

# AIR VENTS AND LIQUID DRAINERS









# Armstrong Selecting The Armstrong Air/Gas Vent

With the desired CFM capacity known, find the orifice size required from the table on this page. Then find the vent or vents with the correct orifice size on pages 457, 459, 461 or 469 that will operate at the required pressure with a liquid of the specific gravity being handled.

Example—Find a model number that will vent 52 cfm of air (including safety factor of 1.5 - 2.0) from a liquid with a specific gravity of 0.93 at 250 psig. Using the table below, follow the 250 psig line across to the number 60.9. Orifice size is 5/32". Now go to pages 457, 459, 461 or 469 checking the 5/32" orifice lines to locate a vent for 250 psig or higher with 0.90 gravity liquid.

NOTE: Since specific gravity falls between 0.95 and 0.90, use 0.90 gravity data. The model 3-AV on page 456 is the one to use.

## For Venting During Filling Only

If a vent is required only for getting rid of air when a system is started up, such as when starting up a deep well pump or filling an empty pipe, tank or other vessel, ability of the vent to open at operating pressure can be ignored. In these cases, a model number with a large orifice for fast venting may be selected, **but the vent will not open after air is expelled and the system reaches operating pressure.** 



Where:

- V = Volume flow rate, ft<sup>3</sup>/min
- W = Mass flow rate, lb/min
- d = Density, 0.07494 lb/ft<sup>3</sup> at standard conditions
- C = Flow coefficient = 0.65
- A = Orifice area, in<sup>2</sup>
- P1 = Upstream pressure, psia
- P2 = Pressure at throat orifice or downstream pressure = greater of 0.53 P1 or 14.7 psia
- $T = Upstream temperature = 530^{\circ}R$
- Ref: Baumeister & Marks, Standard Handbook for Mechanical Engineers, 7th edition.

Discharg	Discharge of Air Through an Orifice in Standard Cubic Feet per Minute at a Standard Atmospheric Pressure of 14.7 psia and 70°F																					
pressure										Or	ifice D	iamete	r, inch	es								
psig	1/16	5/64	3/32	#38	7/64	1/8	9/64	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1-1/16
5	0.64	1.00	1.44	1.54	1.96	2.56	3.24	4.00	5.76	7.84	10.2	13.0	16.0	19.4	23.0	31.4	41.0	51.9	64.0	92.2	125	185
6	0.70	1.09	1.57	1.69	2.14	2.80	3.54	4.37	6.30	8.57	11.2	14.2	17.5	21.2	25.2	34.3	44.8	56.7	70.0	101	137	202
7	0.75	1.18	1.70	1.82	2.31	3.02	3.82	4.71	6.78	9.23	12.1	15.3	18.8	22.8	27.1	36.9	48.2	61.1	75.4	109	148	218
9	0.85	1.33	1.91	2.05	2.61	3.40	4.31	5.32	7.66	10.4	13.6	17.2	21.3	25.7	30.6	41.7	54.4	68.9	85.1	122	167	246
12	0.98	1.52	2.19	2.35	2.99	3.90	4.94	6.10	8.78	11.9	15.6	19.8	24.4	29.5	35.1	47.8	62.4	79.0	97.5	140	191	282
15	1.09	1.70	2.44	2.62	3.33	4.34	5.50	6.79	9.78	13.3	17.4	22.0	27.2	32.9	39.1	53.2	69.5	88.0	109	156	213	314
20	1.27	1.98	2.86	3.06	3.89	5.08	6.42	7.93	11.4	15.5	20.3	25.7	31.7	38.4	45.7	62.2	81.2	103	127	183	249	367
25	1.45	2.27	3.27	3.50	4.45	5.81	7.35	9.07	13.1	17.8	23.2	29.4	36.3	43.9	52.3	71.1	92.9	118	145	209	285	420
30	1.63	2.55	3.68	3.94	5.01	6.54	8.28	10.2	14.7	20.0	26.2	33.1	40.9	49.5	58.9	80.1	105	132	163	235	320	472
35	1.82	2.84	4.09	4.38	5.57	7.27	9.20	11.4	16.4	22.3	29.1	36.8	45.4	55.0	65.4	89.1	116	147	182	262	356	525
40	2.00	3.13	4.50	4.82	6.13	8.00	10.1	12.5	18.0	24.5	32.0	40.5	50.0	60.5	72.0	98.0	128	162	200	288	392	578
45	2.18	3.41	4.91	5.26	6.69	8.73	11.1	13.6	19.6	26.7	34.9	44.2	54.6	66.0	78.6	107	140	177	218	314	428	631
50	2.37	3.70	5.32	5.70	7.25	9.46	12.0	14.8	21.3	29.0	37.9	47.9	59.2	71.6	85.2	116	151	192	237	341	464	684
60	2.73	4.27	6.15	6.58	8.37	10.9	13.8	17.1	24.6	33.5	43.7	55.3	68.3	82.6	98.3	134	175	221	273	393	535	790
70	3.10	4.84	6.97	7.46	9.49	12.4	15.7	19.4	27.9	37.9	49.6	62.7	77.4	93.7	112	152	198	251	310	446	607	895
80	3.46	5.41	7.79	8.34	10.6	13.9	17.5	21.6	31.2	42.4	55.4	70.1	86.6	105	125	170	222	281	346	499	679	1 0 0 1
90	3.83	5.98	8.62	9.2	11.7	15.3	19.4	23.9	34.5	46.9	61.3	77.5	95.7	116	138	188	245	310	383	551	750	1 107
100	4.19	6.55	9.44	10.1	12.8	16.8	21.2	26.2	37.8	51.4	67.1	84.9	105	127	151	206	268	340	419	604	822	1 212
110	4.56	7.13	10.3	11.0	14.0	18.2	23.1	28.5	41.0	55.9	73.0	92.4	114	138	164	223	292	369	456	657	894	1 318
125	5.11	7.98	11.5	12.3	15.6	20.4	25.9	31.9	46.0	62.6	81.7	103	128	155	184	250	327	414	511	736	1 0 0 1	1477
150	6.02	9.41	13.6	14.5	18.4	24.1	30.5	37.6	54.2	73.8	96.4	122	151	182	217	295	385	488	602	867	1 181	1741
200	7.85	12.3	17.7	18.9	24.0	31.4	39.8	49.1	70.7	96.2	126	159	196	238	283	385	503	636	785	1 1 3 1	1539	2 269
250	9.68	15.1	21.8	23.3	29.6	38.7	49.0	60.5	87.1	119	155	196	242	293	348	474	620	784	968	1394	1897	2 798
300	11.5	18.0	25.9	27.7	35.2	46.0	58.3	71.9	104	141	184	233	288	348	414	564	737	932	1 151	1657	2 256	3 326
400	15.2	23.7	34.1	36.5	46.4	60.7	76.8	94.8	136	186	243	307	379	459	546	743	971	1228	1 517	2 184	2 973	4 383
500	18.8	29.4	42.4	45.3	57.6	75.3	95.3	118	169	231	301	381	471	569	678	922	1205	1525	1882	2 711	3 689	5 440
600	22.5	35.1	50.6	54.1	68.8	89.9	114	141	202	275	360	455	562	680	809	1 102	1439	1 821	2 248	3 237	4 406	6 497
750	28.0	43.7	62.9	67.4	85.6	112	142	175	252	343	447	566	699	846	1007	1370	1790	2 265	2 797	4 027	5 481	8 082
1000	37.1	58.0	83.5	89.4	114	148	188	232	334	455	594	751	928	1123	1336	1 818	2 375	3 006	3 711	5 344	7 273	10 725



1-AVC See-Thru Air Vent

For Pressures to 150 psig (7 barg) or Specific Gravity Down to 0.80

#### A See-Thru Body—So You'll Know When It's Working

Now, you can literally see what you've been missing—the early warning signs of a system problem. Since you'll know the operating condition of the air vent, you won't have to waste time and money scheduling maintenance that isn't needed. In other words, you will be able to react to a condition before it becomes a problem.

A simple ball float mechanism requiring no electricity to operate, the new Armstrong 1-AVC discharges automatically only when air/gas are present. That means no liquid loss as with manual venting.

#### An Inside Look

See-thru body means you can observe changing conditions as they occur. See a problem in the making—instead of having to deal with it after the fact.

#### **Efficient Operation**

Simple ball float mechanism discharges only when air is present so it doesn't waste liquid.

#### **Positive Seating**

Free-floating valve mechanism assures positive seating so it prevents liquid loss. There are no fixed pivots to wear or create friction, and wear points are heavily reinforced for long life.

#### **Reduced Maintenance**

Stainless steel internals mean corrosion resistance and reduced maintenance.

#### **Corrosion Resistance**

Long-lasting polycarbonate body and reinforced nylon cap resist corrosion and provide long, trouble-free service life.

List of Materials									
Name of Part	Material								
Сар	Reinforced Nylon*								
Body	Polycarbonate								
O-Rings (Body Cap and Fitting)	Nitrile Elastomer Compound								
Float Lever and Screws	Stainless Steel								
Valve & Seat	Stainless Steel								
Fitting & Pipe Plug	Reinforced Nylon								
Retainer Ring	Zinc Plated Steel								

\*UV sensitive.

Physical Data						
	in	mm				
Inlet Connection	1/2, 3/4	15, 20				
Outlet Connection	1/2	15				
"A" Face-to-Face	3-1/2	89				
"B" Height	6-3/4	171				
"C" Bottom to Q	61	52				
Maximum Allowable Pressure	150 psig	g @ 150°F				
(Vessel Design)	(10 barg	@ 65°C)				
Maximum Operating Pressure	150 psig	(10 barg)				
Specific Gravity Range	1.00 to 0.80					
Weight, lb (kg)	1 (.	.45)				





How to Order

Inlet ①	Alternate Inlet ②	Outlet ③
3/4"	1/2"	1/2"
1/2" or 3/4"	1/2" or 3/4"	1/2"

NOTE: The Armstrong 1-AVC should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.

For a fully detailed certified drawing, refer to CD #1031.

Model 1-AVC Capacity											
Differentia	l Pressure	Orifice	a of m								
psig	barg	Size	scim	1119/111							
15	1.0		4.3	7.3							
30	2.0		6.5	11.0							
50	3.5		9.5	16.1							
75	5.0	1/8"	13.1	22.2							
100	7.0		16.9	28.7							
125	8.5		20.5	34.8							
150	10.5		24.2	41.3							

NOTE: Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).



**1-AVCW See-Thru Air Vent for Ozone Applications** 

For Pressures to 150 psig (10 barg) or Specific Gravity Down to 0.80

#### What Is Ozone?

Ozone is a gas that forms naturally during thunderstorms when lightning converts normal oxygen molecules  $(O^2)$  into ozone  $(O^3)$ . The fresh, sweet smell in the air after a storm is the smell of ozone. The unstable ozone molecule reacts rapidly with most substances and is an extremely strong natural oxidant.

#### How Is Commercial Ozone Produced?

Ozone can be formed by exposing air to ultraviolet light; however, the most common method of generating ozone is by passing air through an electrical discharge. Because ozone has strong oxidizing properties, its production requires corrosion-resistant equipment.

#### How Is Ozone Used in Water Filtration and Purification?

Because ozone is such an effective oxidant, it kills viruses, bacteria, mold, mildew, fungus and germs. Passing ozone through water achieves high purification rates without any chemical residue. Oxygen is the only by-product.

#### **Typical Customer Applications:**

- Purifying standing ground water in Third World countries.
- Conditioning water for poultry and livestock.
- Purifying water in the bottled water industry.
- Filtering and purifying water for process applications.

#### A See-Thru Body Shows You It's Working

Now, you can literally see what you've been missing. The Armstrong 1-AVCW See-Thru Air Vent lets you easily check its operating condition. You won't have to waste time and money scheduling maintenance that isn't needed, and you can quickly react to a condition before it becomes a problem.

#### **Efficient Operation**

Simple ball-float mechanism doesn't need electricity to operate. The air vent automatically discharges only when air or gas is present. No liquid is lost, as with manual venting.

#### **Positive Seating**

Free-floating valve mechanism ensures positive seating and prevents liquid loss. There are no fixed pivots to wear or create friction. Wear points are heavily reinforced for long life.

#### **Corrosion Resistance**

Long-lasting polycarbonate cap and body provides troublefree operation. T316 stainless steel internal parts resist corrosion and reduce maintenance.

#### **Compare-and Save the Difference**

Seeing really is believing–especially when you compare the Armstrong 1-AVCW See-Thru Air Vent with manual venting. Measure the time and money you can save with a more efficient, easier-to-maintain system. For more information or technical assistance, contact your local Armstrong Representative.

NOTE: The Armstrong 1-AVCW should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.



List of Materials	
Name of Part	Material
Сар	Polycarbonate
Body	Polycarbonate
O-Rings (Body Cap and Fitting)	Aflas
Float Lever and Screws	T316 Stainless Steel
Valve & Seat	T316 Stainless Steel
Fitting	Polycarbonate
Retainer Ring	Zinc Plated Steel

Physical Data						
	in	mm				
Inlet Connection (In Body)	3/4	20				
Inlet Connection (Alternate)	1/2	15				
Outlet Connection	1/2	15				
"A" Face-to-Face	3-1/2	89				
"B" Height	6-13/16	172				
"C" Bottom to Q	6	152				
Maximum Allowable Pressure (Vessel Design)	150 psig (10 barg	@ 150°F @ 66°C)				
Maximum Operating Pressure	150 psig	(10 barg)				
Specific Gravity Range	1.00 to 0.80					
Weight, lb (kg)	1 (.5)					

Model 1-AVCW Capacity											
Differentia	I Pressure	Orifico Sizo	a of m	ma <sup>3</sup> /la r							
psig	barg	Office Size	scim	m /nr							
15	1.0		4.3	7.3							
30	2.0		6.5	11.0							
50	3.5		9.5	16.1							
75	5.0	1/8"	13.1	22.2							
100	7.0		16.9	28.7							
125	8.5		20.5	34.8							
150	10.5		24.2	41.3							

**NOTE:** Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).



# Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40





Armstrong free floating lever Air/Gas Vents use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service.

Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for vent size and weight. The hemispherical valve, seat and leverage are identical in design, materials and workmanship to those for saturated steam service up to 1 000 psig, with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.



**1-AV**—A cast iron air vent that uses a positive-closing free floating lever to ensure leaktight closing under all conditions. This vent is good for low capacity air/gas venting up to 300 psig.

#### For a fully detailed certified drawing, refer to CD #1070.

**2-AV, 3-AV and 6-AV**—Cast iron vents using the same proven free floating lever mechanisms used in Armstrong steam traps. For applications where high air/gas venting capacity is required up to 250 psig.

#### For a fully detailed certified drawing, refer to CD #1034.

Physical Data															
Medal Na	Cast Iron														
Model No.	1-AV	**	2-/	AV	3-	AV	6-AV								
Dine Competing	in	mm	in mm		in	mm	in	mm							
Pipe Connections	1/2*, 3/4*	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25	1-1/2, 2	40, 50							
"A"	3-3/4	89	5-1/4	133	6-3/8	162	10-3/16	259							
"В"	5-1/2	140	8-3/4	222	11-1/2	292	18	457							
"D"	-	-	5-1/8	130	7	188	9-3/8	238							
"К"	13/16	21	-	-	-	-	-	-							
"L"	-	-	2-7/16	62	2-7/8	73	4-5/8	-							
Weight, lb (kg)	4 (1.8	3)	12 (	5.5)	21 (9.5) 78 (35.5)										
Max. Allowable Pressure (Vessel Design)	300 psig @ 200°F ( 250 psig @ 450°F (	21 barg @ 93°C ) 17 barg @ 232°C)	250 psig @ 450°F (17 barg @ 232°C)												

\*Outlet connection 1/4" (7 mm). \*\*1-AV available with side connection if specified on order. On models 2-AV, 3-AV and 6-AV, pipe size of side connections is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.

List of Materials											
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Bolts	Nuts				
1-AV						ASTM A193 Gr. B7					
2-AV		Chaimlean Chaol		ASTM A48			ASTM A563				
3-AV		Stamess Steel		Class 30	Non-aspestos	SAE Gr. 2	Gr. A				
6-AV				Cast non							



Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40

1-AV Maximum Operating Pressures									
Minimum Specific Gravity	0.80								
Orifice Size (in)	Maximum Operating Pressure								
Orifice Size (in)	psig	barg							
1/8	146	10							
7/64	173	12							
#38	219	15							
5/64	300	21							

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2-AV Maximum Operating Pressures																						
Specific Gravity*	Specific Gravity* 1.00		0.9	95	0.9	0.90		0.85		0.80		75	0.70		0.65		0.60		0.55		0.50	
Float wt., oz (g) 7.7 (217)		7.3 (2	206)	6.9 (195)		6.5 (	(184)	6.1 (174)		5.7 (	163)	3) 5.4 (152)		5.0	(141)	4.6 (130)		4.2 (119)		3.8 (109)		
Orifice Size (in)		Maximum Operating Pressure																				
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	27	1.8	25	1.8	24	1.7	23	1.6	22	1.5	20	1.4	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	44	3.0	42	2.9	40	2.7	38	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	97	6.7	92	6.4	88	6.0	83	5.7	78	5.4	73	5.0	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	167	12	159	11	151	10.4	142	9.8	134	9.3	126	8.7	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	250	17	250	17	250	17	244	17	230	16	216	15	202	14	187	13	173	12	159	11	145	10.0
7/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	240	17	222	15	204	14	186	13
#38	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	231	16
5/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

3-AV Maximum Operati	ng Pre	ssures																
Specific Gravity*	1.0	00	0.	95	0.9	90	0.	85	0.	80	0.	75	0.	70	0.	65	0.0	60
Float wt., oz (g)	14.9	(423)	14.2	(402)	13.4	(381)	12.7	(360)	12.0	(339)	11.2	(318)	10.5	(296)	9.7 (	275)	9.0 (	254)
Orifice Size (in)								Maximu	ım Ope	rating F	ressure	3						
Office Size (iii)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	21     1.5     20     1.4       45     3.1     43     3.0		41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9		
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	250	206     14     196     13       250     17     250     17				17	250	17	249	17	234	16	218	15	203	14	188	13
5/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

6-AV Maximu	m Op	oerati	ng P	ressı	ires																					
Specific Gravity*	1.0	00	0.	95	0.9	90	0.	85	0.	80	0.	75	0.	70	0.	65	0.	60	0.	55	0.!	50	0.	.45	0.	40
Float wt., oz (g)	73 (2 (	3.5 )84)	69 (1 9	9.8 179)	66 (1 8	5.2 375)	62 (17	2.5 771)	58 (1 6	3.8 67)	55 (1 5	5. 1 63)	5 <sup>.</sup> (1 4	1.5  59)	47 (1 3	7.8 54)	4 (1 2	4.1 :50)	40 (1 1	).4 46)	36 (1 0	5.8 42)	33.1	(938)	29.4	(833)
											Max	kimur	n Ope	rating	Pres	sure										
Orifice Size (in)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9
3/8	250	17	250	17	250	17	250	17	250	17	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3
11/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	245	17	223	15	201	14	179	12
5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	230	16
9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.



Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40



Model 32-AV, 33-AV and 36-AV

**32-AV, 33-AV and 36-AV**—Forged steel vents using the same proven free floating lever mechanisms used in Armstrong steam traps.



For applications where high air/gas venting capacity is required up to 1 000 psig. Available with screwed, socketweld or flanged connections.

#### For a fully detailed certified drawing, refer to CD #1035.

List of Material	S					
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Bolting
32-AV						
33-AV		Stainless Steel		ASTM A105	Non-asbestos	Bolts ASTM A193 Gr. B7
36-AV				i orged Steel		NULS ASTIN A194 GI. 2H

Physical Data						
Medal No			Forged	l Steel		
Woder No.	32-	AV <sup>+</sup>	33-/	4V <sup>+</sup>	36-4	AV <sup>+</sup>
Pipe Connections	1/2, 3/4, 1	15, 20, 25	3/4, 1	20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	301
"В"	10-3/16	259	11-9/16	294	17-1/8	435
"D"	5-9/16	141	6-1/16	154	9	229
"К"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-7/8	98	6-1/16	154
Approx. Wt. lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allow. Pressure	600 psig @ 100°F	- (41 barg @ 38°C)		1 000 psig @ 100°	F (69 barg @ 38°C)	
(Vessel Design)	500 psig @ 750°F	(34 barg @ 399°C)		600 psig @ 750°F	( 41 barg @ 399°C)	

†Available in Type 316 SS. Consult factory. Pipe size of side connections if provided is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.



For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40

### **High-Temperature Service**

Maximum allowable working pressures of floats decrease at temperatures above 100°F. Allow for approximately:

- 10% decrease at 200°F
- 15% decrease at 300°F
- 20% decrease at 400°F

The float is not always the limiting factor, however. Consult with Armstrong Application Engineering if you have a high-temperature application that also requires maximum operating pressures.

## **Sour Gas Service**

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half of its normal value. Consult Armstrong Application Engineering for allowable working pressures.

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

32-AV Maximum O	peratin	g Press	ures													
Specific Gravity*	1.0	00	0.	95	0.9	90	0.	85	0.	80	0.	75	0.	70	0.	65
Float wt., oz (g)	11.8 (	(335)	11.2	(318)	10.6	(301)	10.0	(285)	9.4 (	268)	8.9	(251)	8.3 (	234)	7.7 (	218)
Orifico Sizo (in)							Maximu	ım Ope	rating P	ressure						
Office Size (iii)	psig	bsig barg psig barg 41 2.8 39 2.7			psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	41	2.8	39	2.7	37	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.9
1/4	68	4.7	64	4.4	61	4.2	58	4.0	54	3.7	51	3.5	47	3.3	44	3.0
3/16	149	10.3	142	9.8	134	9.3	127	8.8	120	8.2	112	7.7	105	7.2	97	6.7
5/32	257	18	244	17	231	16	219	15	206	14	193	13	180	12	168	12
1/8	439	30	417	29	396	27	374	26	352	24	330	23	309	21	287	20
7/64	562	39	534	37	506	35	478	33	450	31	423	29	395	27	367	25
#38	600	41	600	41	600	41	595	41	561	39	526	36	491	34	457	31
5/64	600	41	600	41	600	41	600	41	600	41	600	41	600	41	600	41

33-AV Maximum Opera	ting Pr	essure	S															
Specific Gravity*	1.0	00	0.	95	0.	90	0.	85	0.8	80	0.	75	0.	70	0.	65	0.0	60
Float wt., oz (g)	14.9	(423)	14.2	(402)	13.4	(381)	12.7	(360)	12.0	(339)	11.2	(318)	10.5	(296)	9.7 (	275)	9.0 (	254)
Orifico Sizo (in)							М	aximur	n Ope	rating	Pressu	re						
Orifice Size (in)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	21     1.5     20     1.4       45     3.1     43     3.0			41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9	
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20
1/8	900	62	900	62	883	61	835	58	787	54	739	51	691	48	643	44	595	41
7/64	900	62	900	62	900	62	900	62	900	62	900	62	883	61	822	57	760	52

36-AV N	/laxim	um C	Operat	ting l	Pressu	ires																				
Specific Gravity*	1.0	0	0.9	15	0.9	0	0.8	85	0.8	30	0.7	75	0.7	70	0.6	65	0.6	60	0.!	55	0.5	50	0.	45	0.4	40
Float wt.,	73	.5	69	.8	66.	2	62	.5	58	8.8	55	5.1	51	.5	47.8	8 (1	44	.1	40	).4	36	.8	33	3.1	29	).4
oz (g)	(2 0	84)	(1 97	79)	(1 87	75)	(17	71)	(16	67)	(15)	63)	(14	59)	35	64)	(1 2	50)	(1 1	46)	(10	42)	(93	38)	(83	33)
Orifice											Maxi	mum	Opera	ting F	ressur	re										
Size (in)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9
3/8	331	23	315	22	299	21	282	19	266	18	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3
11/32	441	30	419	29	398	27	376	26	354	24	332	23	310	21	288	20	266	18	245	17	223	15	201	14	179	12
5/16	567	39	539	37	511	35	483	33	455	31	427	29	399	27	371	26	342	24	250	17	250	17	250	17	230	16
9/32	743	51	706	49	669	46	633	44	596	41	559	39	522	36	485	33	449	31	250	17	250	17	250	17	250	17
1/4	1 0 0 0	69	1000	69	979	67	925	64	871	60	817	56	763	53	710	49	656	45	250	17	250	17	250	17	250	17
7/32	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	1000	69	926	64	250	17	250	17	250	17	250	17
3/16	1 000	69	1000	69	1000	69	11000	69	1000	69	1000	69	1 000	69	1000	69	11000	69	250	17	250	17	250	17	250	17

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.



# Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50







Model 22-AV and 13-AV



The Armstrong stainless steel free floating lever air vents have been developed to provide positive venting of air/ gases under pressure.

The body and cap and all working parts of the No. 11-AV, 22-AV and 13-AV are made of high strength, corrosion resistant stainless steel. Body and caps are welded together to form a permanently sealed, tamperproof unit with no gaskets. Elliptical floats and high leverage provide up to 115 SCFM capacity for these compact air/gas vents. Lever action is guided to assure proper seating of the valve under all operating conditions.

**11-AV, 22-AV and 13-AV**—All stainless steel construction where exposure to either internal or external corrosion is a problem. These air/gas vents have the same proven free floating mechanisms used in other Armstrong steam traps. Pressures to 600 psig @ 100°F (41 barg @ 38°C).

For a fully detailed certified drawing, refer to list below: 11-AV CD #1066 13-AV and 22-AV CD #1086

Physical Data						
Model No.	11-A	V	22-/	AV	13-4	AV
Pipe Connections	1/2, 3/4**	15, 20**	3/4	20	1	25
"A"	2-3/4	70	3-7/8	99	4-1/2	114
"В"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	_	-	3-3/8	86	6-1/8	156
"К"	9/16	14	7/8	22	1-3/16	30
"L"	_	_	2-5/8	67	3-1/4	83
Weight, lb (kg)			5 (2	3)	7-1/2	(3.4)
Max. Allow. Pressure	500 psig @ 100°F (	34 barg @ 38°C)	600 psig @ 100°F	(41 barg @ 38°C)	570 psig @ 100°F	(39 barg @ 38°C)
(Vessel Design)	440 psig @ 500°F (3	30 barg @ 260°C)	475 psig @ 500°F (	33 barg @ 260°C)	490 psig @ 500°F (	34 barg @ 260°C)

\*\* 1/2" (15 mm) outlet.

List of Ma	aterials			
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
11-AV	Hardened	202/204	204	
22-AV	chrome	Stainless	Stainless	Sealed Stainless
13-AV	steel—17- 4PH	Steel	Steel	Steel 304-L

\*Type 316 SS valve and seat available. Consult factory.



Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

11-AV Maximum Operating	Pressures			
Minimum Specific Gravity	0.75	5	0.	50
Float wt., oz (g)	2.90 (82) S	tandard	2.08 (59	) Special
	Maxin	num Opera	ating Press	sure
Orifice Size (in)	psig	barg	psig	barg
1/8	178	12	118	8
#38	267	18	177	12
5/64	400	28	311	21

22-AV Maximum Opera	ating	Press	ure																			
Specific Gravity*	1.0	00	0.	95	0.9	90	0.	85	0.	80	0.	75	0.	70	0.0	65	0.	60	0.	55	0.	50
Float wt., oz (g)	10.0	(282)	9.5 (	268)	9.0 (	254)	8.5	(240)	8.0 (	226)	7.5 (	212)	5.4	(152)	5.0	(141)	4.6	(130)	4.2	(119)	3.8	(109)
Orifico Sizo (in)									Ma	aximur	n Ope	rating	Press	ure								
Office Size (iii)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	57	3.9	54	3.7	51	3.5	49	3.4	46	3.2	43	3.0	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	126	8.7	120	8.2	113	7.8	107	7.4	101	7.0	95	6.5	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	217	14.9	206	14.2	195	13.5	185	12.7	174	12.0	163	11.2	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	371	25.6	352	24.3	334	23.0	316	21.8	297	20.5	279	19.2	202	13.9	187	12.9	173	12.0	159	11.0	145	10.0
7/64	474	32.7	451	31.1	427	29.5	404	27.9	380	26.2	357	24.6	258	17.8	240	16.5	222	15.3	204	14.0	186	12.8
#38	590	40.7	561	38.7	532	36.7	503	34.7	473	32.7	444	30.6	321	22.1	298	20.6	276	19.0	253	17.5	231	15.9
5/64	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	473	32.6	440	30.3	407	28.1	374	25.8	341	23.5

13-AV Maximum O	peratin	g Pres	sures															
Specific Gravity*	1.0	00	0.	95	0.	90	0.	85	0.	80	0.	75	0.	70	0.	65	0.	60
Float wt., oz (g)	14.9	(423)	14.2	(402)	13.4	(381)	12.7	(360)	12.0	(339)	11.2	(318)	10.5	(296)	9.7 (	275)	9.0	254)
Orifico Sizo (in)								Maximu	ım Ope	rating P	ressure							
Office Size (iii)	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20
1/8	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39
7/64	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.



High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49



The Armstrong High Leverage Series of Air Relief traps were developed especially for venting gases from low specific gravity fluids at high pressures. They use standard Armstrong forged steel bodies with very high leverage air relief mechanisms. Available with screwed, socketweld or flanged connections.

**NOTE:** Models 2313-HLAR, 2316-HLAR, 2413-HLAR and 2415-HLAR are also available with cast T-316 stainless steel body and all-stainless steel internals. Consult factory.

#### Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half its normal value. Consult Armstrong Application Engineering for allowable working pressures.

Physical D	nysical Data—High Leverage Ball Float Type Air Relief Traps																	
Model No.	2313-1	HLAR⁺	2315-ł	HLAR	2316-ł	HLAR	2413-	HLAR⁺	2415-ł	HLAR	2416-H	LAR	25133G	-HLAR	25155G	-HLAR	26155G	-HLAR
Dine	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Connections	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32	1, 1-1/4	25, 32
"A"	8	203	9-3/4	248	11-7/8	302	8-5/8	219	10-3/4	273	12-1/2	318	8-1/2	216	10-3/8	263	11-3/4	298
"B"	11-9/16	294	15-1/16	383	17-1/8	435	11-7/8	302	15	381	17-3/4	451	14-1/4	362	16-7/32	412	24-1/8	613
"D"	6-1/16	154	7-13/16	198	9	229	5-3/8	137	7-1/4	184	9	229	3	75	4	102	5	127
"G"	5-1/8	130	6-7/8	175	8-3/8	213	5-3/8	137	6-7/8	175	8-5/8	219	5-3/4	146	7-3/8	187	8-3/8	213
"K"	1-7/16	37	1-3/4	44	2-1/8	54	1-7/16	37	1-3/4	44	2-1/8	54	1-5/16	33	1-3/4	44	1-3/4	44
"L"	3-7/8	98	4-11/16	119	5-3/4	146	4	102	4-13/16	122	5-13/16	148	-	-	-	-	-	-
Weight, Ibs (kg)	46	(21)	98 (	44)	160 (	(73)	69	(31)	130 (	59)	210 (9	95)	113 (	51)	171 (1	78)	325 (	147)
Maximum Allowable Pressure (Vessel Design)	1 C 6C	000 psig 00 psig (	@ 100°F @ 750°F (4	(69 barg 41 barg (	∣@ 38°C ፬ 400°C	;) )	1 500 psi (103 barg 900 psig (62 barg	g @ 100°F g @ 38°C) j @ 850°F @ 454°C)	1 8 (1) 90 (6	300 psig 25 barg 00 psig @ 2 barg @	@ 100°F @ 38°C) @ 900°F @ 482°C)		2 120 psig (146 barg ( 700 psig ( (117 barg (	@ 100°F @ 38°C) 1 @ 900°F @ 482°C)	2 520 psig (174 barg @ 000 psig (138 barg @	) @ 100°F 9 38°C) 2 @ 900°F @ 482°C)	3 700 psig (255 barg 3 000 psig (207 barg	@ 100°F @ 38°C) @ 900°F @ 482°C)

†Available with cast 316 stainless steel body and all stainless steel internals. Consult factory.

List of Materi	ist of Materials							
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket			
2313-HLAR				ASTM				
2315-HLAR				A105 Forged				
2316-HLAR				Steel	Compressed			
2413-HLAR					Asbestos-free			
2415-HLAR	Sta	ainless Steel		ASTM				
2416-HLAR				A182				
25133G-HLAR				Grade F22	Spiral Wound			
25155G-HLAR				Forged Steel	Stainless Steel			
26155G-HLAR					non-asbestos			

2315-HLAR Maximum Operating Pressures							
Specific Gravity	1.00 -	- 0.61	0.60 – 0.51				
Float Weight, oz (g)	9.0 (	255)	7.1 (201)				
Orifice	Maximum Operating Pressure						
Office	psig	barg	psig	barg			
3/16	825	56					
5/32			600	44			
1/8	1000	69	600	41			
3/32							

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2313-HLAR Maximum Operating Pressures							
Specific Gravity	1.00	- 0.69	0.68 - 0.54				
Float Weight, oz (g)	6.75	5 (191)	4.75 (135)				
Orifico cizo (in)	Maximum Operating Pressure						
Office size (iii)	psig	barg	psig	barg			
1/8							
7/64							
3/32	1000	69	475	33			
5/64							
1/16							

2316-HLAR Maximum Operating Pressures								
Specific Gravity	1.00 -	- 0.70	0.69 – 0.55					
Float Weight, oz (g)	22 (	624)	15.5 (439)					
Orifice	Maximum Operating Pressure							
Offlice	psig barg		psig	barg				
7/32			475					
3/16		69						
5/32	1 0 0 0			33				
1/8								
3/32								



High Leverage Ball Float Type Air Relief Traps For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2413-HLAR Maximum Operating Pressures									
Specific Gravity	1.00 - 0.90		0.89 – 0.69		0.68 – 0.54				
Float Weight, oz (g)	9.375 (266)		6.75 (191)		4.75 (135)				
	Maximum Operating Pressure								
Office size (in)	psig	barg	psig	barg	psig	barg			
1/8									
7/64									
3/32	1 500	103	1000	69	475	33			
5/64									
1/16									

2416-HLAR Maximum Operating Pressures							
Specific Gravity	1.00 -	- 0.70	0.69 – 0.55				
Float Weight, oz (g)	22 (	624)	15.5 (439)				
Orifice	Maximum Operating Pressure						
Office	psig	barg	psig	barg			
7/32		96					
3/16				33			
5/32	1 400		475				
1/8							
3/32							

2415-HLAR Maximum Operating Pressures									
Specific Gravity	1.00 -	- 0.85	0.84	- 0.61	0.60 - 0.51				
Float weight, oz (g)	13.75	(390)	9.0 (255)		7.1 (201)				
Orifice	Maximum Operating Pressure								
Office	psig	barg	psig	barg	psig	barg			
3/16	1200	83	825	56					
5/32	1725	119	1 150	80	600	41			
1/8	1 000	12.4	1 200	0.2	600				
3/32	1800	124	1200	83					

25133G HLAR Maximum Operating Pressures										
Specific gravity	1.00 – 0.98		0.97 – 0.90		0.89 – 0.69		0.68 – 0.54			
Float weight, oz (g)	10.5 (298)		9.375 (266)		6.75 (191)		4.75 (135)			
Orifico	Maximum Operating Pressure									
Office	psig	barg	psig	barg	psig	barg	psig	barg		
7/64		146		103	1 000	69	475	33		
3/32	2.425									
5/64	2 125		1500							
1/16										

5155G HLAR Maximum Operating Pressures											
Specific gravity	1.00 -	1.00 – 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52			
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)				
Orifice	Maximum Operating Pressure										
Office	psig	barg	psig	barg	psig	barg	psig	barg			
3/16	1 350	93	1 2 0 0	83	825	58					
5/32	1925	132	1725	119	1 2 0 0	82	600				
1/8	2 5 0 0	2 500 172	2,000	400	4.000			41			
3/32	≥ 500	1/2	2 000	138	1200	03					

26155G HLAR Maximum Operating Pressures											
Specific gravity	1.00 - 0.95		0.94 – 0.86		0.85 – 0.63		0.62 – 0.52				
Float weight, oz (g)	15.4 (437)		13.75 (390)		9.25 (262)		7.1 (201)				
Orifice		Maximum Operating Pressure									
Orffice	psig	barg	psig	barg	psig	barg	psig	barg			
3/16	1 350	93	1 2 0 0	83	825	58					
5/32	1925	132	1725	119	1 200	82	600	41			
1/8	2 700	2 700 400	2,000	120	1 200						
3/32		2700	186	2 000	138	1200	83				

**Armstrong Stainless Steel Thermostatic Air Vents** 

For Pressures to 300 psig (20 barg)...Capacities to 104 scfm



**Armstrong**<sup>®</sup>

Armstrong offers Thermostatic Air Vents for positive venting of air and other non-condensable gases from steam in chamber type heat transfer equipment. Typical applications include jacketed kettles, retorts, vulcanizers, jacketed sterilizers or other contained equipment where air could accumulate in remote areas of the steam chamber and reduce heat transfer capacity. These vents are balanced pressure air vents that respond to the pressure-temperature curve of steam. Air is automatically vented at slightly below steam temperature throughout the entire operating pressure range.

#### Features

- Suitable for pressures from 0 300 psig
- All 304-L stainless steel bodies—sealed, tamper-proof
- Balanced pressure thermostatic element vents air at slightly below steam temperature over the entire pressure range—no adjustments required
- Dependable, proven phosphor-bronze bellows caged in stainless steel with bronze valve and stainless steel seat
- Available in straight-thru or right-angle connections

Armstrong thermostatic air vents should be installed at the highest point on a steam chamber, with the air vent located above the chamber. This will minimize the possibility of any liquid carryover, and air can be vented at atmosphere without a drain line.

#### For a fully detailed certified drawing, refer to CD #1018.

List of Materials							
Name of Part	Material						
Body	304-L Stainless steel						
Connections	304 Stainless steel						
Balanced Pressure Thermostatic Air Vent	Stainless steel and bronze with phosphor-bronze bellows, entire unit caged in stainless steel						
Gasket	Copper clad non-asbestos						

Optional: All stainless steel thermostatic air vent.

Physical Data									
Model No.	Sti	aight-Thru C	Connections T1	۲F-1	Right-Angle Connections TTF-1R				
Dine Compositions	in	mm	in	mm	in	mm	in	mm	
Pipe Connections	1/2	15	3/4	20	1/2	15	3/4	20	
"A" Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57	
"B" Height	4-1/2	114	4-11/16	119	3-3/4	95	3-15/16	100	
"C" @ inlet to face of outlet	_		_		2-5/8	67	2-13/16	71	
"D" @ outlet to face of inlet	_		_		1-15/16	49	1-7/8	48	
"H"	_		_		3-1/16	78	3	76	
Weight, lb (kg)	3/4 (	0.4)	1 (	0.5)	3/4	(0.4)	1 (0	).5)	
Maximum Allowable Pressure (Vessel Design)	300 psig @ 450°F (20 barg @ 232°C)								
Maximum Operating Pressure, psig (barg)				300	(20)				
Discharge Orifice Size				3/	16"				



**TV-2** Thermostatic Air Vent

For Pressures to 125 psig (9 barg)...Capacities to 46 scfm



Armstrong offers the Model TV-2 Balanced Pressure Thermostatic Air Vent for positive venting of air from chamber type heat transfer equipment with no loss of steam. Typical applications include jacketed kettles, retorts, vulcanizers, jacketed sterilizers or other contained equipment where air could accumulate at the top of the steam chamber and reduce heat transfer capacity.

The Model TV-2 is a balanced-pressure thermostatic air vent that responds to the pressure-temperature curve of steam at any pressure from light vacuum to maximum operating pressure. Air is automatically vented at slightly below steam temperature throughout the entire operating pressure range.

The thermostatic element is a charged multi-convolution phosphor bronze bellows caged in stainless steel. Valve and seat are also stainless steel designed to meet the most rigid cycling specifications known for this type of service.



#### **Features**

- · Stainless steel hemispherical valve and seat
- Thermostatic element comprises a multi-convolution phosphor bronze bellows caged in stainless steel
- Thermostatic element is charged with water to provide positive opening of the valve at slightly below steam temperature and positive closing in the presence of steam throughout the operating pressure range
- ASTM B62 cast bronze body

Armstrong Model TV-2 Thermostatic Air Vents should be installed at the highest points of steam chambers with inlet connections to the vents higher than the highest points of the chambers. Thus installed there is a minimum hazard of any liquid carryover and air can be vented to atmosphere with no drain line necessary.

For a fully detailed certified drawing, refer to CD #1032.

TV-2 Physical Data			
Dine Compositions	in	mm	
Pipe Connections	1/2	15	
"A" (Diameter)	2-3/16	56	
"B" (Height)	3-1/2	89	
Weight, lb (kg)	1-1/2 (0.8)		
Maximum Operating Pressure	125 psig (9 barg)		
Temperature Maximum, °F (°C)	350°F (177°C)		

TV-2 Materials	
Name of Part	Material
Body & Cap	Cast bronze ASTM B62
Gasket	Compressed non-asbestos
Thermostatic Unit	
Bellows	Phosphor bronze
Cage and Cover	Stainless steel
Thermostatic Unit Gasket	Copper clad





TS-2 Air Vent Angle Type



TS-2 Air Vent Straight Type



Armstrong TS thermostatic air vent is offered in both angle and straight patterns. The TS-2 has a balanced pressure thermostatic element with a high quality multiple-convolution bellows. It's ideal for venting air from equipment such as steam radiators and convectors, small heat exchangers, and unit heaters. The TS-2 comes with a strong, cast bronze body and a stainless steel seat. The valve and seat are renewable in-line.

### Materials

Cap: Body: Union Nipple: Valve: Valve Seat: Element: Bronze, ASTM B62 Bronze, ASTM B62 Brass, ASTM B584 Brass Stainless steel Phosphor-bronze bellows

For a fully detailed certified drawing, refer to CDY #1045.

Physical Data									
Model				Т	S-2				
Pattern		Angle				Straight			
Dine Connections	in	mm	in	mm	in	mm	in	mm	
Pipe Connections	1/2	15	3/4	20	1/2	15	3/4	20	
"A" Diameter	1-5/8	41	1-5/8	41	1-5/8	41	1-5/8	41	
"B" Height	2-15/16	75	3	76	2-11/16	68	2-7/8	73	
"C"	2-9/16	65	2-7/8	73	4	102	4-1/2	114	
"D"	1-3/8	35	1-5/8	41	1-1/8	28	1-5/16	33	
Weight, Ib (kg)	1-1/2 (	0.68)	1-3/4	1-3/4 (0.79)		1-1/2 (0.68)		2 (0.91)	







## For Hot or Cold Water and Non-Viscous Liquids

Air vent models AV-11 and AV-13 are compact float-type valves for the removal of air and other gases from hydronic heating and cooling systems, liquid chilling operations and other light liquid services.

Physical Data						
Model	AV	-11	AV-13			
Connection	in	mm	in	mm	in	mm
Size	1/8	3	1/2 Female	15 Female	3/4 Male	20 Male
"A"	1-3/4	44	2-1/8	54	2-1/8	54
"Н"	3-3/8	86	4-5/8	118	4-5/8	118
Weight, lb (kg)	1/4 (0.11)					

Capaci	ties						
	AV	-11			AV	-13	
4	ΔP	Capacities		Δρ		Capa	cities
psig	barg	cfm	m³/hr	psig	barg	cfm	m³/hr
3.5	0.24	0.5	0.84	16	1.1	1	1.7
10	0.69	1.0	1.7	48	3.3	2	3.4
24	1.7	1.5	2.5	84	5.8	3	5.1
35	2.4	1.9	3.2	120	8.3	4	6.8
50	3.4	2.0	3.4	150	10	4.9	8.3

Specifications								
Medel	Application	Workir	g Pressure	Maximum Temperature		Connection	Hydraulic Test Body	
woder	Application	psig	barg	°F	°C	Connection	psig	barg
AV-11	Hot or Cold	1 - 50	0.06 - 3.4	210	00	NDT Serowed	200	14
AV-13	Water	1 - 150	0.06 - 10.3	210	99	INFI Screwed	350	24

Materials			
Valve	Float	Disc	
Brass	Polypropylene	Nitrile	

# Armstrong<sup>®</sup> SV-12 Steam Radiator Air Vent





SV-12 Angle Air Vent



SV-12 Straight Air Vent



SV-12 Straight Main Air Vent

## For Steam Service

A vent port size for every room location with the largest size for the coldest rooms and the smallest size for the "too hot" rooms. SV-12 air vents are easy to install on any steam radiator.

For a fully detailed certified drawing, refer to CDY #1042.



Materials	
Name of Part	Material
Body	Nickel plated brass
Float	Polypropylene
Valve Seat	Brass
Bimetal Thermostatic Element	Stainless steel

Physical Data						
Pattern	Angle Co	onnection	Straight C	Connection	Straight Main Connection	
Dine Composition Size	in	mm	in	mm	in	mm
Pipe Connection Size	1/8	3	1/8, 1/4	3, 6	1/2, 3/4	15, 20
"A"	2-3/16	56	2-3/16	56	2-3/16	56
"B"	2-5/16	59	3-1/4	83	3-1/2	89
"C"	1-3/16	30	1-3/16	30	1-3/16	30
Max. Operating Pressure, psig (barg)			15 (1)			
Vent Port Designation and Port Size	Each air ve	4 = .040" 5 = .070" D = . nt is provided with	6 = .0935" C = .1285" 1850" all five of the abov	e vent ports	1 = .1 Only one will be j	850" e vent port provided



# **Fixed Pivot Ball Float Air/Gas Vents**

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.83





Model 21-AR

Model 21-312 AR/VAR

Physical Data						
Medal Na	Cast	Iron	Forged Steel 21-312 AR/VAR			
Woder No.	21-4	٨R				
Dina Connections	in	mm	in	mm		
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4	15, 20		
"A"	6-3/16	157	6-3/4	171		
"В"	5-1/4 133		10-1/4	260		
"D"			5-9/16	141		
"К"	1-5/16	33	1-1/4	32		
"L"	-	-	3-5/16	84		
Approximate Weight, Ib (kg)	8 (4	4)	30 (14)			
Maximum Allowable Pressure (Vessel Design)	250 psig @ (17 barg @	∮ 450°F** 232°C**)	600 psig @ 100°F (41 barg @ 38°C) 500 psig @ 750°F** (34 barg @ 399° C**)			

\*\*Viton valve seat insert limited to 400°F (204°C).

21-AR Maximum Operating Pressures								
Minimum Specific Gravity	0.4	.9	0.8	4				
Float Weight, oz (g)	2.25	(64)	4.12 (	118)				
	Maxim	um Ope	rating Pre	ssure				
	psig	barg	psig	barg				
7/32	17	1.2	-	-				
3/16	23	1.6	-	-				
5/32	33	2.3	-	-				
9/64	41	2.8	-	-				
1/8	52	3.6	-	-				
3/32	92	6.4	-	-				
5/64	133	9.2	-	-				
1/16	208	14	-	-				
1/16	-	-	250	17				



**21-AR**—A small, high-quality economical air vent. It employs a single lever with a fixed pivot and viton seat, ensuring a tight shut-off.

For a fully detailed certified drawing, refer to CD #1037.

**21-312 AR/VAR** —Forged steel version of the Model 21 with a larger float and higher leverage. Available with screwed, socketweld or flanged connections.

For a fully detailed certified drawing, refer to CD #1106.

21-312 AR/VAR Maximum Operating Pressures										
	Minimum Specific Gravity	0.8	33							
	Float Weight, oz (g)	5 (14	43)							
Model	Orifice (in)	Maximum Press	Operating sure							
		psig	barg							
	1/4	22	1.5							
	7/32	28	1.9							
21-312AR	3/16	38	2.7							
	5/32	55	3.8							
	9/64	68	4.7							
	1/8	173	12							
21-312VAR	3/32	308	21							
	5/64	443	31							
	1/16	600	41							

List of Material	S						
Model No.	Valve	Seat	Leverage System	Float	Body & Cap	Gasket	Bolting
21-AR	Stainless	Stainless	Stainless	Stainless	ASTM A48 Class 30 Cast Iron	Non-	Bolts SAE Gr. 2 Nuts ASTM A563 Gr. A
21-312 AR 21-312 VAR	Steel	ess Steel with Stainless Sta el *Viton Insert Steel S		Steel	ASTM A105 Forged Steel	Asbestos	Bolts and Nuts ASTM B633 Type 1

NOTE: Above vents available in T-316 SS bodies and caps and all SS internals. Aluminum body and cap available for Model 21-AR only. \*Other seat insert materials available. Consult factory.



Oil & Gas Equipment (e.g. LACT Skids and Petroleum Metering Skids) Ozone Generators and Injectors Coils ans Heat Exchangers Food Equipment Tanks ... and many more!





\*\*Ozone Injection System Featuring Armstrong 1AVCW





32-LD Forged Steel Free Floating Lever Drain Trap



1-LD Cast Iron Free Floating Lever Drain Trap



11-LD Stainless Steel Free Floating Lever Drain Trap

# Armstrong How to Select and Size Armstrong Drain Traps

### For Draining Liquids From Gases Under Pressure

Armstrong liquid drain traps are offered in a wide variety of sizes and types to meet the most specific requirements. The most widely used models and sizes utilize bodies, caps and some operating parts that are mass produced for Armstrong steam traps. The proven capabilities of these components, along with volume production economies, enable us to offer you exceptionally high quality at attractive prices. You can choose the smallest and least costly model that will meet your requirements with confidence.

#### Selection Procedure for Draining Liquid From Gas

- 1. Multiply the actual peak liquid load (lbs/hr) by a safety factor of at least 1-1/2 or 2. See paragraph headed "Safety Factors."
- From Orifice Capacity Chart LD-12, find the orifice size that will deliver the required cold water capacity at the maximum operating pressure. If a light liquid is to be drained, convert light liquid capacity in Ibs per hour to water capacity using factors in Table LD-5. Then find orifice size from Chart LD-12.
- From the Orifice Size Operating Pressure tables on the product model pages, find the drain trap(s) capable of opening the required orifice size at a specific pressure (and specific gravity if other than cold water–specific gravity 1.0).

**NOTE:** If specific gravity falls between those shown in the tables, use next lower. Example: If specific gravity is 0.73, use 0.70 gravity data.

#### Safety Factors

Safety factor is the ratio between actual continuous discharge capacity of the drain trap and the amount of liquid to be discharged during any given period. Chart LD-12 shows the maximum continuous rate of cold water discharge of the drain trap. However, you must provide capacity for peak loads and, possibly, lower-than-normal pressures. A safety factor of 1-1/2 or 2 is generally adequate if applied to the peak load and the minimum pressure at which it occurs. If the load discharge to the trap is sporadic, a higher safety factor may be required. Contact your Armstrong Representative for details.

#### **Selection Examples**

**EXAMPLE No. 1:** Find a drain trap to drain 1 000 lbs of water per hour from air at 500 psig pressure differential.

Multiply 1 000 lbs/hr by 2 (if not already done) to provide a safety factor; thus, a 2 000 lbs/hr continuous discharge capacity is required. In Capacity Chart LD-12, the 2 000 lb capacity line intersects the 500 psig pressure line directly below the No. 38 drill orifice curve. This orifice is available in the No. 1-LD or No. 11-LD drain trap, but for much lower pressures. Moving to the 32-LD, a #38 orifice is good to 489 psig. This is the trap/orifice combination to use. Table LD-14, page LD-37, shows the No. 32-LD drain trap with #38 orifice will operate at pressures up to 489 psig and, therefore, is suitable for the job. Further checking shows the No. 2313 HLS drain trap with a 7/64" orifice could also handle the job, but it is designed particularly for low gravity liquids and is more costly than the No. 32-LD, so the No. 32-LD is a better choice.

**EXAMPLE No. 2:** Find a drain trap to drain 6 400 lbs/hr (safety factor included) of .80 specific gravity liquid from gas at 400 psig pressure differential.

Since Capacity Chart LD-12 is based on water capacity, the known light liquid capacity requirement must be converted to its equivalent water capacity with the factor given in Table LD-5: 6 400 x 1.12 = 7168 = water capacity required for using Chart LD-12.

Chart LD-12 shows that 7 168 lbs/hr and 400 psig calls for a 7/32" orifice. Entering the .80 specific gravity column of Table LD-14, page LD-37, shows that a No. 36-LD forged steel drain trap will open a 7/32" orifice at pressures up to 707 psig. As a matter of fact, this drain trap will open a 1/4" orifice at 501 psig and would be the one to use.

**NOTE:** While drain traps are sized on the basis of pressure differential, steel must be used whenever gauge pressure in the drain trap exceeds 250 psig.

#### Where Not to Use

Float type drain traps are not recommended where heavy oil, sludge or considerable dirt are encountered in lines. Dirt can prevent the valve from seating tightly, and cold oil can prevent float traps from opening. Where these conditions exist, Armstrong inverted bucket BVSW traps should be used.

#### How to Order Drain Traps

Specify:

- Drain trap size by number
- Orifice size
- Pipe connections—size and type
- Maximum operating pressure

If the correct drain trap cannot be determined, tell us capacity required, maximum pressure, and SPECIFIC GRAVITY of liquid.

Table LD-5. Conversion Factors to Find Cold Water Capacity Equivalents for Light Liquids									
Specific Gravity Capacity in Pounds Per Hour by:									
.95	1.03								
.90	1.06								
.85	1.09								
.80	1.12								
.75	1.16								
.70	1.20								
.65	1.24								
.60	1.29								
.55	1.35								
.50	1.42								
.45	1.49								
.40	1.58								

# Armstrong<sup>®</sup> How to Select and Size Armstrong Drain Traps

# For Draining Water From a Light Liquid

Armstrong dual gravity drain traps for draining water from a light liquid are described on pages LD-47 and LD-48. All models shown are identical to corresponding models of traps used to drain liquid from a gas except that float weights are modified to make them suitable for draining water from a light liquid.

Dual gravity drain trap\* selection requires that you know the peak heavy liquid load, maximum operating pressure, and specific gravity of the light liquid. With this information you can determine the orifice size required from Chart LD-12 and find the specific drain trap that will meet your conditions from the pressure tables on the dual gravity pages.

#### Selection Procedure for Draining Water from a Light Liquid

- Assume a required safety factor of 2:1. Multiply the peak load in pounds per hour by 2. (See paragraph on "Safety Factors.")
- From Capacity Chart LD-12, find the intersection of actual load times safety factor and the minimum operating pressure differential.
  Follow the pressure line immediately above this point to intersect the next higher orifice capacity curve. Then follow this curve downward and to the left to get the orifice size.
- Inspect the tables on pages LD-47 and LD-48 to find the smallest trap that can open the predetermined orifice size at the maximum operating pressure differential. Do not oversize dual gravity drain traps. Oversizing will cause excessive fluctuation of the interface between the two liquids.

**NOTE:** While drain traps are sized on the basis of operating pressure differential, forged steel must be used when total pressure in the drain trap exceeds 250 psig.

\* Floats for dual gravity drain traps are weighted with quenching oil which, in the unlikely possibility of float failure, may be dispersed through the system. If this is a hazard, consult the Armstrong Application Engineering Department.

### How to Order Dual Gravity Drain Traps

Specify:

- Drain trap size by number
- Orifice size
- Pipe connections—size and type

• Weight of water discharge per hour

• Specific gravity of light liquid

Maximum operating pressure

If you are not sure of the drain trap size to use, then specify:

- Specific gravity of light liquid
- Capacity in pounds of water per hour with safety factor included
- Working pressure—maximum and minimum
- Chart LD-12. Calculated Cold Water Capacity of Armstrong Drain Trap Orifices at Various Pressures

Actual capacity also depends on trap configuration, piping and flow to trap. It is important to allow for safety factors and fluid density variations due to temperature.





**Benefits You Can See** 





Now, you can literally see what you've been missing—the early warning signs of a drain trap or system problem. Since you'll know the operating condition of a drain trap, you won't waste time and money scheduling maintenance that isn't needed. In other words, you will be able to react to a condition before it becomes a problem.

A simple ball float mechanism requiring no electricity to operate, the new Armstrong 1-LDC discharges automatically only when liquid is present. That means no air loss as with timed devices, which open even when liquid is not present. Moisture in a compressed air system causes a variety of problems— everything from dirt fouling and potential corrosion to water hammer. Getting the water out—automatically, reliably—builds greater efficiency into your system. In short, pay attention to your compressed air system, and you'll probably pay less to compress air.

## **Compare...and Save the Difference**

Seeing really is believing—especially when you compare the Armstrong see-thru drain trap with cast iron units. Measure the differences in the time and money you can save with a more efficient, easier-to-maintain compressed air system. For more information or technical assistance, contact your local Armstrong Representative.





Now, you can literally see what you've been missing—the early warning signs of a drain trap or system problem. Since you'll know the operating condition of a drain trap, you won't waste time and money scheduling maintenance that isn't needed. In other words, you'll be able to react to a condition before it becomes a problem.

# List of Materials

Table LD-6.	
Name of Part	Material
Cap and Fitting	Reinforced Nylon*
Body	Polycarbonate
O-Rings (Cap, Body and Fitting)	Nitrile Elastomer Compound
Float, Lever and Screws	Staiplass Staal
Valve & Seat	Stalliness Steel
Retainer Ring	Zinc-Plated Steel

\*UV sensitive

# Maximum Operation Pressures and Capacities

Table LD-7.	•							
Specific Gravity		1.	.0			0.	95	
Orifice Size	Maximum Operating Pressure		Maximum Operating Capacity Pressure			mum ating sure	Cap	acity
	psig	barg	lb/hr	kg/hr	psig	barg	lb/hr	kg/hr
1/8	121	8.3	1500	690	109	7.6	1400	640
#38	150	10.0	1 100	510	150	10.0	1 100	490

Capacities given are continuous discharge capacities in lb/hr or kg/ hr of liquid at pressure differential indicated.

# **Physical Data**

Table LD-8.					
Inlat Compositions	in	mm			
Iniet Connections	1/2, 3/4	15, 20			
Outlet Connection	1/2	15			
Alternate Inlet or Vent Connection	1/2, 3/4	15, 20			
"A"	3-1/2	89			
"B"	6-7/8	175			
"C"	6-3/32	155			
Weight Ibs (kg)	1 (	0.45)			
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 65°C)				
Maximum Operating Pressure psig (barg)	150 (10)				

# How to Order



A free floating mechanism needs no electricity to operate, the 1-LDC discharges automatically only when liquid is present. That means no air loss as with timed devices that open even when liquid is not present. Moisture in a compressed air system causes problems. Getting the water out—automatically, reliably—builds greater efficiency into your system.

#### For a fully detailed certified drawing, refer to CD #1031.



Drain traps dispose of water that collects in many places in a compressed air system. Each drain trap arrangement must be considered individually.

#### Figure LD-28.





# 1-LDCW See-Thru Air Liquid Drainer for Ozone Applications

For Pressures to 150 psig (10 barg) or Specific Gravity 1.0

#### What Is Ozone?

Ozone is a gas that forms naturally during thunderstorms when lightning converts normal oxygen molecules (O<sup>2</sup>) into ozone (O<sup>3</sup>). The fresh, sweet smell in the air after a storm is the smell of ozone. The unstable ozone molecule reacts rapidly with most substances and is an extremely strong natural oxidant.

#### How Is Commercial Ozone Produced?

Ozone can be formed by exposing air to ultraviolet light; however, the most common method of generating ozone is by passing air through an electrical discharge. Because ozone has strong oxidizing properties, its production requires corrosion-resistant equipment.

#### How Is Ozone Used in Water Filtration and Purification?

Because ozone is such an effective oxidant, it kills viruses, bacteria, mold, mildew, fungus and germs. Passing ozone through water achieves high purification rates without any chemical residue. Oxygen is the only by-product.

#### **Typical Customer Applications:**

- Purifying standing ground water in Third World countries.
- Conditioning water for poultry and livestock.
- Purifying water in the bottled water industry.
- Filtering and purifying water for process applications.

#### A See-Thru Body Shows You It's Working

Now, you can literally see what you've been missing. The Armstrong 1-LDCW See-Thru Liquid Drainer lets you easily check its operating condition. You won't have to waste time and money scheduling maintenance that isn't needed, and you can quickly react to a condition before it becomes a problem.

#### **Efficient Operation**

Simple ball-float mechanism doesn't need electricity to operate. The liquid drainer automatically discharges liquid when it is present. No air or gas is lost, as with manual draining.

#### **Positive Seating**

Free-floating valve mechanism ensures positive seating and prevents liquid loss. There are no fixed pivots to wear or create friction. Wear points are heavily reinforced for long life.

#### **Corrosion Resistance**

Long-lasting polycarbonate cap and body provides trouble-free operation. T316 stainless steel internal parts resist corrosion and reduce maintenance.

#### Compare-and Save the Difference

Seeing really is believing–especially when you compare the Armstrong 1-LDCW See-Thru Air Liquid Drainer with manual drainage. Measure the time and money you can save with a more efficient, easier-to-maintain system. For more information or technical assistance, contact your local Armstrong Representative.

NOTE: The Armstrong 1-LDCW should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.



1-LDCW

List of Materials	
Name of Part	Material
Сар	Polycarbonate
Body	Polycarbonate
O-Rings (Body Cap and Fitting)	Aflas
Float Lever and Screws	T316 Stainless Steel
Valve & Seat	T316 Stainless Steel
Fitting	Polycarbonate
Retainer Ring	Zinc Plated Steel

Physical Data					
	in	mm			
Inlet Connection (In Body)	3/4	20			
Inlet Connection (Alternate)	1/2	15			
Outlet Connection	1/2	15			
"A" Face-to-Face	3-1/2	89			
"B" Height	6-13/16	172			
"C" Bottom to C	6	152			
Maximum Altowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 66°F)				
Maximum Operating Pressure	150 psig (10 barg)				
Specific Gravity Range	1.00 to 0.80				
Weight, Ib (kg)	1 (.5)				



Armstrong inverted bucket drain traps are designed for systems where heavy oil and dirt may be encountered. The enlarged bucket vent equipped with a scrub wire (BVSW) keeps the drain trap operating under dirty conditions.

# **List of Materials**

Table LD-9.						
BVSW Model No.	Body & Cap	Valve & Seat	Bucket & Leverage System	Gasket		
800, 811, 812, 813, 880, 881, 882, 883, 211, 212, 213	Cast Iron ASTM A48 Class 30	Cast Iron ASTM A48 Class 30				
312, 313	Forged Steel ASTM A105	Stainle	Stainless Steel Compress Asbestos-			
981, 983	Cast Steel ASTM A216 Grade WCB					



# **Physical Data**

Table LD-10. Orifices, Maximum Operating Pressure (See Chart LD-12, page LD-30, for cold water capacities at various pressures.)														
Model No.	800 BVSW 880 BVSW		811 B	SVSW	812 E	BVSW	212 8	VSW/*	813 E 883 E 213 E	BVSW BVSW BVSW	021 R	V/S///*		
Orifice Size			211 BVSW		/ 212 BVSW		312 DV3W		313 BVSW* 983 BVSW*		301 DV3W			
in	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg		
1/4	—	—	—	—	—	—	—	—	125	8.5	—	_		
7/32	_	—	—	—	—	—	—	—	180	12.5	—	_		
3/16	-	—	—	—	—	—	—	—	250	17	50	3.5		
5/32	—	—	—	—	125	8.5	—	—	450	31	85	6		
1/8	80	5.5	125	8.5	200	14	—	—	600	41	170	11		
7/64	125	8.5	200	14	250	17	600	41	_	_	250	17		
#38	150	10.5	250	17	—	—	—	—	_	—	330	22.5		

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory. \* Use steel traps for pressures above 250 psig (17 barg).

Table LD-11. Armstrong 800 Series Drain Traps												
Model No.	800 E	BVSW	811 B	VSW	812 E	SVSW	813 BVSW					
	in	mm	in	mm	in	mm	in	mm				
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1	20, 25				
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20				
"A"	3-3/4	95	3-3/4	95	5-5/8	143	7	178				
"B"	5-7/16	138	6-7/8	175	9-1/16	230	11-3/4	298				
"C"	5	127	5	127	6-1/2	165	7-3/4	197				
"D"	2-3/4	70	4-1/4	108	5-3/8	137	7-1/32	179				
Number of Bolts	e	6	6	6	6		6					
Weight lbs (kg)	5 (2	2.3)	6 (2	2.7)	15 (6.8)		27-1/2 (13)					
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)											
Max. Operating Pressure psig (barg)	150 (	10.5)			250 (17	)						

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.



For Loads to 7 000 lb/hr (3 175 kg/hr)...Pressures to 650 psig (45 barg)

# **Physical Data**

Table LD-12. Armstrong 880-980 Series Drain Traps With Integral Strainers (See pages LD-29 and LD-30 for capacity.)												
Madal No					Cast Steel							
Model No.	880 B	VSW	881 E	BVSW	882 B	VSW	883 B	VSW	981 B	VSW	983 B	VSW
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Pipe Connections	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4	15, 20	3/4, 1, 1-1/4	20, 25, 32	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/4	6	1/2	15	3/4	20	1/2	15	3/4	20
"A"	3-3/4	95	3-3/4	95	5-5/8	143	7	178	4-1/2	114	7-1/4	184
"B"	6-1/16	154	7-1/16	179	9-3/8	244	12-3/8	314	8-5/8	219	12-15/32	313
"C"	5	127	5	127	6-1/2	165	7-7/8	200	5-3/8	137	7-3/4	197
"D"	3-7/16	87.3	4-7/16	113	5-3/4	146	7-3/8	187	4-13/16	122	7-9/16	192
Number of Bolts	6	5	(	ô	6 6				6	j	6	
Weight lbs (kg)	5-1/2	(2.5)	6 (	2.7)	15-1/2	2 (7)	31 (1	4)	11-1/2 (5) 43 (20)			
Maximum Allowable Pressure (Vessel Design)		250 psig @ 450°F (17 barg @ 232°C) 600 psig @ 650°F (41 barg @ 343°C) 343°C)								oarg @		
Max. Oper. Pressure psig (barg)	150 (1	10.5)			250 (17)				330 (2	22.5)	600	(41)

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.

Table LD-13. Armstrong 200-300 Series Drain Traps (See pages LD-29 and LD-30 for capacity.)											
Madal Na			Cast	Iron			Forged Steel				
Model No.	211 B	211 BVSW		212 BVSW		213 BVSW		312 BVSW		313 BVSW	
Dine Connections	in	mm	in	mm	in	mm	in	mm	in	mm	
Pipe Connections	1/2	15	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	
Test Plug	1/8	3	3/8	10	1/2	15	—	_	_	_	
"A"	4-1/4	108	5-1/4	133	6-3/8	162	6-3/4	171	8	203	
"В"	6-3/8	162	8-3/4	222	10-3/4	273	10-3/16	259	11-1/2	292	
"G"	_	_	_	_	_	-	4-3/4	121	5-1/8	130	
"K" (@ Outlet to @ Inlet)	_	_	_	_	_	-	1-1/4	31.7	1-7/16	36.5	
Number of Bolts	6	6	8	3		6	6		8		
Weight Ibs (kg)	6 (1	2.7)	11-1/2	(5.2)	20-1/-	4 (9.2)	30	(14)	50	(23)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F (17 barg @ 232°C)						600 psig (41 barg	∣ @ 650°F @ 343°C)	1 080 psig @ 650°F (75 barg @ 343°C)		
Max. Oper. Pressure psig (barg)			250	) (17)			600	) (41)	650	(45)	

NOTE: Larger capacity models available. Consult your local Armstrong Representative or the Armstrong factory.









Figure LD-29. Series 800 **Figure LD-30.** Series 880 & 980 Figure LD-31. Series 200 Figure LD-32. Series 300



# Free Floating Lever Drain Traps

**19**<sup>®</sup> For Loads to 50 000 lb/hr (22 679 kg/hr)...Pressures to 1 000 psig (69 barg)

Table LD-14. Maxin LD-30.)	num Operatii	ng Pres	sures f	or Hand	lling Di	fferent	Specifi	c Grav	ity Liqu	ids Wit	h Orific	es Ava	ilable ir	n Guide	d Free	Floatin	g Leve	r Drain	Traps. (	(See pa	iges LD	-29 an	d
Marial Na	Sp. Grav	1.0	00	.9	5	.9	0	.8	5	.8	80	.7	/5	.7	<u>/0</u>	.6	5	.6	0	.5	5	.5	50
Wodel No.	Orifice	nsia	barg	nsia	barg	neia	barg	neia	barg	nsia	um Op	erating	Pressu	ne psig	(barg)	neia	hard	neia	barg	neia	barg	neia	barg
	1/8	121	83	109	76	98	68	87	60	75	52	64	44	52	36	41	28	29	20	18	12	6	0.4
	7/64	143	9.9	130	9.0	116	8.0	103	7.1	89	6.1	75	5.2	62	4.3	48	3.3	35	2.4	21	1.4	7	0.5
1-LD	#38	182	12.5	164	11	147	10.2	130	9.0	113	7.8	95	6.6	78	5.4	61	4.2	44	3.0	26	1.8	9	0.6
	5/64	300	20.7	289	19.9	259	17.8	228	15.7	198	13.7	168	11.6	137	9.5	107	7.4	77	5.3	47	3.2	16	1.1
	1/8	176	12.1	161	11.1	146	10.1	130	9.0	115	7.9	100	6.9	85	5.8	69	4.8	54	3.7	39	2.7	24	1.6
11-L D	7/64	209	14	191	13	173	12	155	10.7	137	9.4	119	8.2	100	6.9	82	5.7	64	4.4	46	3.2	28	1.9
	#38	264	18	242	17	219	15	196	14	173	12	150	10.4	127	8.8	104	7.2	81	5.6	59	4.0	36	2.5
	5/64	400	28	400	28	384	27	344	24	304	21	264	18	224	15	183	13	143	9.9	103	7.1	63	4.3
	5/16	22	1.5	20	1.4	18	1.3	1/	1.1	15	1.0	13	0.9	11	0.8	10	0.7	12	0.5	6	0.4	4	0.3
2-LD to 250 psig	3/16	79	2.5	33 73	2.3	50 67	2.1	27 60	1.9	54	1.7	17	1.5	19	1.3	35	24	28	2.0	22	0.7	16	0.5
(17 barg)	5/32	137	94	126	87	115	79	104	72	93	64	82	5.5	71	4.9	60	41	49	3.4	38	26	27	1.1
22 LD to E22 pairs	1/8	234	16.1	215	14.8	196	13.5	178	12.2	159	10.9	140	9.6	121	8.4	102	7.1	83	5.8	65	4.5	46	3.2
(37 bard)	7/64	299	20.6	275	19	251	17.3	227	15.7	203	14	179	12	155	10.7	131	9.0	107	7.4	83	5.7	59	4.0
(57 barg)	#38	372	25.7	342	23.6	313	21.6	283	19.5	253	17.4	223	15	193	13	163	11.2	133	9.2	103	7.1	73	5.0
	5/64	533	37	475	33	461	32	417	29	372	26	328	23	284	20	240	17	196	14	152	10.5	108	7.4
	5/16	29	2.0	26	1.8	23	1.6	21	1.4	18	1.2	15	1.0	12	0.9	10	0.7	7	0.5	4	0.3	2	0.1
	1/4	47	3.3	43	3.0	38	2.6	34	2.3	29	2.0	25	1.7	20	1.4	16	1.1	12	0.8	7	0.5	3	0.2
	3/16	104	7.2	94	6.5	85	5.8	75	5.2	65	4.5	55	3.8	45	3.1	35	2.4	25	1.8	16	1.1	6	0.4
32-LD	5/32	180	12	163	11	146	10	129	8.9	112	7.7	95	6.5	78	5.4	61	4.2	44	3.0	27	1.9	10	0.7
	1/8	307	21	278	19	249	17	220	15	191	13	162	11	133	9	104	7.2	75	5.2	46	3.2	17	1.2
	//64	393	2/	356	25	319	22	282	19	245	1/	207	14	1/0	12	133	9	96	6.6	59	4.1	22	1.5
	#38	489	34	443 600	31	397	27	551	24	304	21	258	18	212	15	244	17	120	8 12	100	5.1	27	1.9
2 LD to 250 point	1/2	16	11	14	10	13	0.9	12	0.8	10	07	9	20	7	0.5	6	0.4	5	03	3	02	2	2.0
(17 barg)	3/8	33	2.3	31	2.1	28	1.9	25	1.7	22	1.5	19	1.3	16	1.1	13	0.9	10	0.7	7	0.5	4	0.3
(Cast Iron)	5/16	54	3.7	49	3.4	44	3.0	39	2.7	35	2.4	30	2.1	25	1.7	20	1.4	16	1.1	11	0.8	6	0.4
(,	9/32	71	4.9	65	4.5	59	4.0	52	3.6	46	3.2	40	2.7	34	2.3	27	1.9	21	1.4	15	1.0	8	0.6
13-LD to 570 psig	1/4	107	7.4	97	6.7	88	6.1	79	5.4	69	4.8	60	4.1	50	3.5	41	2.8	32	2.2	22	1.5	13	0.9
(39 barg)	7/32	153	10.5	139	9.6	126	8.7	112	7.7	99	6.8	85	5.9	72	5.0	59	4.0	45	3.1	32	2.2	18	1.2
(Stanness)	3/16	230	16	209	14	189	13	169	12	149	10.3	129	8.9	108	7.5	88	6.1	68	4.7	48	3.3	27	1.9
33-LD to 900 psig	5/32	359	25	327	23	296	20	264	18	233	16	201	14	169	12	138	9.5	106	7.3	74	5.1	43	2.9
(62 barg)	1/8	726	50	662	46	598	41	534	37	470	32	406	28	342	24	278	19	214	15	150	10.3	86	5.9
(Steel)	7/64	900	62	847	58	765	53	683	47	601	41	519	36	437	30	356	25	274	19	192	13	110	7.6
	1-1/16	21	1.4	19	1.3	18	1.2	16	1.1	15	1.0	13	0.9	12	0.8	10	0.7	9	0.6	12	0.5	6	0.4
	7/8	32	2.2	30	2.1	28	1.9	20	1.8	23	1.0	21	1.4	19	1.3	24	1.1	14	1.0	12	0.8	14	0.6
	5/4	47	3.2	44 67	3.0	40 61	2.0	56	2.5	51	2.5	16	2.1	11	1.9	24	1.0	20	1.4	26	1.2	21	0.9
	9/16	95	65	88	61	81	5.6	75	5.2	68	47	61	4.2	55	3.8	48	2.5	41	2.1	34	2.4	28	1.4
	1/2	138	9.5	128	8.8	118	8.1	108	7.5	99	6.8	89	6.1	79	5.4	69	4.8	59	4.1	50	3.4	40	2.8
6-LD	7/16	196	13	182	13	168	12	154	11	140	10	126	8.7	112	7.7	98	6.8	85	5.8	71	4.9	57	3.9
Cast Iron	3/8	250	17	250	17	250	17	243	17	221	15	199	14	177	12	155	11	133	9.0	111	7.7	90	6.2
	11/32	250	17	250	17	250	17	250	17	250	17	250	17	236	16	207	14	178	12	148	10	119	8.2
	5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	228	16	191	13	153	11
	9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	201	14
	1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
	7/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
	3/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
	1-1/16 7/9	16	1.1	15	1.01	13	0.91	12	0.8	10	0./1	14	0.6	11	0.5	6	0.4	4	0.3	5	0.2	1	0.1
	2/4	25	25	23	1.0	20	1.4	10	1.5	22	1.1	20	0.95	17	11	12	0.03	10	0.47	5	0.51	2	0.10
	5/8	56	39	51	2.5	46	31	27 41	2.8	35	24	30	21	25	17	20	14	15	105	10	0.45	5	0.22
	9/16	74	51	67	4.6	60	4.2	54	37	47	3.2	40	28	34	23	27	1.8	20	1.4	13	0.92	7	0.46
	1/2	107	7.4	97	6.7	88	6.0	78	5.4	68	4.7	58	4.0	49	3.4	39	2.7	29	2.0	19	1.3	10	0.66
36-LD	7/16	152	10.5	138	9.6	125	8.6	111	7.6	97	6.7	83	5.7	69	4.8	55	3.8	41	2.9	27	1.9	14	0.94
Forged Steel	3/8	240	17	218	15	197	14	175	12	153	10.5	131	9.0	109	7.5	87	6.0	65	4.5	43	3.0	21	1.5
	11/32	320	22	291	20	262	18	233	16	203	14	174	12	145	10	116	8.0	87	6.0	58	4.0	29	2.0
	5/16	411	28	374	26	336	23	299	21	262	18	224	15	187	13	149	10.3	112	7.7	74	5.1	37	2.5
	9/32	539	37	490	34	441	30	392	27	343	24	293	20	244	17	195	13	146	10.1	97	6.7	48	3.3
	1/4	788	54	716	49	644	44	573	39	501	35	429	30	357	25	286	20	214	15	142	9.8	70	4.9
	7/32	1000	69	1000	69	910	63	808	56	707	49	606	42	505	35	403	28	302	21	201	14	99	6.9
	3/16	1000	69	1000	69	1000	69	1000	69	1000	69	992	68	826	57	660	46	494	34	328	23	163	11.2
Specific Gr	avity	J 1.0	00	.9	5	.9	U	.8	35	3. ]	30	.7	5	.7	υ	.6	5	.6	0	.5	5	.5	0

NOTE: If specific gravity falls between those shown in the chart, use the next lower gravity. For example, if specific gravity is 0.73, use 0.70 gravity data.

#### High Temperature Service

Maximum allowable working pressures of floats decrease at temperatures above 100°F (37.8°C). Allow for approximately:

• 10% decrease at 200°F (93.3°C)

• 15% decrease at 300°F (148.9°C)

• 20% decrease at 400°F (204.4°C)

The float is not always the limiting factor, however. Consult with Armstrong Application Engineering if you have a high-temperature application that also requires maximum operating pressures.



Armstrong's cast iron, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

# List of Materials

Table Ll	Table LD-15.									
Model No.	Valve & Seat	alve & Leverage Seat System		Body & Cap	Gasket					
1-LD					Compressed					
2-LD	Cto	inlass Staal		Cast Iron ASTM						
3-LD	Slo	inness Steer		A48 Class 30	Aspesios-					
6-LD					nee					

For information on special materials, consult the Armstrong Application Engineering Department.



Figure LD-33. No. 2-LD, 3-LD and 6-LD cast iron guided lever drain traps. No. 1-LD has standard top inlet and optional side connection.

# **Physical Data**

Table LD-16. Armstrong Guided Lever Liquid Drain Traps										
	Cast Iron									
Model No.	1-LD		2-	LD	3-	LD	6-LD			
Dine Competiens	in	mm	in	mm	in	mm	in	mm		
Pipe Connections	1/2*	15*	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1-1/2, 2	40, 50		
"A"	3-3/4	95	5-1/4	133	6-3/8	162	10-3/16	259		
"B"	5-1/2	140	8-3/4	222	11-1/2	292	18	457		
"D"	2-7/8	73	5-1/8	130	7	188	9-3/8	238		
"K" (@ Outlet to @ Inlet)	13/16	21	—	_	-	—	—	_		
"L"	1-7/8	48	2-7/16	62	2-7/8	73	4-5/8	117		
Approx. Wt. lb (kg)	4 (2)		12 (	5.5)	21	9.5)	78 (35.5)			
Max. Allow. Pressure (Vessel Design)	300 psig @ 200°F⁺ (21 barg @ 93°C)		250 psig @ 450°F (17 barg @ 232°C)							

NOTE: Vessel design pressure may exceed float collapse pressure in some cases.

Pipe size of vent connection is same as that of inlet and outlet connections.

<sup>t</sup>For pressures not exceeding 250 psig (17 barg), a maximum temperature of 450°F (232°C) is allowed.

\*1/4" (6 mm) outlet.

The hemispherical valve, seat and leverage of the 1-LD, 2-LD, 3-LD and 6-LD cast iron traps are identical in design, materials and workmanship to those for saturated steam service up to 300 psig (21 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

For a fully detailed certified drawing, refer to:1-LDCD #10702-LD, 3-LD, 6-LDCD #1034





Armstrong's stainless steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

## **List of Materials**

Table L	Table LD-17.									
Model No.	Valve & Leverage Seat System		Float	Body & Cap	Gasket					
11-LD 22-LD 13-LD	Stainless Steel			Sealed Stainless Steel, 304L	_					

For information on special materials, consult the Armstrong Application Engineering Department.



#### Figure LD-34.

No. 22-LD and 13-LD stainless steel guided lever liquid drain trap with sealed, tamperproof construction.

## Physical Data

Liquid Drainers

Table LD-10. Annstrong Guided Lever Liquid Drain Traps									
Medal No	Stainless Steel								
Model No.	11-L	.D**	22-	-LD	13-LD				
Pipe Connections	in	mm	in	mm	in	mm			
	3/4*	20*	3/4	20	1	25			
"A"	2-3/4	70	3-15/16	100	4-1/2	114			
"B"	7-1/4	184	8-13/16	224	11-3/8	289			
"D"	_	—	3	76	6-1/8	156			
"K"	9/16	14	7/8	22	1-3/16	30			
"L"	—	—	2-5/8	67	3-9/32	83			
Approx. Wt. lbs (kg)	1-3/4 (0.79)		3-1/4	(1.5)	7-1/2 (3.4)				
Max. Allowable Pressure (Vessel Design)	500 psig @ 100°F (35 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)		600 psig @ 100°F 475 psig @ 500°F	- (41 barg @ 38°C) (33 barg @ 260°C)	570 psig @ 100°F (39 barg @ 38°C) 490 psig @ 500°F (34 barg @ 260°C)				

**Note:** Vessel design pressure may exceed float collapse pressure in some cases. Pipe size of vent connection is same as that of inlet and outlet connections.

\*1/2" (15 mm) outlet. \*\*No side connection.

The hemispherical valve, seat and leverage of the 11-LD, 22-LD and 13-LD stainless steel traps are identical in design, materials and workmanship to those for saturated steam service up to 570 psig (39 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

For a fully detailed certified drawing, refer to list below: 11-LD CD #1066 13-LD and 22-LD CD #1086





Armstrong's forged steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

## List of Materials

Table Ll	Table LD-21.										
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket						
32-LD 33-LD	Stainless Steel			Forged Steel	Compressed Asbestos-						
36-LD				ASTIM AIUS	free						

For information on special materials, consult the Armstrong Application Engineering Department.



Figure LD-37.

No. 32-LD, 33-LD and 36-LD forged steel guided lever drain trap. Socketweld or flanged connections are also available.

# Physical Data

Table LD-22. Armstrong Guided Lever Liquid Drain Traps											
Medal Na		Forged Steel									
wodel No.	32	2-LD <sup>+</sup>	33-	LD⁺	36-LD <sup>+</sup>						
	in	mm	in	mm	in	mm					
Pipe Connections	1/2, 3/4, 1	15, 20, 25	1/2, 3/4, 1	15, 20, 25	1-1/2, 2	40, 50					
"A"	6-3/4	171	8	203	11-7/8	302					
"B"	10-3/16	259	11-9/16	294	17-1/8	435					
"D"	5-9/16	141	6-1/16	154	9	229					
"K"	1-1/4	32	1-7/16	37	2-1/8	54					
"L"	3-3/8	86	3-9/16	90	6-1/16	154					
Approx. Wt. lbs (kg)	3	1 (14)	49	(22)	163 (74)						
Max. Allowable Pressure (Vessel Design)	600 psig @ 100 500 psig @ 750°	°F (41 barg @ 38°C) F (35 barg @ 400°C)	1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F (41 barg @ 400°C)								

**Note:** Vessel design pressure may exceed float collapse pressure in some cases. Pipe size of vent connection is same as that of inlet and outlet connections.

<sup>+</sup>Available in Type 316 stainless steel. Consult factory.

The hemispherical valve, seat and leverage of the 32-LD, 33-LD and 36-LD forged steel traps are identical in design, materials and workmanship to those for saturated steam service up to 1 000 psig (69 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

#### For a fully detailed certified drawing, refer to CD #1035.





# **180 Series Free Floating Lever Drain Traps**

All Stainless Steel for Horizontal Installation

For pressures to 400 psig (28 barg) . . . Capacities to 2 000 lb/hr (907 kg/hr)

Armstrong's stainless steel, free floating lever drain traps use the same bodies, caps, lever mechanisms, valves and seats as Armstrong inverted bucket steam traps that have been proven in years of service. Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for drain trap size and weight.

The hemispherical valve, seat and leverage of the 180-LD and 181-LD stainless steel traps are identical in design, materials and workmanship to those for saturated steam service up to 570 psig (39 barg), except that the 180 Series traps have a guidepost to ensure a positive, leak-tight valve closing under all conditions. The 180 Series is designed for situations where mounting a drainer close to the floor is critical. A back vent connection is required.

For a fully detailed certified drawing, refer to list below: 180-LD CD #1276

# **List of Materials**

Table LD-19.				
Model No.	Valve & Seat	Leverage System	Float	Body & Cap
180-LD 181-LD	S	tainless Steel		Sealed Stainless Steel 304L

# **Physical Data**

Table LD-20. Armstrong 180 Series Free Floating Lever Drain Traps									
Model No.	180-L	D	181-LD						
Dine Compactions	in	mm	in	mm					
Pipe Connections	1/2	15	3/4	20					
"A" (Diameter)	2-11/16	68	2-11/16	68					
"B" (Height)	6	152	7-1/4	184					
"C" (Face to Face)	4-5/16	110	4-5/16	110					
"D" (Bottom to C Inlet)	5-1/8	130	6-9/32	160					
"P"	1/2	15	3/4	20					
Weight, lb (kg)	1-3/4 (0	).8)	2-3/8 (1.1)						
Max. Allowable Pressure (Vessel Design)	500 psi 440 psig	500 psig @ 100°F (35 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)							

**Note:** Vessel design pressure may exceed float collapse pressure in some cases. Pipe size of vent is same as that of inlet and oulet connections.

#### Chart LD-13. Model 180-LD Capacity









Figure LD-35. Model 180-LD

Figure LD-36. Model 181-LD





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> \*\*Ozone Injection System Featuring Armstrong 11LD and 1LDCW





Armstrong Filter with 11LD Liquid Drainer



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