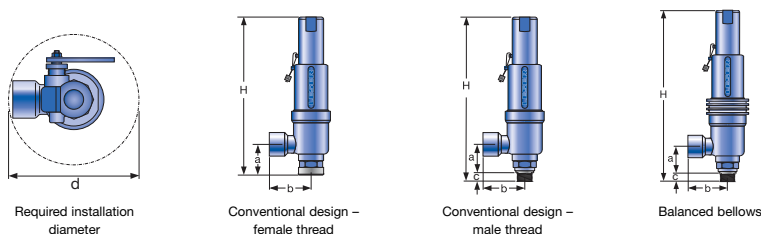
Size outlet body	½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"		
Actual Orice diameter d_o [mm]	6	6	6	9	9	9		
Center to face / Height								
DIN ISO 228-1	G (BSP)	Inlet a	53	53	62*)	53	56	62
ASME B1.20.1	NPT							
Center to face [mm]		Outlet b	75	75	75*)	75	75	75
Height [mm]		H max.	283	286	292*)	283	286	292
	Balanced bellows	H max.	315	318	342*)	315	318	324
ISO 7-1/BS 21	Rc (BSPT)	Inlet a	53	56	64	53	56	64
Center to face [mm]								
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 Orice diameter d_o [mm]	6	9						
Center to face [mm]								
DIN ISO 228-1	G (BSP)	Inlet a	52	52				
					Outlet b	75	75	
ISO 7-1/BS 21	R (BSPT)	Inlet a	49	49				
ASME B1.20.1	NPT	Outlet b	75	75				
Height [mm]								
			Conventional design		Balanced bellows			
	Size inlet thread		½"	¾"	1"	½"	¾"	1"
DIN ISO 228-1	G (BSP)	H max.	296	298	301	328	330	333
ISO 7-1/BS 21	R (BSPT)	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		½"	¾"	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 (BSP) not possible.



Type 459 IC

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 Orice diameter d_0 [inch]		0.236	0.236	0.236	0.354	0.354	0.354
Actual Orifice area A_0 [inch ²]		0.044	0.044	0.044	0.099	0.099	0.099
Weight	[lbs]	9.3	9.3	9.3	9.3	9.3	9.3
Balanced bellows	[lbs]	11	11	11	11	11	11
Required installation diameter d	[inch]	6½	6½	6½	6½	6½	6½

Inlet thread female

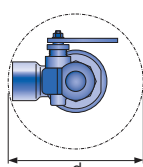
Size outlet body		½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"	
Actual Orice diameter d_0 [inch]		0.236	0.236	0.236	0.354	0.354	0.354	
Center to face / Height								
DIN ISO 228-1	G (BSP)	Inlet a	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₁₆ *)	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₁₆
ASME B1.20.1	NPT		Outlet b	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆ *)	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
Center to face [mm]		H max.	11 ⁵ / ₃₂	11 ¹ / ₁₄	11 ¹ / ₂ *)	11 ⁵ / ₃₂	11 ¹ / ₁₄	11 ¹ / ₂
Height [mm]	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 (BSPT)	Inlet a	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₃₂	2 ³ / ₃₂	2 ⁷ / ₃₂	2 ⁷ / ₃₂
Center to face [mm]			Outlet b	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆
Height [mm]		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

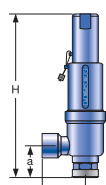
Size outlet body		1"	1"					
Actual Orice diameter d_0 [inch]		¾	1 ¹ / ₃₂					
Center to face [mm]								
DIN ISO 228-1	G (BSP)	Inlet a	2 ¹ / ₁₆	2 ¹ / ₁₆				
			Outlet b	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆			
ISO 7-1/BS 21	R (BSPT)	Inlet a	1 ¹⁵ / ₁₆	1 ¹⁵ / ₁₆				
ASME B1.20.1	NPT	Outlet b	2 ¹⁵ / ₁₆	2 ¹⁵ / ₁₆				
Height [mm]								
Size inlet thread		Conventional design			Balanced bellows			
		½"	¾"	1"	½"	¾"	1"	
DIN ISO 228-1	G (BSP)	H max.	11 ²¹ / ₃₂	11 ²³ / ₃₂	11 ²⁷ / ₃₂	12 ²⁹ / ₃₂	13	13 ¹ / ₈
ISO 7-1/BS 21	R (BSPT)	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 [mm]				
Size inlet thread		½"	¾"	1"
DIN ISO 228-1	G	9 ¹ / ₁₆	5 ¹ / ₈	2 ³ / ₃₂
ISO 7-1/BS 21	R	¾	2 ⁵ / ₃₂	2 ⁹ / ₃₂
ASME B1.20.1	NPT	7 ¹ / ₈	7 ¹ / ₈	1 ¹ / ₁₆

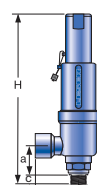
*) DIN ISO 228-1 G (BSP) not possible.



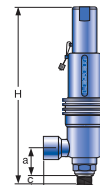
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459 IC

Dimensions and weights

Flanged connections [Metric units]

	Conventional design			Balanced bellows		
Actual Orifice diameter d_o [mm]	9	13	17.5	9	13	17.5
Actual Orifice area A_o [mm ²]	63.6	133	241	63.6	133	241

DIN EN 1092-1

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	375

ASME B 16.5

Flange rating class 150 – 2500								
Center to face	[mm]	Inlet a	100	100	100	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.

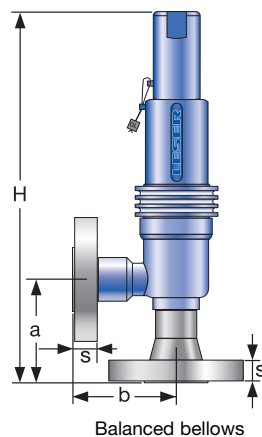
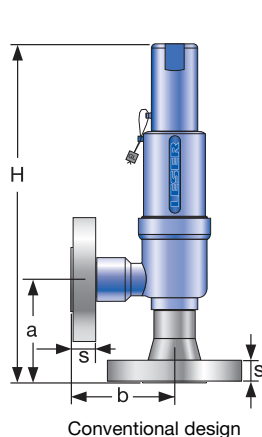
Weight

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

Weight net	[kg]							
(without inlet and outlet flange)		m_N	4.7	4.7	5.5	5.9	5.9	6.4

Flange dimensions

		DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		40	100	160	250	320	400	Size	150	300	600	900	1500	2500
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
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
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
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	–	–



Type 459 IC

Dimensions and weights

Flanged connections [US units]

		Conventional design			Balanced bellows		
	Actual Orifice diameter d_o [inch]	0.354	0.512	0.689	0.354	0.512	0.689
	Actual Orifice area A_o [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.

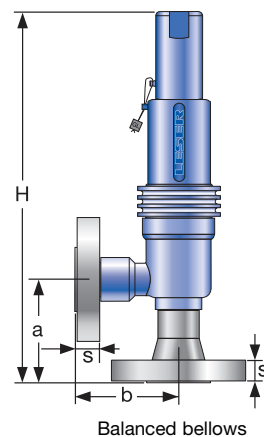
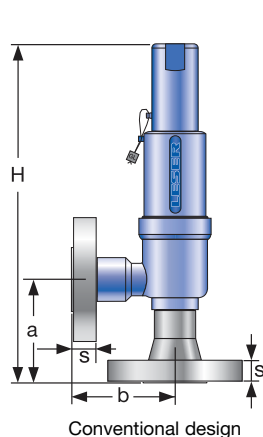
Weight

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

Weight net	[lbs]	m_N	10.4	10.4	12.1	13.0	13.0	14.1
(without inlet and outlet flange)								

Flange dimensions

		DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		40	100	160	250	320	400	Size	150	300	600	900	1500	2500
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
NPS $3/4$ "														
Flange thickness [inch]		$25/_{32}$	$7/_{8}$	–	–	–	–		$19/_{32}$	$23/_{32}$	$23/_{32}$	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
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
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	–	–



Type 459 IC
Capacities
US Units

Capacities according to ASME Section VIII (UV), based on set pressure plus 10% overpressure.
Capacities at 30 psig (2.07 bar) and below are based on 3 psig (0.207 bar) overpressure.

ASME Section VIII

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		
Set pressure	Capacities			Capacities			Capacities		
	Steam saturated	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]	Steam saturated	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]	Steam saturated	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]
[psig]	[lb/h]			[lb/h]			[lb/h]		
15	134	48	9.02	281	100	18.8	509	181	34
20	155	55	10.2	324	115	21.2	586	209	38.4
30	196	70	12.2	410	146	25.4	742	264	46
40	242	86	14.1	504	180	29.3	913	326	53.1
50	287	103	15.8	599	213	32.8	1085	387	59.4
60	332	119	17.3	693	247	35.9	1256	448	65.1
70	377	135	18.7	788	281	38.8	1427	509	70.3
80	423	151	19.9	882	315	41.5	1599	570	75.1
90	468	167	21.2	977	348	44	1770	631	79.7
100	513	184	22.3	1071	382	46.4	1941	692	84
120	604	216	24.4	1260	449	50.8	2284	814	92
140	695	248	26.4	1449	517	54.9	2626	936	99.4
160	785	281	28.2	1638	584	58.7	2969	1058	106
180	876	313	29.9	1827	652	62.3	3311	1180	113
200	966	346	31.5	2016	719	65.6	3654	1302	119
220	1057	378	33.1	2205	787	68.8	3996	1424	125
240	1148	410	34.5	2394	854	71.9	4339	1546	130
260	1238	443	36	2584	921	74.8	4682	1669	135
280	1329	475	37.3	2773	989	77.6	5024	1791	141
300	1419	508	38.6	2962	1056	80.4	5367	1913	146
320	1510	540	39.9	3151	1124	83	5709	2035	150
340	1601	572	41.1	3340	1191	85.6	6052	2157	155
360	1691	605	42.3	3529	1259	88	6394	2279	159
380	1782	637	43.5	3718	1326	90.5	6737	2401	164
400	1872	670	44.6	3907	1393	92.8	7080	2523	168
420	1963	702	45.7	4096	1461	95.1	7422	2645	172
440	2054	734	46.8	4285	1528	97.3	7765	2767	176
460	2144	767	47.8	4474	1596	100	8107	2889	180
480	2235	799	48.9	4663	1663	102	8450	3011	184
500	2326	832	49.9	4852	1731	104	8792	3134	188
550	2552	913	52.3	5352	1899	109	9649	3439	197
600	2779	994	54.6	5797	2068	114	10505	3744	206
650	3005	1075	56.9	6270	2236	118	11362	4049	214
700	3232	1156	59	6742	2405	123	12218	4354	222

Type 459 IC

Capacities

US Units

Actual Orifice diameter d_o [inch]	0.354			0.512			0.689		
Actual Orifice area A_o [inch ²]	0.099			0.206			0.374		
Set pressure [psig]	Capacities			Capacities			Capacities		
	Steam saturated [lb/h]	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]	Steam saturated [lb/h]	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]	Steam saturated [lb/h]	Air 60° F and 14.5 psig [S.C.F.M.]	Water 70°F [US-G.P.M.]
750	3458	1237	61.1	7215	2573	127	13075	4660	230
800	3685	1318	63.1	7688	2742	131	13931	4965	238
850	3911	1399	65	8160	2911	135	14787	5270	245
900	4138	1480	66.9	8633	3079	139	15644	5575	252
950	4364	1561	68.7	9105	3248	143	16500	5881	259
1000	4591	1642	70.5	9578	3416	147	17357	6186	266
1100	5044	1804	74	10523	3753	154	19070	6796	279
1200	5497	1966	77.2	11469	4091	161	20782	7407	291
1300	5950	2128	80.4	12414	4428	167	22495	8017	303
1400	6394	2290	83.4	13340	4765	174	24174	8628	314
1500	6889	2452	86.4	14373	5102	180			
1600	7393	2614	89.2	15424	5439	186			
1700	7907	2776	91.9	16497	5776	191			
1800	8433	2938	94.6	17594	6113	197			
1900	8971	3100	97.2	18718	6451	202			
2000	9525	3262	100	19872	6788	208			
2200	10684	3586	105	22292	7462	218			
2400	11935	3910	109	24901	8136	227			
2600	13310	4234	114	27770	8811	237			
2800	14864	4558	118	31012	9485	246			
3000		4882	122						
3200		5206	126						
3400		5530	130						
3600		5854	134						

Type 459 IC
Capacities
US Units

Capacities according to ASME Section VIII (UV), based on set pressure plus 10% overpressure.
Capacities at 30 psig (2.07 bar) and below are based on 3 psig (0.207 bar) overpressure.

ASME Section VIII

Actual Orifice diameter d_o [inch]	0.236			0.354		
Actual Orifice area A_o [inch ²]	0.044			0.099		
Set pressure	Capacities			Capacities		
	Steam saturated	Air	Water	Steam saturated	Air	Water
[psig]	[lb/h]	60° F and 14.5 psig [S.C.F.M.]	70°F [US-G.P.M.]	[lb/h]	60° F and 14.5 psig [S.C.F.M.]	70°F [US-G.P.M.]
3500				No saturated steam application in set pressure range	5692	132
3750					6097	137
4000					6502	141
4250					6908	145
4500					7313	150
4750					7718	154
5000					8123	158
5250					8528	162
5500					8933	165
5750					9338	169
6000		4330	76.8		9743	173
6250		4510	78.4		10148	176
6500		4690	79.9			
6750		4870	81.4			
7000		5050	82.9			
7250		5230	84.4			
7500		5410	85.8			
7750		5590	87.3			
8000		5770	88.6			
8250		5950	90			
8500		6130	91.4			
8750		6310	92.7			
9000		6490	94			
9500		6851	96.6			
10000		7211	99.1			
11000		7931	104.0			
12000		8651	109.0			

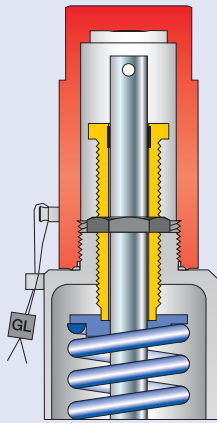
Coefficient of discharge acc. to ASME sec. VIII Div. 1

Medium	Approval No.	k
Gaseous	M 37112	0.811
Liquid	M 37101	0.566

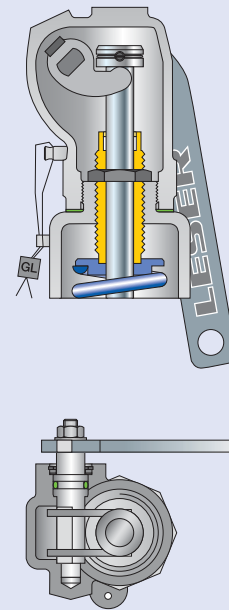
Type 459 IC

Caps and levers - subassembly item 40

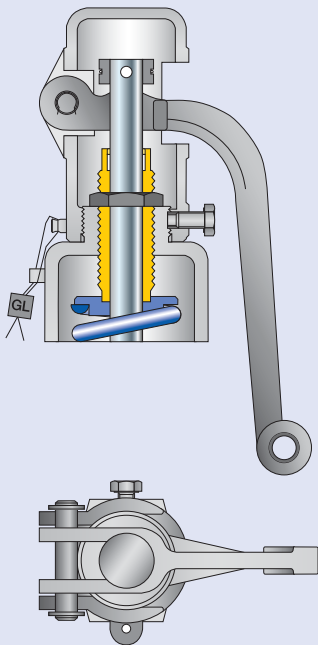
Cap H2



Lifting device H4

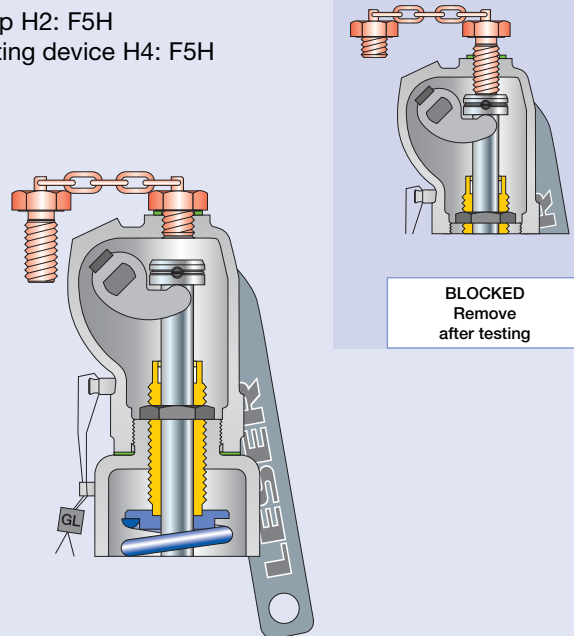


Plain lever H3



Test gag

Cap H2: F5H
Lifting device H4: F5H



BLOCKED
Remove
after testing

Test Tag

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

The test tag 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!

Type 459 IC NACE-Compliant Safety Valves

General requirements for safety valves in sour gas service

Media such as sour gas, which is especially common in oil and gas production, can have a corrosive effect on safety valves. The National Association of Corrosion Engineers (NACE) is a global association that deals with the development of corrosion control measures and defines these in standards such as NACE MR0175 and NACE MR0103. Both of these standards identify requirements for metallic materials used for piping and related components, to include safety valves, in the oil and gas industry.

The aim here is to protect the environment from escaping media. The focus is on the prevention of various types of corrosion (e.g. sulfur-induced stress corrosion cracking) of used materials that can be caused by acidic media.

Both standards define the maximum material hardness for prevention of corrosion damage because hardness increases corrosion resistance. NACE MR0175 provides requirements for materials used in oil and gas extraction (upstream) whereas NACE MR0103 specifies less stringent requirements for materials used in refinery processes (downstream).

Various components of LESER safety valves can be constructed in corrosion resistant materials using a level concept. This way, LESER can offer efficient safety valve solutions according to the requirements of NACE MR0175 and NACE MR0103 for different application conditions.

Norms

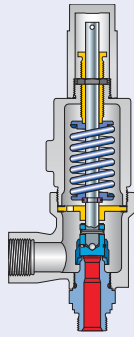
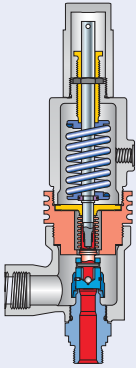
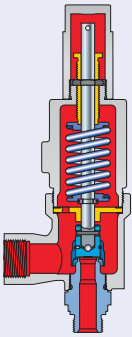
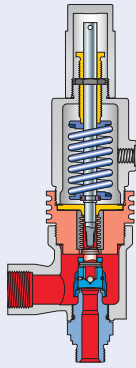
NACE MR0175/ISO15156 – 2003

1 Scope: This part of NACE MR0175/ISO 15156 describes general principles and gives requirements and recommendations for the selection and qualification of metallic materials for service in equipment used in oil and gas production and in natural gas sweetening plants in H₂S-containing environments, where the failure of such equipment could pose a risk to the health and safety of the public and personnel or to the environment.

NACE MR0103 – 2012

- 1.1.1: This standard establishes material requirements for resistance to SSC in sour petroleum refining and related processing environments containing H₂S either as a gas or dissolved in an aqueous (liquid water) phase with or without the presence of hydrocarbon.
- 1.1.2: Specifically, this standard is directed at the prevention of SSC of equipment (including pressure vessels, heat exchangers, piping, valve bodies, and pump and compressor cases) and components used in the refining industry.

Works standard: LDeS 3001.91

	Level 1		Level 2	
Part denition	Contact with the medium in closed position		Contact with the medium in opened position	
	Conventional	Balanced bellows	Conventional	Balanced bellows
Contact area				
Safety valve operation	closed		opened	
Parts concerned	Inlet body, disc	Inlet body, disc	all	Inlet body, disc, bonnet spacer, bellows

LESER already uses NACE compliant materials as standard for many of its components. This means that material adjustments are required for only certain components - these are listed in the table below.

Necessary material modification NACE MR0175/ISO 15156 – 2003 (Option code F1U) and NACE MR0103 – 2012 (Option code F1U)						
Type	Design	Part	Material	Option code	Material	Option code
459IC	Conventional	Spring	No modification required		2.4669 / Inconel X-750	X08
	Balanced bellows	Balanced bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78

Type 459 IC

Type of sealing

Types 459 – Soft seal

LESER soft seal solutions allow for superior tightness.

Features and benefits

- two different designs for a wide variety application
- large selection of soft seal materials to best adapt to the application
- increased service life of sealing surfaces compared to a metal to metal seat
- simple replacement of the soft seal reduces maintenance costs
- standard ARP O-ring sizes for easy worldwide procurement
- one standard durometer per O-ring material for all set pressures to reduce stocking expenses

Series 459 IC	
O-ring disc	
Design	
Requirements	<p>superior tightness maintained tightness close to the set pressure Pressure range: 0.5 - 250 bar, 7.3 - 3626 psig</p>
Example application	Gas storage tanks

Subassembly of the disc (item 7)		
Disc	Item 7.1	1.4404
		S A 479 316L
Soft seal Materials refer to next page	Item 7.4	O-ring
Lifting aid	Item 7.2	1.4404
		316L
Retaining clip	-	-
	-	-
Pin	Item 7.5	1.4310
		S tainles s s teel

For temperature limits and medium resistance please refer to the soft seal material selection, page 17

Type 459 IC Soft seal selection

Abbreviation ASTM 14	Trade name (Designation)	Code letter ¹⁾	Option- code	T _{min}		T _{max}		Application ²⁾
				[°C]	[°F]	[°C]	[°F]	
O-ring								
CR: FW3	Neoprene®	K	J21	-40	-40	100	212	Paraffins, mineral oils, silicon oils and greases, water and aqueous solutions, refrigerants, ozone
EPDM: FW9	Buna-EP® (Ethylene-Propylene-Diene)	D	J22	-45	-49	150	302	Hot water and hot steam up to 150 °C, 302 °F, many organic and inorganic acids, silicon oils and greases FDA conforming compound
FKM: FW1	Viton® (Fluorocarbon)	L	J23	-20	-4	180	356	High temperatures (not hot steam), mineral oils and greases, silicon oils and greases, plant and animal oils and fats, ozone FDA conforming compound on request
FFKM: FW2	Kalrez® (Perfluor)	C	J20	0	32	250	482	Almost all chemicals, standard compound is Kalrez® 6375 with steam resistance FDA conforming compound on request

¹⁾ The code letters are stamped on the disc (Item 1)

²⁾ The pressure and temperature application range must be observed in all cases. The chemical resistance is based on specifications from the soft seal manufacturer. LESER assumes no guarantee.

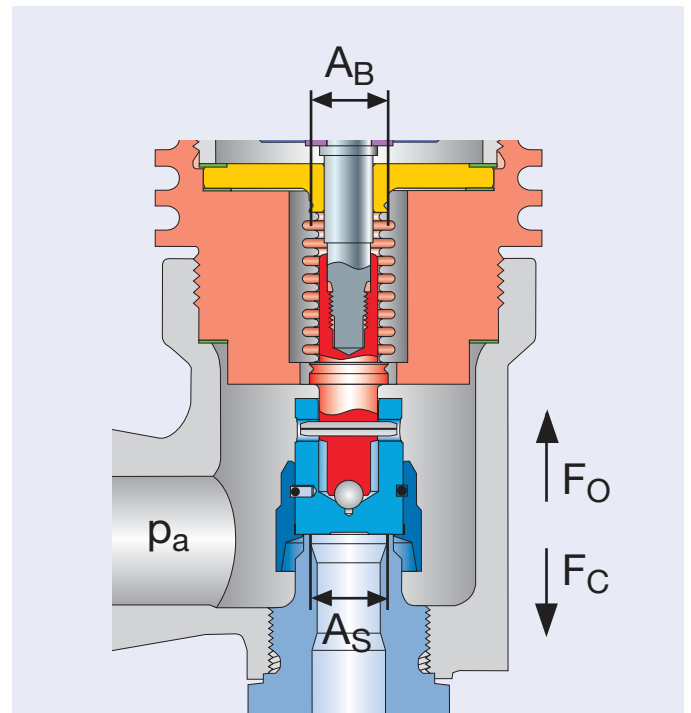
Balanced bellows – Subassembly item 15

Balanced bellows are generally used for two applications:

- to compensate for back pressure
- to seal off the bonnet from the outlet chamber

Compensation for back pressure

The back pressure acts on the reverse side of the disc, creating a force in the closing direction (F_c). The balanced bellows constitutes an area equal to the seat area, creating a force acting in the opening direction (F_o), thus compensating the force in closing direction.



A quantitative representation is shown in the table below:

Actual area	Back pressure	Actual force	Direction of force	Compensation criteria
Seat area = A_s	p_a	$F_c = p_a \times A_s$	closing	$A_s = A_B$
Bellows area = A_B	p_a	$F_o = p_a \times A_B$	opening	$F_c = F_o$

LESER Series 459 is the first safety valve line in the world to offer stainless steel bellows in sizes less than an API D orifice. The stainless steel bellows was designed to compensate for back pressure in the valve size $A_o = 133 \text{ mm}^2 / 0.206 \text{ inch}^2$, but the same design is also used in the smaller $A_o = 63.9 \text{ mm}^2 / 0.099 \text{ inch}^2$ and $A_o = 241 \text{ mm}^2 / 0.689 \text{ inch}^2$ sizes. For this reason, the bellows do not completely balance the smaller orifice size.

Type 459 IC

Sealing the bonnet from the outlet chamber

LEASER's balanced bellows reliably seal the bonnet from the outlet chamber; protecting the guide, moving parts and the spring

from problems associated with the media, such as dirt, corrosion, impurities of temperature.

Material and design

LEASER Series 459 with balanced bellow is constructed with a bonnet spacer incorporated. The spacer helps to cool the bellows as well as shield it from turbulences during discharge, which reduces bellows vibration and guarantees a longer service life. Standard material of LESER balanced bellows is stainless steel 1.4571 / 316Ti. Other bellows materials like

Hastelloy® or Inconel® are available as well. A control thread DIN ISO 228-1 size G¼" is fitted into the bonnet to monitor the condition of the bellows.

A discharge pipe can be fitted to the G¼" control thread to allow safe discharge of aggressive or toxic fluids.

Option codes

Bellows design	Standard	High pressure
Set pressure range	p ≤ 40 bar / 580 psig	p > 40 bar / 580 psig
Option code	J78	J78

The dimensions and weights of a safety valve with balanced bellows are displayed in the tables "Dimensions and weights" for each type. The set pressure range as well as the temperature range are displayed in the tables "Pressure temperature ratings" for each types.

Balanced bellows - Subassembly item 15

Materials

Item	Component	Series 459 IC
8	Upper adaptor	1.4404
		316L
11	Bonnet spacer	1.4404
		316L
15.1	Lower adaptor	1.4404
		316L
15.3	Bellows	1.4571
		316Ti
60	Gaskets	Non Asbestos / Graphite / 1.4401
		Non Asbestos / Graphite / 316

Hastelloy bellows or special materials are available on request.

INCONEL X-750 spring

LEASER offers the spring material INCONEL X-750 / 2.4669 as an Option of Series 459 for all valve sizes and the complete pressure range.

Applications

INCONEL X-750 is recommended in the following applications:

- **Sour gas applications acc. to NACE MR 0175 and NACE MR 0103:**

if NACE conditions are present at the outlet of the safety valve (NACE Level 2) and no balanced bellows are used. INCONEL X-750 is a spring material which is recommended in the NACE standards.

- **High temperature applications:**

INCONEL X-750 allows higher operating temperatures than other standard spring materials which are often the

restricting components. Thus, the full temperature range of the valve type can be utilized.

- Highly corrosive applications:

applications that require a spring material with a corrosion resistance superior to that of stainless steel, e.g. seawater applications.

Option Code

Option code X08: Spring material INCONEL X-750

Ordering

The option code for ordering is X08. Spring part numbers and pressure limits can be taken from the actual spring charts LGS 3608.

Type 459 IC



Type 459 IC -
designed for thermal
applications in Oil &
Gas Industry which
complements API 526

Other products



Type 526 IC

Flanged safety relief valves with “UV” stamp, Designed as per API 526 and ASME Sec. VIII. Also available with IBR and CCoE Certificate.



Type 441 IC

Flanged standard pressure series suitable for steam, gas and liquid service. They have proven themselves as a universal safety valve for many applications. IBR & CCoE approved.



Type 237 IC

For all smaller capacity applications of steam, gases and liquids. Available with “UV” Stamp, IBR and CCoE approval.

How to contact LESER India

Head office in Mumbai

136/137, Sanjay Bldg. No. 3, Mittal Estate
Marol, Andheri Kurla Road,
Andheri (E), Mumbai - 400 059
India
Telephone: +91 22 28532200
E-mail: info@leser.co.in
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
www.leser.co.in



Type 459 IC

Edition April 2019

LESER

The-Safety-Valve.com