



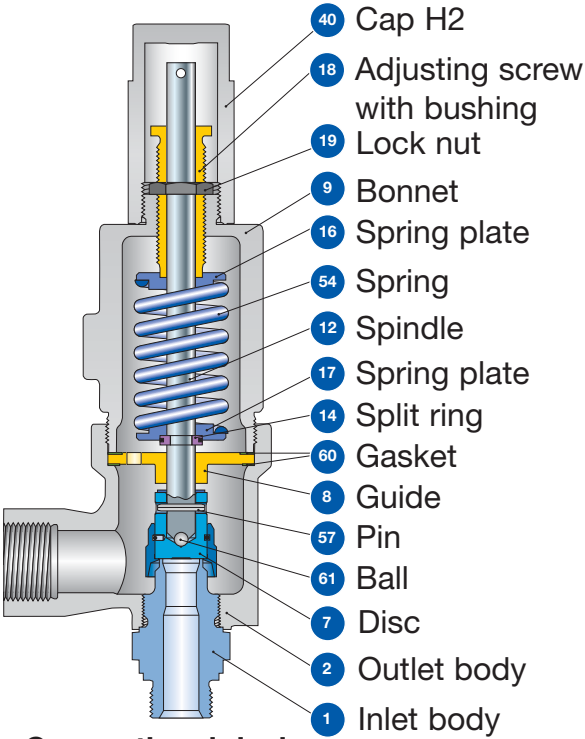
Type 459 HDD

Type 459 HDD
Cap H2

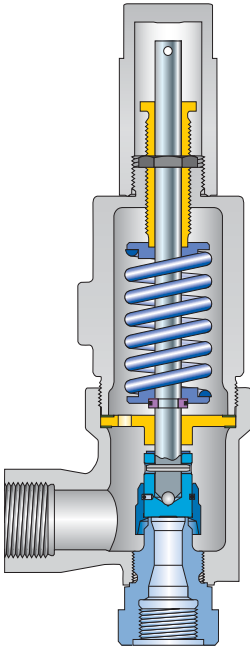
Type 459 HDD
Safety Relief Valves

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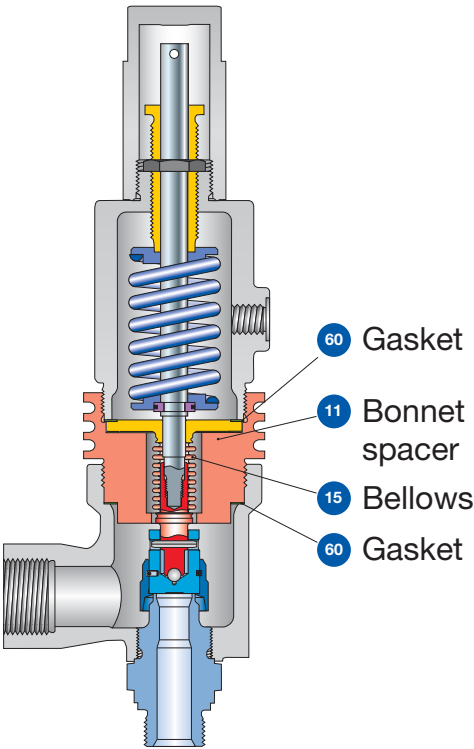
Type 459 HDD
Designs



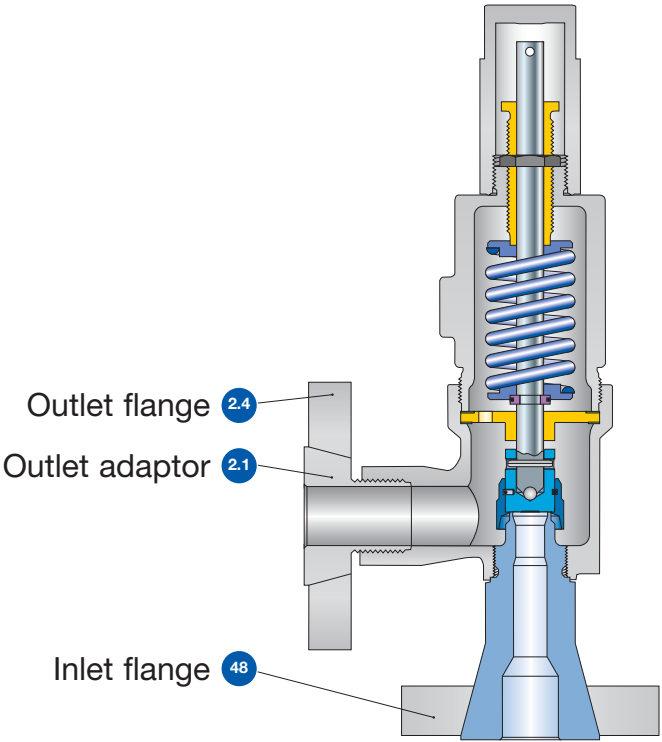
Conventional design
Threaded connection



Conventional design
Threaded connection



Balanced bellows
Threaded connection



Conventional design
Flange connection

Type 459 HDD

Type 459 HDD

Materials

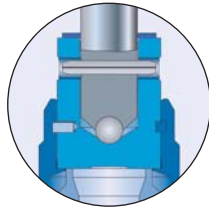
Item	Component	Design	Type 4594 HDD
1	Base / Inlet body	Threaded connection	1.4404 stelled SA 479 316L stelled
		Flange connection	1.4404 stelled SA 479 316L stelled
2	Outlet body		1.4408 CF8M
2.1	Outlet adaptor	Flange connection	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L
7	Disc	Metal seat	1.4404 stelled SA 479 316L stelled
			1.4404 316L
8	Guide		1.4404 316L
		Balanced bellows design	1.4404 / SA 316L Upper connection of balanced bellows
9	Bonnet		1.4408 CF8M
		Balanced bellows design	1.4408 CF8M
11	Bonnet spacer	Balanced bellows design	1.4404 316L
			1.4404 316L
12	Spindle		1.4404 316L
		Balanced bellows design	1.4404 316L
14	Split ring		1.4404 316L
			1.4571 316Ti
15	Bellows	Balanced bellows design	1.4404 316L
16/17	Spring plate		1.4404 316L
			1.4404 / PTFE 316L / PTFE
18	Adjusting screw with bushing		1.4404 316L
19	Lock nut		1.4404 316L
			1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L
			1.4310 Stainless steel
54	Spring	Standard	1.4310 Stainless steel
			1.4310 Stainless steel
57	Pin		1.4310 Stainless steel
			Graphite / 1.4301 Graphite / 316L
60	Gasket		1.4401 316
61	Ball		1.4401 316

Please notice:

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

Type 459 HDD

Article numbers



Metal seat

Actual Orifice diameter d_0 [mm]		6 ¹⁾		9	
Actual Orifice area A_0 [mm ²]		28.3		63.9	
Actual Orifice diameter d_0 [inch]		0.236		0.354	
Actual Orifice area A_0 [inch ²]		0.044		0.099	
Body material: 14404 (316L)					
Outlet body	1.4408	H2	Art. No. 4594.	2132	2142
	CF8M				
Bonnet	1.4404	H4	Art. No. 4594.	2134	2144
	1.4408				
	<u>p [bar_g]</u>				
<u>p [psig]</u>	6091 – 12328	3626 – 6091			

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

Type 459 HDD

Dimensions and weights

Threaded connections [Metric units]

Size Outlet body	1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"
Actual Orifice diameter d_0 [mm]	6	6	6	9	9	9
Actual Orifice area A_0 [mm ²]	28.3	28.3	28.3	63.6	63.6	63.6
Weight [kg]	3.1	3.1	3.1	3.1	3.1	3.1
Balanced bellows [kg]	3.9	3.9	3.9	3.9	3.9	3.9
Required installation diameter d [mm]	165	165	165	165	165	165

Inlet thread female

Size outlet body	1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"		
Actual Orifice diameter d_0 [mm]	6	6	6	9	9	9		
Center to face / Height								
DIN ISO 228-1 G	Inlet a		53	53	62*)	53	56	62
ASME B1.20.1 NPT	Outlet b		75	75	75*)	75	75	75
Center to face [mm]	H max.		283	286	292*)	283	286	292
Height [mm]	Balanced bellows H max.		315	318	342*)	315	318	324
ISO 7-1/BS 21 Rc	Inlet a		53	56	64	53	56	64
Center to face [mm]	Outlet b		75	75	75	75	75	75
Height [mm]	H max.		283	286	294	283	286	294
	Balanced bellows H max.		315	318	326	315	318	326

Inlet thread male

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

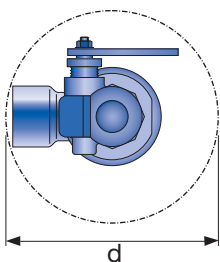
Height [mm]

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

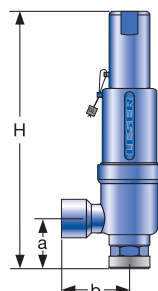
Length of screwed end c [mm]

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

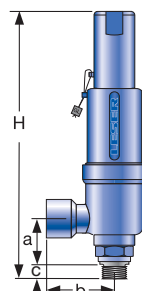
*) DIN ISO 228-1 G not possible.



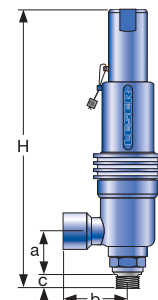
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459 HDD

Dimensions and weights

Threaded connections [US units]

Size Outlet body	1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"
Actual Orifice diameter d_0 [inch]	0.236	0.236	0.236	0.354	0.354	0.354
Actual Orifice area A_0 [inch ²]	0.044	0.044	0.044	0.099	0.099	0.099
Weight [lbs]	6.8	6.8	6.8	6.8	6.8	6.8
Balanced bellows [lbs]	8.6	8.6	8.6	8.6	8.6	8.6
Required installation diameter d [inch]	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2

Inlet thread female

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

Inlet thread male

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

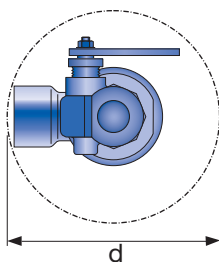
Height [inch]

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

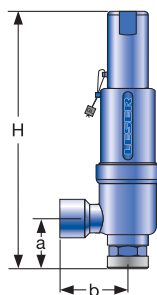
Length of screwed end c [inch]

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

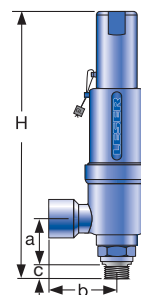
*) DIN ISO 228-1 G not possible.



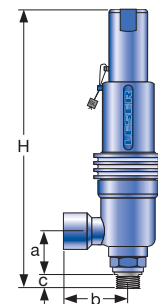
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459 HDD

Dimensions and weights

Flanged connections [Metric units]

	Conventional design		Balanced bellows	
Actual Orifice diameter d_0 [mm]	6	9	6	9
Actual Orifice area A_0 [mm ²]	28.3	63.6	28.3	63.6

DIN EN 1092-1 (Available flange sizes refer to page 09/07)

Flange rating PN 40 – PN 400						
Center to face	[mm]	Inleta	100	100	100	100
		Outlet b	100	100	100	100
Height	[mm]	H max.	330	330	375	375

ASME B 16.5 (Available flange sizes refer to page 09/07)

Flange rating class 150 – 2500						
Center to face	[mm]	Inlet a	100	100	100	100
		Outlet b	100	100	100	100
Height	[mm]	H max.	330	330	375	375

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

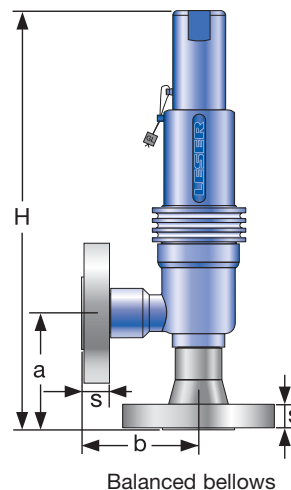
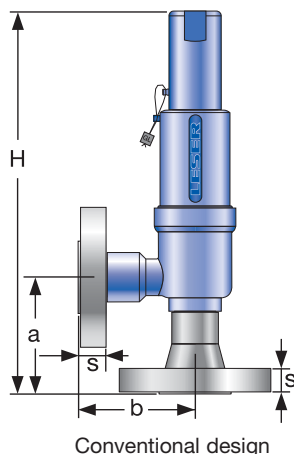
Weight

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

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

Flange dimensions

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



Type 459 HDD

Dimensions and weights

Flanged connections [US units]

	Conventional design		Balanced bellows	
Actual Orifice diameter d_0 [inch]	0.236	0.354	0.236	0.354
Actual Orifice area A_0 [inch ²]	0.044	0.099	0.044	0.099

DIN EN 1092-1 (Available flange sizes refer to page 09/07)

Flange rating PN 40 – PN 400				
Center to face [inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
	Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height [inch]	H max.	13	13	$14^{3}/_{4}$

ASME B 16.5 (Available flange sizes refer to page 09/07)

Flange rating class 150 – 2500				
Center to face [inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
	Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height [inch]	H max.	13	13	$14^{3}/_{4}$

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

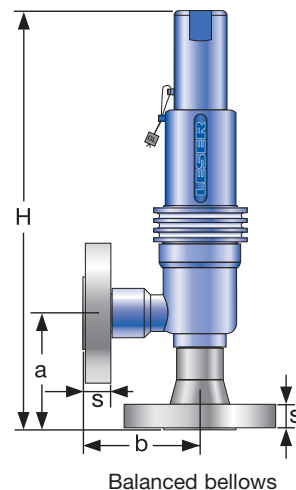
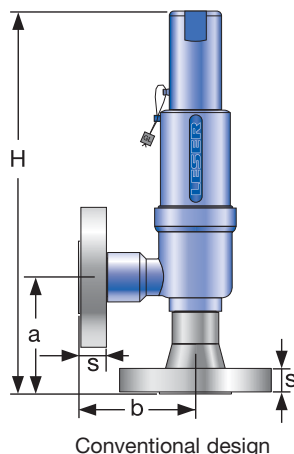
Weight

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

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

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



Type 459 HDD

Pressure/temperature ratings

[Metric units + US units]

Metric units

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

US units

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

¹⁾ For DIN EN applications at temperatures under -200 °C / -328 °F please proceed in accordance to AD-2000 Merkblatt W10.

• Load case II: under -200 °C / -328 °F to -255 °C / -427 °F, $p_{max} = PN \times 0.75$

• Load case III: under -255 °C / -427 °F to -273 °C / -459 °F, $p_{max} = PN \times 0.25$

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

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

Type 459 HDD

Approvals

Actual Orifice diameter d_0 [mm]	6	9
Actual Orifice area A_0 [mm ²]	28.3	63.6
Actual Orifice diameter d_0 [inch]	0.236	0.354
Actual Orifice area A_0 [inch ²]	0.044	0.099
Europe		
		Coefficient of discharge K_{dr}
Approval No.	072021409Z0022/15/D/0135	
PED / DIN EN ISO 4126-1	S/G	0.81
	L	0.70
Germany		
		Coefficient of discharge α_w
Approval No.	TÜV SV 909	
PED / AD 2000-Merkblatt A2	S/G	0.81
	L	0.70
United States		
		Coefficient of discharge K
Approval No.	M 37112	
ASME Sec. VIII Div. 1	S/G	0.811
	Approval No.	M 37112
	L	0.566
Canada		
		Coefficient of discharge K
Approval No.	The current approval no. can be found at www.leser.com	
CRN	S/G	0.811
	L	0.566
China		
		Coefficient of discharge α_w
Approval No.	The current approval no. can be found at www.leser.com	
AQSIQ	S/G	0.81
	L	0.70
Eurasian Custom Union		
		Coefficient of discharge α_w
Approval No.	The current approval no. can be found at www.leser.com	
EAC	S/G	0.81
	L	0.70
Classification societies		
		Homepage
Bureau Veritas	BV	www.bureauveritas.com
DNV GL		www.dnvgl.com
Lloyd's Register EMEA	LREMEA	www.lr.org
Registro Italiano Navale	RINA	www.rina.org
U.S. Coast Guard	U.S.C.G	www.uscg.org
		The valid certification number is changed with every renewal.
		A sample certificate including the valid certification number can be found at www.leser.com