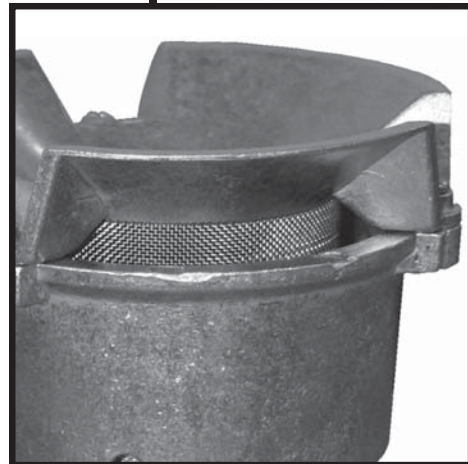
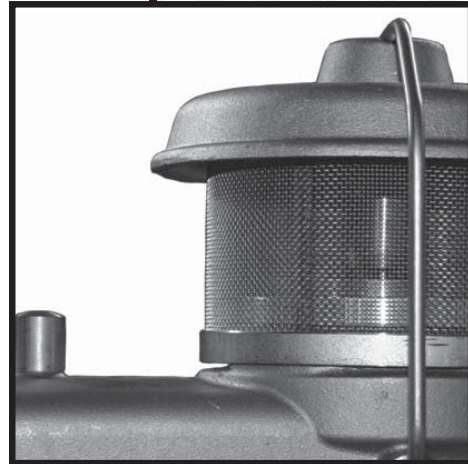


VENTING GUIDE

for aboveground storage tanks



*A Guide Used to Assist in Equipment Selection
for Aboveground Storage Tanks*



Changes to this edition of the Morrison Venting Guide include...

Product Updates

EMERGENCY VENTS



- Vents with brass seats obsoleted
- All 244Os now UL and ULC listed
- Updated CFH capacities
- Added CFH capacities for vents with screens
- Added Enhanced Vapor Recovery (EVR) models
- Added 2" 16 oz. brass vents - *New Product!*
- Added 2" 16 oz. aluminum vents - *New Product!*
- Added 3" 16 oz. vents - *New Product!*
- Added 4" flanged vents - *New Product!*
- Added 5" male and female threaded vents - *New Product!*

OVERFILL PREVENTION VALVES



- Added 9095SS valve - *New Product!*
- Added 9095DS valve - *New Product!*
- Added 9095C valve - *New Product!*
- Added Enhanced Vapor Recovery (EVR) models - *New Product!*

SPILL CONTAINERS/FILL PORTS



- Added 515OEM - *New Product!*
- Added 516 - *New Product!*
- Added Enhanced Vapor Recovery (EVR) models - *New Product!*
- Added 715 remote fill box - *New Product!*

PRESSURE/VACUUM VENTS



- Added 3" 749 vent - *New Product!*

TANK GAUGES



- Added 1018 series

Reference Updates

- UL 142 references updated according to 9th edition.
- NFPA 30 references updated from 2003 edition to 2008 edition.
- Addition of ULC S601-07 reference.

Morrison Bros. Co. is continuously adding new products, receiving third party approvals, and making product improvements where possible.

To view the most current version of this document or specific product specification sheets describing our products, visit our website at www.morbros.com or contact Morrison Customer Service at custserv@morbros.com.



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References

- NFPA 30 “Flammable and Combustible Liquids Code” 2008 Edition
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269
- UL 142 “Steel Aboveground Tanks” 9th Edition, December 28, 2006
UL Standards for Safety—UL Publication Stock, 333 Pfingsten Road, Northbrook, IL 60062, Tel (847) 272-8800
- ULC S601-07 Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids, December 2007, Underwriters’ Laboratories of Canada
7 Underwriters Rd., Toronto, ON M1R 3B4, (514) 757-3611
- API Std 2000 “Venting Atmospheric & Low Pressure Storage Tanks”
American Petroleum Institute—Fifth Edition, April 1998
1120 L Street, Northwest, Washington, DC 20005 Order #822-20000
- PEI RP200 “Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling”
Petroleum Equipment Institute, 2003 Edition, P.O. Box 2380. Tulsa, OK, 74101
Tel (918) 494-9696
- Morrison Bros. Co. 507 East 7th Street, Dubuque, Iowa 52001. Tel (563) 583-5701



Background Information

The Morrison Bros. Co. Venting Guide was created to assist in equipment selection for aboveground storage tanks. Examples on the next two pages illustrate a vent selection process. It is best to work through the examples before attempting to use any of the tables in this book.

Tables include examples for standard sized tanks. The venting capacity charts and wetted area tables were taken directly from NFPA 30 and UL 142.

The vent selection chapter includes venting capacities of specific Morrison vents. This data was obtained from results of laboratory testing and engineering calculations. Catalog pages of the Morrison equipment follow the vent capacity chart.

Definitions

Emergency Venting — Venting sufficient to relieve excessive internal pressure in storage tanks caused by exposure fires. Venting rate may exceed requirements of normal atmospheric and product transfer effects. In such cases, the construction of the tank will determine if additional venting capacity must be provided.

Atmospheric Tank — A storage tank that has been designed to operate at pressures from atmospheric through 1.0 PSIG (760 mm Hg through 812 mm Hg) measured at the top of the tank (NFPA 30 Pg. 30-13). Pressure not to exceed 1.0 PSIG under normal operation, and 2.5 PSIG under emergency conditions (PEI RP-200).

Pressure Relieving Devices — Defined in NFPA 30 4.2.5.2.3, where entire dependence for emergency relief is placed upon pressure relieving devices, the total venting capacity of both normal and emergency vents shall be enough to prevent rupture of

the shell or bottom of the tank if vertical, or of the shell or heads if horizontal.

Wetted Area — Exposed surface or shell area of a tank used in determining the venting requirements needed for that size tank in event of an exposure fire. In a horizontal tank, the wetted area is calculated as 75% of the exposed surface area. In a vertical tank, the wetted area is calculated as the first 30 ft. above grade of the exposed shell area of the tank.

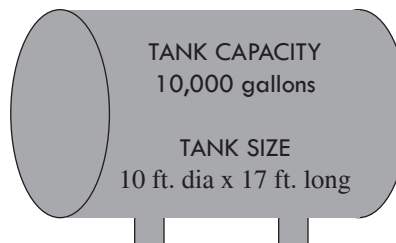
CFH — Abbreviation for Cubic Feet per Hour used to quantify or measure the airflow and degree of pressure relief for venting calculations.

Vent Capacity — The maximum rate of airflow (CFH) recorded under test conditions at a maximum pressure of 2.5 PSI for specific sized emergency vents. This capacity rating is often required to be indicated on the vent itself.



Vent Selection/Capacity Example 1

Horizontal Cylindrical Storage Tank



STEP 1 Precalculated Data for Common Sizes

Find tank size on Table A which can be found on page 6. Table lists wetted area and CFH for common sized horizontal tanks. For a 10' x 17' tank – wetted area = 518 sq. ft. and required vent capacity = 360,840 CFH. Proceed to Step 5.

STEP 2 Wetted Area Table

If tank size is NOT listed on Table A, page 6, wetted area can also be found on Table D, page 9. Follow grid for this example – 10' diameter x 17' length = 518 sq. ft. Proceed to Step 4.

STEP 3 Calculate Wetted Area

If the tank size is NOT on either chart, wetted area can be calculated. For Horizontal Tanks, wetted area = 75% of the total exposed surface area.

For a 10' x 17' tank:

$$0.75[2(\text{area of each end}) + (\text{area of shell})] = \text{wetted area}$$

$$\pi = 3.14, d = \text{diameter}, L = \text{length}, WA = \text{wetted area}$$

$$WA = 0.75[(\pi d^2 \div 2) + (\pi dL)]$$

$$0.75[((3.14)(10^2) \div 2) + (3.14)(10)(17)]$$

$$WA = 518 \text{ sq. ft.}$$

STEP 4 Determine CFH Requirement

Use Table F: Venting Capacity Chart on page 11. Wetted area must be known (518 sq. ft.). Since 518 is between 500 and 600 on the chart, interpolation is needed and is done as follows:

	600 sq. ft.	392,000	CFH
	500 sq. ft.	<u>354,000</u>	CFH
Difference =	100 sq. ft.	38,000	CFH

$$\frac{38,000}{100} = \frac{x}{(518-500)} \quad x = 6,840 \text{ CFH}$$

$$\text{Total CFH Required: } (6,840 + 354,000) = 360,840 \text{ CFH}$$

STEP 5 Vent Selection

Options based on size of piping, type of product, flow requirements, required venting capacity and mounting. For the sake of this example, use 2" piping, Class 1B liquid. The normal vent size should be no smaller than the system piping, so a Morrison 2" Fig. 548 (20,200 CFH) is selected.

Total required venting capacity for this tank example was determined to be 360,840 CFH. Normal venting and emergency venting may be combined to reach this total. Morrison Vent Capacities are listed on Table H, page 13. Since the 6" Emergency Vent (278,660 CFH) can not provide enough additional capacity to meet the requirement, an 8" Emergency Vent (504,818 CFH) is selected. In specifying pressure settings, it is recommended that the Emergency Vent NOT be less than the normal vent. Therefore, the vent specification for this example is as follows:

Normal Vent - 2" Fig 548	20,200	CFH
(8 oz pressure - 1 oz vacuum)		
Emergency Vent - 8" Fig 244O	<u>504,818</u>	CFH
(16 oz pressure)		
Total Venting Provided	525,018	CFH

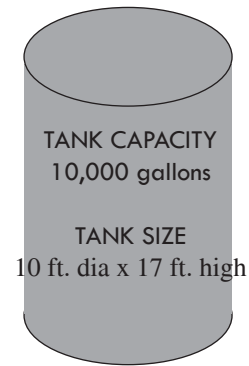
STEP 6 Verification

Refer to Table I on page 14 showing vent combinations and verify the total CFH figure. Also refer to the product illustrations on pages 15-19 and verify the selection for correct option on material compatibility and mounting requirements.



Vent Selection/Capacity Example 2

Vertical Cylindrical Storage Tank



STEP 1 Precalculated Data for Common Sizes

Find tank size on Table B which can be found on page 7. Table lists wetted area and CFH for common sized vertical tanks. For a 10' x 17' tank – wetted area = 534 sq. ft. and required vent capacity = 366,920 CFH. Proceed to Step 5.

STEP 2 Wetted Area Table

If tank size is NOT listed on Table B, page 7, wetted area can also be found on Table E, page 10. Follow grid for this example – 10' diameter x 17' height = 534 sq. ft. Proceed to Step 4.

STEP 3 Calculate Wetted Area

If the tank size is NOT on either chart, wetted area can be calculated. For Vertical Tanks, wetted area = area of shell to elevation not more than 30 ft. above the bottom.

For a 10' x 17' tank:

Wetted Area = (area of shell)

$\pi = 3.14$, d = diameter, L = length, WA = wetted area

$$WA = (\pi d)L \\ (3.14)(10)(17)$$

$$WA = 534 \text{ sq. ft.}$$

STEP 4 Determine CFH Requirement

Use Table F: Venting Capacity Chart on page 11. Wetted area must be known (534 sq. ft.). Since 534 is between 500 and 600 on the chart, interpolation is needed and is done as follows:

	600 sq. ft.	392,000	CFH
	500 sq. ft.	354,000	CFH
Difference =	100 sq. ft.	38,000	CFH

$$\frac{38,000}{100} = \frac{x}{(534-500)} \quad x = 12,920 \text{ CFH}$$

Total CFH Required: (12,920 + 354,000) = 366,920 CFH

STEP 5 Vent Selection

Options based on size of piping, type of product, flow requirements, required venting capacity and mounting. For the sake of this example, use 2" piping, Class 1B liquid. The normal vent size should be no smaller than the system piping, so a Morrison 2" Fig. 548 (20,200 CFH) is selected.

Total required venting capacity for this tank example was determined to be 366,920 CFH. Normal venting and emergency venting may be combined to reach this total. Morrison Vent Capacities are listed on Table H, page 13. Since the 6" Emergency Vent (278,660 CFH) can not provide enough additional capacity to meet the requirement, an 8" Emergency Vent (504,818 CFH) is selected. In specifying pressure settings, it is recommended that the Emergency Vent NOT be less than the normal vent. Therefore, the vent specification for this example is as follows:

Normal Vent - 2" Fig 548	20,200	CFH
(8 oz pressure - 1 oz vacuum)		
Emergency Vent - 8" Fig 244O	<u>504,818</u>	CFH
(16 oz pressure)		
Total Venting Provided	525,018	CFH

STEP 6 Verification

Refer to Table I on page 14 showing vent combinations and verify the total CFH figure. Also refer to the product illustrations on pages 15-19 and verify the selection for correct option on material compatibility and mounting requirements.



Vent Selection/Capacity Example 3

Horizontal Rectangular Storage Tank

TANK CAPACITY
10,000 gallons

TANK SIZE
274"L x 130"W x 65"H
(22'-10"L x 10'-10"W x 5'5"H)

STEP 1 Precalculated Data for Common Sizes

Find tank size on Table C which can be found on page 8. Table lists wetted area and CFH for common sized tanks. For a 274"L x 130"W x 65"H (22'10"L x 10'-10"W x 5'5"H) tank – wetted area = 612 sq. ft. and required vent capacity = 396,320 CFH. Proceed to Step 4.

STEP 2 Wetted Area Table

If tank size is NOT listed on Table C, page 8, wetted area can be calculated. For Horizontal Rectangular Tanks, wetted area = exposed shell area excluding the top surface of the tank.

For a 274"L x 130"W x 65"H tank:

$$\text{Wetted area} = \frac{(L \times W) + 2(L \times H) + 2(W \times H)}{144}$$

L = length, W = width, H = height

$$\frac{(274 \times 130) + 2(274 \times 65) + 2(130 \times 65)}{144}$$

Wetted Area = 612 Sq. ft.

STEP 3 Determine CFH Requirement

Use Table F: Venting Capacity Chart on page 11. Wetted area must be known (612 sq. ft.). Since 612 is between 600 and 700 on the chart, interpolation is needed and is done as follows:

	700 sq. ft.	428,000	CFH
	600 sq. ft.	<u>392,000</u>	CFH
Difference =	100 sq. ft.	36,000	CFH

$$\frac{36,000}{100} = \frac{x}{(612-600)} \quad x = 4,320 \text{ CFH}$$

Total CFH Required: (4,320 + 392,000) = 396,320 CFH

STEP 4 Vent Selection

Options based on size of piping, type of product, flow requirements, required venting capacity and mounting. For the sake of this example, use 2" piping, Class 1B liquid. The normal vent size should be no smaller than the system piping, so a Morrison 2" Fig. 548 (20,200 CFH) is selected.

Total required venting capacity for this tank example was determined to be 396,320 CFH. Normal venting and emergency venting may be combined to reach this total. Morrison Vent Capacities are listed on Table H, page 13. Since the 6" Emergency Vent (278,660 CFH) can not provide enough additional capacity to meet the requirement, an 8" Emergency Vent (504,818 CFH) is selected. In specifying pressure settings, it is recommended that the Emergency Vent NOT be less than the normal vent. Therefore, the vent specification for this example is as follows:

Normal Vent - 2" Fig 548 (8 oz pressure - 1 oz vacuum)	20,200	CFH
Emergency Vent - 8" Fig 244O (16 oz pressure)	<u>504,818</u>	CFH
Total Venting Provided	525,018	CFH

STEP 5 Verification

Refer to Table I on page 14 showing vent combinations and verify the total CFH figure. Also refer to the product illustrations on pages 15-19 and verify the selection for correct option on material compatibility and mounting requirements.

**Table A: Pre-Calculated Data**

Horizontal Cylindrical Tanks

TANK			WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE WITHOUT SCREEN (Inches)	EMERGENCY VENT SIZE WITH SCREEN (Inches)
CAPACITY (Gallons)	DIAMETER (Ft or In)	LENGTH (Ft-In)				
280	36"	5'-2"	47	49,520	3	3
300	38"	5'-0"	49	51,640	3	4
500	48"	5'-5"	69	72,650	4	4
530	46"	6'-0"	71	74,750	4	4
550	48"	6'-0"	75	78,950	4	4
1,000	48"	10'-8"	119	124,950	5	5
1,000	64"	6'-0"	109	114,450	5	5
1,500	64"	9'-0"	147	154,350	5	5
2,000	64"	12'-0"	184	193,200	6	6
2,500	64"	15'-0"	222	223,320	6	6
3,000	64"	18'-0"	259	243,680	6	6
3,000	6'-0"	14'-0"	240	233,400	6	NA
4,000	64"	24'-0"	335	281,100	8	NA
4,000	6'-0"	19'-0"	311	270,060	8	NA
5,000	8'-0"	13'-4"	326	276,960	8	NA
6,000	8'-0"	16'-0"	376	300,480	8	NA
8,000	8'-0"	21'-4"	477	344,340	8	NA
10,000	8'-0"	27'-0"	584	385,920	8	NA
10,000	9'-0"	21'-0"	540	369,200	8	NA
10,000	10'-0"	17'-0"	518	360,840	8	NA
10,000	10'-6"	15'-7"	515	359,700	8	NA
12,000	8'-0"	32'-0"	678	420,080	8	NA
12,000	9'-0"	25'-0"	625	401,000	8	NA
12,000	10'-0"	20'-6"	600	392,000	8	NA
12,000	11'-0"	17'-0"	583	385,540	8	NA
15,000	8'-0"	40'-0"	829	470,990	8	NA
15,000	10'-6"	23'-5"	703	429,020	8	NA
20,000	10'-0"	34'-2"	922	499,820	8	NA
20,000	10'-6"	31'-0"	896	491,760	8	NA
20,000	11'-0"	28'-0"	868	483,080	8	NA
25,000	10'-6"	38'-6"	1,082	537,530	10	NA
30,000	10'-6"	46'-3"	1,274	568,100	10	NA



Table B: Pre-Calculated Data

Vertical Cylindrical Tanks

TANK			WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE WITHOUT SCREEN (Inches)	EMERGENCY VENT SIZE WITH SCREEN (Inches)
CAPACITY (Gallons)	DIAMETER (Ft or In)	LENGTH (Ft-In)				
280	36"	5'-2"	48	50,580	3	3
300	38"	5'-0"	49	51,640	3	4
500	48"	5'-5"	68	71,600	4	4
530	46"	6'-0"	72	75,800	4	4
550	48"	6'-0"	75	78,950	4	4
1,000	48"	10'-8"	134	140,700	5	5
1,000	64"	6'-0"	100	105,000	5	5
1,500	64"	9'-0"	151	158,550	5	5
2,000	64"	12'-0"	201	213,100	6	6
2,500	64"	15'-0"	251	239,520	6	6
3,000	64"	18'-0"	301	265,460	6	6
3,000	6'-0"	14'-0"	263	245,760	6	NA
4,000	64"	24'-0"	402	312,840	8	NA
4,000	6'-0"	19'-0"	358	291,840	8	NA
5,000	8'-0"	13'-4"	335	281,100	8	NA
6,000	8'-0"	16'-0"	402	312,840	8	NA
8,000	8'-0"	21'-4"	536	367,680	8	NA
10,000	8'-0"	27'-0"	678	420,080	8	NA
10,000	9'-0"	21'-0"	593	389,340	8	NA
10,000	10'-0"	17'-0"	534	366,920	8	NA
10,000	10'-6"	15'-7"	514	359,320	8	NA
12,000	8'-0"	32'-0"	754	446,360	8	NA
12,000	9'-0"	25'-0"	706	430,040	8	NA
12,000	10'-0"	20'-6"	644	407,840	8	NA
12,000	11'-0"	17'-0"	587	387,060	8	NA
15,000	8'-0"	40'-0"	754	446,360	8	NA
15,000	10'-6"	23'-5"	764	449,760	8	NA
20,000	10'-0"	34'-2"	942	506,020	10	NA
20,000	10'-6"	31'-0"	990	520,900	10	NA
20,000	11'-0"	28'-0"	967	513,770	10	NA
25,000	10'-6"	38'-6"	990	520,900	10	NA

**Table C: Pre-Calculated Data****Horizontal Rectangular Tanks**

TANK				WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE WITHOUT SCREEN (Inches)	EMERGENCY VENT SIZE WITH SCREEN (Inches)
CAPACITY (Gallons)	LENGTH (Ft-In)	WIDTH (Ft-In)	HEIGHT (Ft-In)				
125	6'-8"	2'-9"	1'-0"	37	38,950	3	3
186	2'-8"	2'-8"	3'-6"	44	46,340	3	3
250	4'-4"	4'-0"	1'-11"	49	51,640	3	4
250	6'-8"	2'-9"	1'-11"	54	56,900	3	4
500	7'-6"	3'-0"	3'-0"	86	90,560	4	4
500	10'-0"	3'-6"	2'-0"	89	93,740	4	4
1,000	9'-8"	4'-8"	3'-0"	131	137,550	5	5
1,000	10'-0"	4'-7"	3'-	133	139,650	5	5
2,000	10'-2"	6'-11"	3'-10"	201	211,560	6	6
2,000	10'-8"	6'-4"	4'-0"	204	213,240	6	6
2,500	10'-2"	6'-11"	4'-9"	233	229,480	6	6
3,000	8'-6"	6'-10"	7'-2"	278	253,560	6	NA
3,000	13'-9"	5'-5"	5'-5"	282	255,640	6	NA
4,000	11'-4"	6'-10"	7'-2"	338	282,480	8	NA
4,000	18'-2"	5'-5"	5'-5"	354	289,920	8	NA
5,000	22'-9"	5'-5"	5'-5"	428	323,760	8	NA
6,000	13'-8"	10'-10"	5'-5"	413	317,460	8	NA
6,000	16'-5"	6'-10"	7'-2"	445	330,900	8	NA
6,000	27'-4"	5'-5"	5'-5"	503	355,140	8	NA
8,000	18'-2"	10'-10"	5'-5"	511	358,180	8	NA
8,000	21'-11"	6'-10"	7'-2"	562	377,560	8	NA
10,000	22'-10"	10'-10"	5'-5"	612	396,320	8	NA
10,000	27'-5"	6'-10"	7'-2"	678	420,080	8	NA
12,000	27'-4"	10'-10"	5'-5"	710	431,400	8	NA
12,000	32'-11"	6'-10"	7'-2"	795	460,300	8	NA



Table D: Approximate Wetted Areas

Horizontal Cylindrical Tanks

Tank Diameter	3 Ft	4 Ft	5 Ft	6 Ft	7 Ft	8 Ft	9 Ft	10 Ft	11 Ft	12 Ft	13 Ft
Tank Length	Approximate Wetted Area of Tanks With Flat Heads, Square Feet										
3 Ft	32										
4 Ft	39	55									
5 Ft	46	65	88								
6 Ft	53	74	100	128							
7 Ft	60	84	112	142	173						
8 Ft	67	93	124	156	190	226					
9 Ft	74	102	136	170	206	245	286				
10 Ft	81	112	147	184	223	264	308	353			
11 Ft	88	121	159	198	239	283	329	377	428		
12 Ft	95	131	171	213	256	301	350	400	454	509	
13 Ft	102	140	183	227	272	320	371	424	480	537	598
14 Ft	109	150	194	241	289	339	393	447	506	565	628
15 Ft	116	159	206	255	305	358	414	471	532	594	659
16 Ft	123	169	218	269	322	377	435	495	558	622	690
17 Ft	130	178	230	283	338	395	456	518	584	650	720
18 Ft	137	188	242	298	355	414	477	542	610	678	751
19 Ft		197	253	312	371	433	499	565	636	707	781
20 Ft		206	265	326	388	452	520	589	662	735	812
21 Ft		216	277	340	404	471	541	612	688	763	843
22 Ft		225	289	354	421	490	562	636	714	792	873
23 Ft		235	300	368	437	508	584	659	740	820	904
24 Ft		244	312	383	454	527	605	683	765	848	935
25 Ft			324	397	470	546	626	706	791	876	965
26 Ft			336	411	487	565	647	730	817	905	996
27 Ft			347	425	503	584	668	754	843	933	1027
28 Ft			359	440	520	603	690	777	869	961	1057
29 Ft			371	454	536	621	711	801	895	989	1088
30 Ft			383	468	553	640	732	824	921	1018	1118
31 Ft			395	482	569	659	753	848	947	1046	1149
32 Ft				496	586	678	775	871	973	1074	1180
33 Ft				510	602	697	796	895	999	1103	1210
34 Ft				524	619	715	817	918	1025	1131	1241
35 Ft				539	635	734	838	942	1051	1159	1272
36 Ft				553	652	753	860	966	1077	1187	1302
37 Ft				567	668	772	881	989	1103	1216	1333

Tank Diameter	3 Ft	4 Ft	5 Ft	6 Ft	7 Ft	8 Ft	9 Ft	10 Ft	11 Ft	12 Ft	13 Ft	
Tank Length	Approximate Wetted Area of Tanks With Flat Heads, Square Feet											
38 Ft						685	791	902	1013	1129	1244	1363
39 Ft						701	810	923	1036	1155	1272	1394
40 Ft						718	828	944	1060	1181	1301	1425
41 Ft						734	847	966	1083	1207	1329	1455
42 Ft						751	866	987	1107	1233	1357	1486
43 Ft						767	885	1008	1130	1259	1385	1517
44 Ft							904	1029	1154	1284	1414	1547
45 Ft							923	1051	1178	1310	1442	1578
46 Ft							941	1072	1201	1336	1470	1609
47 Ft							960	1093	1225	1362	1498	1639
48 Ft							979	1114	1248	1388	1527	1670
49 Ft							998	1135	1272	1414	1555	1700
50 Ft								1157	1295	1440	1583	1731
51 Ft								1178	1319	1466	1612	1762
52 Ft								1199	1342	1492	1640	1792
53 Ft								1220	1366	1518	1668	1823
54 Ft								1246	1389	1544	1697	1854
55 Ft								1263	1413	1570	1725	1884
56 Ft									1437	1593	1753	1915
57 Ft									1460	1622	1781	1945
58 Ft									1484	1648	1809	1976
59 Ft									1507	1674	1839	2007
60 Ft									1531	1700	1867	2037
61 Ft										1726	1895	2068
62 Ft										1752	1923	2099
63 Ft										1778	1951	2129
64 Ft										1803	1980	2160
65 Ft										1829	2007	2190
66 Ft										1855	2036	2221
67 Ft											2064	2252
68 Ft											2093	2282
69 Ft											2121	2313
70 Ft											2149	2343
71 Ft											2177	2374
72 Ft											2205	2405

SI Units: 1 Ft = 0.30 m; 1 sq ft = 0.09 sq m

Source for Chart: UL 142, Table A-2, 9th Edition, December 28, 2006



Table E: Approximate Wetted Areas

Vertical Cylindrical Tanks

(Area of Shell to Elevation Not More Than 30 Ft. Above Bottom)

Tank Diameter	3 Ft	4 Ft	5 Ft	6 Ft	7 Ft	8 Ft	9 Ft	10 Ft	11 Ft	12 Ft	13 Ft	14 Ft
Tank Length	Wetted Area, Square Feet											
3 Ft	28											
4 Ft	38	50										
5 Ft	47	63	79									
6 Ft	56	76	94	113								
7 Ft	66	88	110	132	154							
8 Ft	75	101	127	151	176	201						
9 Ft	85	113	141	170	198	226	255					
10 Ft	94	126	157	189	220	251	283	314				
11 Ft	103	139	173	208	242	276	311	345	381			
12 Ft	113	151	188	227	264	301	340	377	415	452		
13 Ft		164	204	246	286	326	368	408	450	490	531	
14 Ft		176	220	265	308	351	396	440	484	528	572	616
15 Ft		189	236	284	330	377	424	471	519	566	613	660
16 Ft		202	251	302	352	402	453	502	554	603	654	704
17 Ft			267	321	374	427	481	534	588	641	695	748
18 Ft			283	340	396	452	510	565	623	679	735	792
19 Ft			298	359	418	477	538	597	657	716	776	836
20 Ft			314	378	440	502	566	628	692	754	817	880
21 Ft				397	462	527	594	659	727	792	858	924
22 Ft				416	484	552	623	691	761	829	899	968
23 Ft				435	506	577	651	722	796	867	940	1012
24 Ft				454	528	602	679	757	830	905	981	1056
25 Ft					550	628	708	785	865	943	1021	1100
26 Ft					572	653	736	816	900	980	1062	1144
27 Ft					594	678	764	848	934	1018	1103	1188
28 Ft					616	703	792	879	969	1056	1144	1232
29 Ft						728	821	911	1003	1093	1185	1275
30 Ft						753	849	942	1038	1131	1226	1319

SI Units: 1 Ft = 0.30 m; 1 sq ft = 0.09 sq m

Source for Chart: UL 142, Table A-3, 9th Edition, December 28, 2006



Table F: Emergency Venting Capacity

Wetted Surface (Sq Ft.)	Venting Capacity (CFH)	Minimal Opening Nominal Pipe Size (Inches)
20	21,100	2
30	31,600	2
40	42,100	3
50	52,700	3
60	63,200	3
70	73,700	4
80	84,200	4
90	94,800	4
100	105,000	4
120	126,000	5
140	147,000	5
160	168,000	5
180	190,000	5
200	211,000	6
250	239,000	6
300	265,000	6
350	288,000	8
400	312,000	8
500	354,000	8
600	392,000	8
700	428,000	8
800	462,000	8
900	493,000	8
1000	524,000	10
1200	557,000	10
1400	587,000	10
1600	614,000	10
1800	639,000	10
2000	662,000	10
2400	704,000	10
2800 and over	742,000	10

- At 14.7 psia and 60° F (101.4 kPa and 16° C)
- Interpolate for intermediate values.
- These values taken from NFPA 30–2008, Table 22.7.3.2
- These pipe sizes apply only to open vent pipes to the specified diameter not more than 12 inches (0.3m) long and a pressure in tank of not more than 2.5 psig (17.1 kPa).
- If tank is to be equipped with a venting device or flame arrestor, the vent opening is to accommodate the venting device or flame arrestor in accordance with the listed CFH.

Normal Venting Recommendations

NFPA 30 — 2008

21.4.3.2 Normal vents shall be sized to be at least as large as the filling or withdrawal connection, whichever is larger, but in no case less than 1-1/4 in. (3.175 cm) nominal inside diameter.

**Table G: Gallon Capacity Per Foot of Length**

Diameter (Inches)	U.S. Gallons Per Ft Length	Diameter (Inches)	U.S. Gallons Per Ft Length	Diameter (Inches)	U.S. Gallons Per Ft Length
24	23.50	65	172.38	106	458.30
25	25.50	66	177.72	107	467.70
26	27.58	67	183.15	108	475.89
27	29.74	68	188.66	109	485.00
28	31.99	69	194.25	110	493.70
29	34.31	70	199.92	111	502.70
30	36.72	71	205.67	112	511.90
31	39.21	72	211.51	113	521.40
32	41.78	73	217.42	114	530.24
33	44.43	74	223.42	115	540.00
34	47.16	75	229.50	116	549.50
35	49.98	76	235.66	117	558.51
36	52.88	77	241.90	118	568.00
37	55.86	78	248.23	119	577.80
38	58.92	79	254.63	120	587.52
39	62.06	80	261.12	121	597.70
40	65.28	81	267.69	122	607.27
41	68.58	82	274.34	123	617.26
42	71.97	83	281.07	124	627.00
43	75.44	84	287.88	125	638.20
44	78.99	85	294.78	126	647.74
45	82.62	86	301.76	127	658.60
46	86.33	87	308.81	128	668.47
47	90.13	88	315.95	129	678.95
48	94.00	89	323.18	130	690.30
49	97.96	90	330.48	131	700.17
50	102.00	91	337.86	132	710.90
51	106.12	92	345.33	133	721.71
52	110.32	93	352.88	134	732.60
53	114.61	94	360.51	135	743.58
54	118.97	95	368.22	136	754.64
55	123.42	96	376.01	137	765.78
56	127.95	97	383.89	138	776.99
57	132.56	98	391.84	139	788.30
58	137.25	99	399.88	140	799.68
59	142.02	100	408.00	141	811.14
60	146.88	101	416.00	142	822.69
61	151.82	102	424.48	143	834.32
62	156.83	103	433.10	144	846.03
63	161.93	104	441.80		
64	167.12	105	449.82		



Table H: Vent Capacity

SIZE	FIG. NO.	MT. CON.	DESCRIPTION	PRESSURE oz/sq in.	CAPACITY CFH	DATA SOURCE
2"	351S	Female Thds	Flame Arrester	0	22,000	Tested at Ohio State Univ. by O. E. Buxton Jr. 1967
2"	351S/748A	Female Thds	Flame Arrester/Vent	2, 4, 6, or 8	15,500	Based on ISU Test of 2" 351S/548-748 - 8 oz by Kavanagh, 1990
2"	351S/748A	Female Thds	Flame Arrester/Vent	12 or 16	13,000	Based on ISU Test of 2" 351S/548-748 - 8 oz by Kavanagh, 1990
1-1/2"	354	Female Slip On	Updraft Vent	0	27,650	Tested at Iowa State University by P. Kavanagh, 1990
2"	354	Female Slip On	Updraft Vent	0	27,650	Tested at Univ. Wisconsin Platteville by L. Lee, 1988
3"	354	Female Slip On	Updraft Vent	0	59,000	Tested at Univ. Wisconsin Platteville by L. Lee, 1996
4"	354	Female Slip On	Updraft Vent	0	116,900	Tested at Continental Disc Corp, 1997
2"	548-748	Female Thds	Pressure Vacuum Vent	2, 4, 6, or 8	20,200	Based on ISU Test of 2" 548 - 8 oz by Kavanagh, 1960
2"	548-748	Female Thds	Pressure Vacuum Vent	12	18,600	Based on ISU Test of 2" 548 - 8 oz by Kavanagh, 1960
2"	548-748	Female Thds	Pressure Vacuum Vent	16	18,000	Tested at Iowa State Univ. by P. Kavanagh, 1960
2"	749	Female Thds/Slip On	Pressure Vacuum Vent	8	8,500	Tested at Univ. Wisconsin Platteville by L. Lee, 1988
2"	749	Female Thds/Slip On	Pressure Vacuum Vent	12	8,500	Tested at Univ. Wisconsin Platteville by L. Lee, 1988
2"	749 CRB	Female Thds/Slip On	Pressure Vacuum Vent	1.70	11,000	Tested at Univ. Wisconsin Platteville by L. Lee, 1996
3"	749	Female Thds/Slip On	Pressure Vacuum Vent	8	8,500	Tested at Univ. Wisconsin Platteville by L. Lee, 1988
3"	749	Female Thds/Slip On	Pressure Vacuum Vent	12	8,500	Tested at Univ. Wisconsin Platteville by L. Lee, 1988
3"	749 CRB	Female Thds/Slip On	Pressure Vacuum Vent	1.70	11,000	Tested at Univ. Wisconsin Platteville by L. Lee, 1996
3"	548	Female Thds	Pressure Vacuum Vent	2, 4, 6, or 8	43,000	Based on ISU Test of 3" 548 - 8 oz by Kavanagh, 1990
3"	548	Female Thds	Pressure Vacuum Vent	12 or 16	40,000	Based on ISU Test of 3" 548 - 16 oz by P. Kavanagh, 1990
2"	244OM	Male Thds	Emergency Vent	8	31,917	Tested at Continental Disc Corp., 2010
2"	244OMS	Male Thds	Emergency Vent w/ Screen	8	24,069	Tested at Continental Disc Corp., 2010
3"	244 OM	Male Thds	Emergency Vent	8 or 16	60,994	Tested at Continental Disc Corp., 2010
3"	244OMS	Male Thds	Emergency Vent w/ Screen	8 or 16	51,076	Tested at Continental Disc Corp., 2010
4"	244OM	Male Thds	Emergency Vent	8 or 16	131,700	Tested at Continental Disc Corp., 2010
4"	244OMS	Male Thds	Emergency Vent w/ Screen	8 or 16	117,160	Tested at Continental Disc Corp., 2010
4"	244O	Female Thds	Emergency Vent	8 or 16	131,700	Tested at Continental Disc Corp., 2010
4"	244OS	Female Thds	Emergency Vent w/ Screen	8 or 16	117,160	Tested at Continental Disc Corp., 2010
5"	244O	Female Thds	Emergency Vent	8 or 16	184,651	Tested at Continental Disc Corp., 2010
5"	244OS	Female Thds	Emergency Vent w/ Screen	8 or 16	161,094	Tested at Continental Disc Corp., 2010
5"	244OM	Male Thds	Emergency Vent	8 or 16	184,651	Tested at Continental Disc Corp., 2010
5"	244OMS	Male Thds	Emergency Vent w/ Screen	8 or 16	161,094	Tested at Continental Disc Corp., 2010
6"	244O	Female Thds	Emergency Vent	8 or 16	278,660	Tested at Continental Disc Corp., 2010
6"	244OS	Female Thds	Emergency Vent w/ Screen	8 or 16	232,638	Tested at Continental Disc Corp., 2010
6"	244OF	Flanged	Emergency Vent	8 or 16	278,660	Tested at Continental Disc Corp., 2010
6"	244OFS	Flanged	Emergency Vent w/ Screen	8 or 16	232,638	Tested at Continental Disc Corp., 2010
6"	244OM	Male Thds	Emergency Vent	8 or 16	278,660	Tested at Continental Disc Corp., 2010
6"	244OMS	Male Thds	Emergency Vent w/ Screen	8 or 16	232,638	Tested at Continental Disc Corp., 2010
8"	244O	Female Thds	Female Emergency Vent	8 or 16	504,818	UL Calc based on Continental Disc Corp. test of 244 Series, 2010
8"	244OF	Flanged	Emergency Vent	8 or 16	504,818	UL Calc based on Continental Disc Corp. test of 244 Series, 2010
8"	244OM	Male Thds	Male Emergency Vent	8 or 16	504,818	UL Calc based on Continental Disc Corp. test of 244 Series, 2010
10"	244OF	Flanged	Flanged Emergency Vent	2.5, 8, or 16	881,670	UL Calc based on Continental Disc Corp. test of 244 Series, 2010
2"	922	Female Thds	Pressure Vacuum Vent Alarm	6	30,120	Tested at Environ Laboratories, 2006
2"	922	Female Thds	Pressure Vacuum Vent Alarm	8	30,300	Tested at Environ Laboratories, 2006
3"	922	Female Thds	Pressure Vacuum Vent Alarm	6	44,160	Tested at Environ Laboratories, 2006
3"	922	Female Thds	Pressure Vacuum Vent Alarm	8	43,080	Tested at Environ Laboratories, 2006



Table I: Vent Combination Examples

	MORRISON VENTS	CFH		MORRISON VENTS	CFH
1.	2" Fig. 548 - 4 oz P	20,200	7.	3" Fig. 548 - 4 oz P	43,000
	4" Fig. 244O - 8 oz P.....	<u>131,700</u>		4" Fig. 244O - 8 oz P.....	<u>131,700</u>
	TOTAL CFH	151,900		TOTAL CFH	174,700
2.	2" Fig. 548 - 8 oz P	20,200	8.	3" Fig. 548 - 8 oz P	43,000
	6" Fig. 244O - 16 oz P	<u>278,660</u>		6" Fig. 244O - 16 oz P	<u>278,660</u>
	TOTAL CFH	298,860		TOTAL CFH	321,660
3.	2" Fig. 548 - 8 oz P	20,200	9.	3" Fig. 548 - 8 oz P	43,000
	8" Fig. 244O - 16 oz P	<u>504,818</u>		8" Fig. 244O - 16 oz P	<u>504,818</u>
	TOTAL CFH	525,018		TOTAL CFH	547,818
4.	2" Fig. 548 - 8 oz P	20,200	10.	3" Fig. 922 - 8 oz P	30,300
	10" Fig. 244OF - 16 oz P	<u>881,670</u>		10" Fig. 244OF - 16 oz P	<u>881,670</u>
	TOTAL CFH	901,870		TOTAL CFH	911,970
5.	2" Fig. 548 - 8 oz P	20,200	11.	3" Fig. 548 - 8 oz P	43,000
	10" Fig. 244OF - 8 oz P.....	<u>881,670</u>		10" Fig. 244OF - 8 oz P.....	<u>881,670</u>
	TOTAL CFH	901,870		TOTAL CFH	924,670
6.	2" Fig. 548 - 8 oz P	20,200	12.	3" Fig. 548 - 8 oz P	43,000
	10" Fig. 244OF - 2.5 oz P	<u>881,670</u>		10" Fig. 244OF - 2.5 oz P	<u>881,670</u>
	TOTAL CFH	901,870		TOTAL CFH	924,670

Note: All calculations above are less screens.



244 Series



Emergency Vent

Emergency vent (pressure relief only) used on aboveground storage tanks, as a code requirement that helps prevent the tanks from becoming over-pressurized and rupturing if exposed to fire.



Fig.244O



Fig.244OM

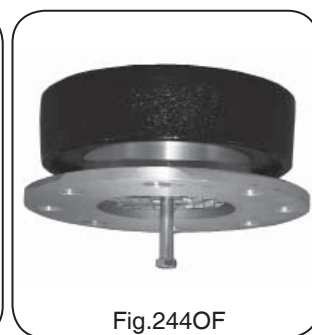


Fig.244OF

Description

The 244 emergency vent consists of a body and a black powder coated cover (2" not powder coated) that moves up and down on a center pin. Pressure inside the tank forces the cover to lift up off the vent seat, allowing air to exhaust. The center pin guides the movement. When pressure falls the cover lowers back down onto seat and the vent is automatically reset.

Code Compliance

When properly sized for the tank, this vent will conform to the requirements of NFPA 30, 30A, UL 142, UL 2244, ULC S601, API 2000, and PEI RP200.

WARNING...The 244 emergency vent is for "emergency pressure relief only" and must be used in conjunction with a "normal vent" or pressure vacuum vent such as a Morrison Fig. 354, 548, 748, 749 or 922.

WARNING...The 244 emergency vent must be properly sized and selected for each specific tank application in order to meet the proper "venting capacity" requirements. See pages 6, 7, and 8 for further instructions.

Fig. No.	Size	Opening Pressure Setting (oz/sq in)	Ship Weight (lbs)	Venting Capacity (*Est. CFH @ 2.5 PSI)	Mounting Connection	
244O	4"	8.0	10.00	131,700	Female NPT	
		16.0*	18.00	131,700	Female NPT	
	5"	8.0	14.00	184,651	Female NPT	
		16.0*	27.00	184,651	Female NPT	
	6"	8.0*	19.00	278,660	Female NPT	
		16.0*	36.00	278,660	Female NPT	
	8"	8.0*	33.00	504,818	Female NPT	
		16.0*	62.00	504,818	Female NPT	
244OF	4"	8.0	11.00	131,700	Flanged	
		16.0	20.00	131,700	Flanged	
	6"	8.0	21.00	278,660	Flanged	
		16.0	38.00	278,660	Flanged	
	8"	8.0	33.00	504,818	Flanged	
		16.0	67.00	504,818	Flanged	
	10"	2.5	25.00	881,670	Flanged	
		8.0	57.00	881,670	Flanged	
		16.0	103.00	881,670	Flanged	
	244OM	2"	8.0	1.0	31,917	Male NPT
			16.0*	0.4	31,917	Male NPT
		3"	8.0	7.00	60,994	Male NPT
16.0*			11.00	60,994	Male NPT	
4"		8.0	10.00	131,700	Male NPT	
		16.0*	19.00	131,700	Male NPT	
5"		8.0	15.00	184,651	Male NPT	
		16.0*	28.00	184,651	Male NPT	
6"		8.0*	20.00	278,660	Male NPT	
		16.0*	37.00	278,660	Male NPT	
8"		8.0*	34.00	504,818	Male NPT	
		16.0*	63.00	504,818	Male NPT	

Material and Configuration Options

Aluminum Body or Iron Body...suffix (I) indicates iron.

Standard Seat (Viton®)...suffix (O) indicates o-ring. EVR models are Viton® B.

Male/Female NPT/BSP or Flanged Mounting Connection...suffix (M) indicates male, and suffix (F) indicates flanged. BSP threads available.

Opening Pressure Setting...settings indicated are approximate.

Screens... 4 mesh stainless steel screens available in 2". 3 mesh stainless steel screens available in 3", 4", 5", and 6".

Emergency vent should be set higher than the normal vent so the normal vent operates first.

Use EVR models to comply with pressure decay test. Contact factory for assistance.

Fig. No.	Size	Opening Pressure Setting (oz/sq in)	Ship Weight (lbs)	Venting Capacity (*Estimated CFH @ 2.5 PSI)	Mounting Connection
244OI	4"	8.0	12.00	131,700	Female NPT
		16.0	21.00	131,700	Female NPT
	6"	8.0	22.00	278,660	Female NPT
		16.0	39.00	278,660	Female NPT
	8"	8.0	39.00	504,818	Female NPT
244OMI	3"	8.0	8.00	60,994	Male NPT
		16.0	13.00	131,700	Male NPT
	4"	8.0	13.00	131,700	Male NPT
		16.0	22.00	131,700	Male NPT
	6"	8.0	26.00	278,660	Male NPT
		16.0	43.00	278,660	Male NPT
	8"	8.0	42.00	504,818	Male NPT
		16.0	71.00	504,818	Male NPT

* indicates EVR models available.

WARNING...Do not fill or unload fuel from a storage tank unless it is certain that the tank vents will operate properly. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank. Normal vents such as pressure vacuum and updraft vents for aboveground storage tanks should be sized according to NFPA 30 (2008) 21.4.3



244A

Flanged Adaptor

The 244A is for use with Fig. 244OF.

Construction Details

Carbon steel welded rim and skirt.



Size	Weight
6" (eight 7/8" holes on 9 1/2" B.C.)	12.0 lbs
8" (eight 7/8" holes on 11 3/4" B.C.)	19.0 lbs
10" (twelve 1" holes on 14 1/4" B.C.)	20.0 lbs

244C

Companion Flange

The 244C is for use with Fig. 244OF.

Construction Details

Cast iron with NPT "center port" I.D.

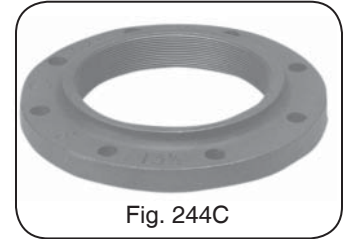


Fig. 244C

Size	Weight
8" (eight 7/8" holes on 11 3/4" B.C. w/8" NPT I.D.)	27.0 lbs
10" (twelve 1" holes on 14 1/4" B.C. w/10" NPT I.D.)	36.0 lbs

244N

Pipe Nipple

Available (T.O.E.) Threaded One End or (T.B.E.) Threaded Both Ends.



Fig. 244N

Construction Details

Carbon steel —NPT

Size	Weight
4" x 8"	7.00 lbs
6" x 8"	13.0 lbs
8" x 8"	20.0 lbs
8" x 12"	28.0 lbs



548 Series

Pressure/Vacuum Vent

With Gauge Hatch...for “normal” venting of above-ground storage tanks. Allows tank to “breathe” during filling and discharging operations. Pressure/vacuum poppets seal vapors in the tank when pressure is equalized. This vent must be used in conjunction with an emergency vent and it is RECOMMENDED that the opening pressure setting is set below that of the emergency vent so the normal vent operates first. Settings are approximate.



Fig. 548

Construction Details

Fig. 548...brass body and hood. Brass (raised) metal-to-metal seats/poppets.

Fig. 548A...aluminum body and hood. Brass (raised) metal-to-metal seats/poppets. 2" available with British Pipe Threads.

Standard Features

1. Threaded gauge hatch for manual gauging access.
2. Horizontal discharge with field-adjustable, tripolar orientation.

Size	Pressure Setting (oz/sq in)	Vacuum Setting (oz/sq in)	Fig. 548 Ship Weight (lbs)	Fig. 548A Ship Weight (lbs)	Venting Capacity (CFH) (@2.5 PSI)
2"	2.0	1.0	13.25	7.00	20,200
	4.0	1.0	13.75	8.75	20,200
	6.0	1.0	14.25	8.50	20,200
	8.0	1.0	14.75	9.50	20,200
	12.0	1.0	15.75	10.50	18,600
	16.0	1.0	17.00	11.25	18,600
3"	2.0	1.0	26.25	12.25	43,000
	4.0	1.0	27.25	13.75	43,000
	6.0	1.0	28.25	15.00	43,000
	8.0	1.0	28.75	15.75	43,000
	12.0	1.0	29.25	15.75	40,000
	16.0	1.0	33.25	20.50	40,000

WARNING...Do not fill or unload fuel from a storage tank unless it is certain that the tank vents will operate properly. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank.

Normal vents such as pressure vacuum and updraft vents for above-ground storage tanks should be sized according to NFPA 30 (2008) 21.4.3

748A Series

Pressure/Vacuum Vent

For “normal” venting of above-ground storage tanks. Allows tank to “breathe” during filling and discharging operations. Pressure/vacuum poppets seal vapors in the tank when pressure is equalized. This vent must be used in conjunction with an emergency vent and it is RECOMMENDED that the opening pressure setting is set below that of the emergency vent so the normal vent operates first. Settings are approximate.

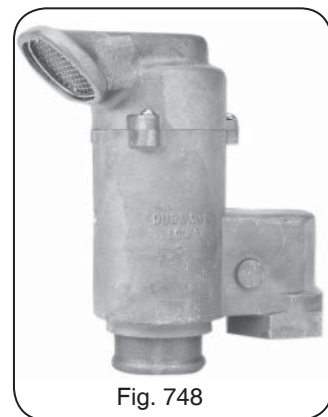


Fig. 748

Construction Details

Brass (raised) metal-to-metal seats/poppets; Aluminum body and hood.

Standard Features

1. Horizontal discharge with field-adjustable, tripolar orientation.
2. Optional pressure discharge NPT hood.

Size	Pressure Setting (oz/sq in)	Vacuum Setting (oz/sq in)	Fig. 748A Ship Weight (lbs)	Venting Capacity (CFH) (@2.5 PSI)
2"	2.0	1.0	6.75	20,200
	4.0	1.0	7.5	20,200
	6.0	1.0	8.25	20,200
	8.0	1.0	9.25	20,200
	12.0	1.0	10.50	18,600
	16.0	1.0	11.00	18,600

748ALT

Pressure-Vacuum Vent

For Ag-Chemical...vent valve used with aqua-ammonia and ag-chemical products allowing tank to “breathe” during filling/discharging operations. Poppets seal vapors in the tank when pressure is equalized. Settings are approximate.

Construction Details

Size...2" NPT
 Body and Cap...aluminum
 Poppets...Teflon® coated aluminum
 Screens...stainless steel

Option (must specify)...male NPT connection for dryer application
 Option...pressure discharge NPT hood



Fig. 748ALT

Pressure Setting (oz/sq in)	Vacuum Setting (oz/sq in)	Ship Weight (lbs)	Venting Capacity (CFH) (@ 2.5 PSI)
8.0	1.0	5.5	20,200
16.0	1.0	5.5	18,000
32.0	1.0	5.5	NA



749 Series

Pressure/Vacuum Vent

Vent valve used on underground and low volume aboveground tanks for motor fueling. Vent allows tank to "breathe" during filling and discharging operations. Poppets seal vapors in the tanks when pressure is equalized. Settings are approximate.

Fig. 749...2" or 3" NPT

Fig. 749S...2" or 3" slip-on style

Fig. 749CRB...2" or 3" NPT CARB approval (95-15A) for stage I and II (8 oz for stage I only). Viton® o-rings on pressure poppet.

Fig. 749CRBS...2" or 3" slip-on style CARB approval (95-15A) for stage I and II (8 oz for stage I only). Viton® o-rings on pressure poppet.

Fig. 749BSP...same as Fig. 749, but with British pipe threads.



Fig. 749

Construction Details

Body...aluminum
Pressure Poppet...aluminum
Vacuum Poppet...brass
Pipe Seal...Buna-N
Screen...brass

Fig. No.	Size	Pressure Setting (oz/in ²)	Vacuum Setting (oz/in ²)	Ship Weight (lbs)	Venting Capacity (CFH) (@ 2.5 PSI)
749	2"	8.0	0.5	1.0	8,500
749	2"	12.0	0.5	1.0	8,500
749	3"	8.0	0.5	1.55	8,500
749	3"	12.0	0.5	1.55	8,500
749S	2"	8.0	0.5	1.0	8,500
749S	2"	12.0	0.5	1.0	8,500
749S	3"	8.0	0.5	1.55	8,500
749S	3"	12.0	0.5	1.55	8,500
749CRB	2"	3"W.C.	8" W.C.	1.45	11,000
749CRB	3"	3"W.C.	8" W.C.	1.95	11,000
749CRBS	2"	8 oz	5 oz	1.45	11,000
749CRBS	3"	8 oz	5 oz	1.95	11,000
749BSP	2"	8.0	0.5	1.0	8,500
749BSP	2"	12.0	0.5	1.0	8,500

WARNING... Fig. 749 P/V vent must only be used in conjunction with motor fueling and/or low capacity flow. Fluid handling in lines larger than that used for retail service stations can cause tank to rupture or implode.

922

Combination Vent/Overfill Alarm

The Fig. 922 Combination Vent/Overfill Alarm is a fully mechanical, high intensity audible alarm that alerts you when your tank is near full while also allowing your tank to breathe during filling and dispensing operations. The unit is equipped with a whistle which incorporates a 2" or 3" full port pressure/vacuum vent. The unit can be set to activate at 90% fill height by adjusting the cable length to the float device. The adjustment tool is provided. The unit attaches to a 2" or 3" N.P.T. pipe mounted on the tank. Minimum fill rate for alarm to operate is 20 GPM.

2" Pressure relief setting 6 oz/in² or 8 oz/in²

2" Vacuum relief setting..... 1 oz/in²

2" Venting capacity (CFH)... 30,120 or 30,300

2" Weight..... 7.5 lbs

3" Pressure relief setting 6 oz/in² or 8 oz/in²

3" Vacuum relief setting..... 1 oz/in²

3" Venting capacity (CFH)... 43,020 or 44,160

3" Weight..... 5.25 lbs

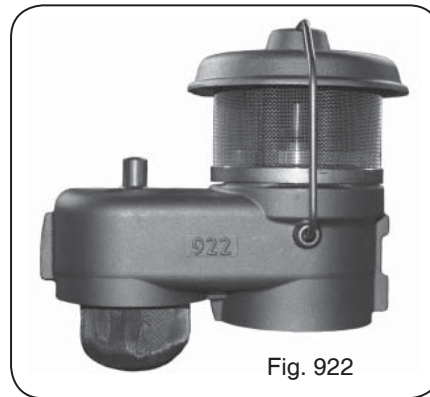


Fig. 922

Construction Details

Body...anodized aluminum
Screens...stainless steel
Rainguard...anodized aluminum
Seals...Viton®
Ball...Teflon
Float...stainless steel

Code Compliance

Florida DEP EQ 227

WARNING... In order for the Fig. 922 to function properly all emergency vents, fill connections, tank openings and piping connections must be airtight. Emergency vent should be set at least 2 oz. higher than the Fig. 922.

NOTE... 922 not for use on vapor recovery systems.

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351S

Flame Arrester

Open (non-pressure vacuum type) flame arrester to help prevent the transmission of heat and/or an ignition source into the tank.



Fig. 351S

Size	Weight
2" NPT	31.0 lbs

Construction Details

Body...cast iron
Cover...cast iron
Cap...brass
Arrester Plates...stainless steel

Standard Features

1. Gauge opening cap.
2. Vapor relief capacity at 2.5 PSI = 22,000 CFH

Restrictions and Warning

1. Do not use with acetylene, carbon disulfide, etheleneoxide or hydrogen gases. For use with normal hydrocarbon flames such as gasoline in air.
2. Routine inspection is required to ensure airways are clear and free of debris. Blocked airways can cause structural deformation of the tank.

351S & 748A

Flame Arrester

With 748A Vent...pressure vacuum type flame arrester to help prevent the transmission of heat and/or an ignition source into the tank.

Fig. 748A...same vent featured in pressure/vacuum vent section.

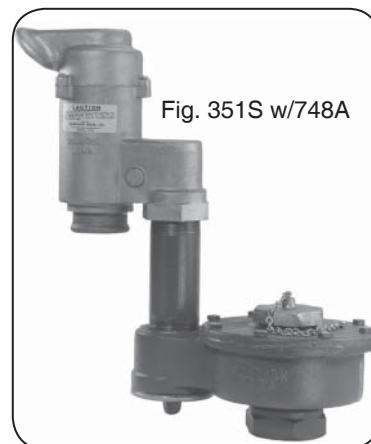


Fig. 351S w/748A

Construction Details

Fig.351S...Flame arrester
Fig. 748A...Pressure/vacuum vent

Size	Pressure Setting (oz/sq in)	Vacuum Setting (oz/sq in)	Fig. 748 Ship Weight (lbs)	Venting Capacity (CFH) (@2.5 PSI)
2"	2.0	1.0	42.00	15,500
	4.0	1.0	42.50	15,500
	6.0	1.0	42.75	15,500
	8.0	1.0	43.50	15,500
	12.0	1.0	44.50	13,000
	16.0	1.0	45.75	13,000

354

Updraft Vent

"Open" vent used on underground and aboveground tanks for motor fueling. Vent allows tank to "breathe" during filling/dispensing operations.



Fig. 354

Construction Details

Body...aluminum
Cap...aluminum
Screen...40 mesh brass

Size (slip-on)	Ship Weight (lbs)	Venting Capacity (CFH)
1½"	0.75	27,650
2"	0.75	27,650
3"	1.50	59,000
4"	2.25	116,900

NOTE...Open vents will allow unrestricted evaporation of product.

155S

Double Outlet Vent

Aluminum T-style vent used primarily on small fuel oil storage tanks. Outlet ports on either side of the inlet with 20 mesh stainless steel screen keeps debris out of the airway.

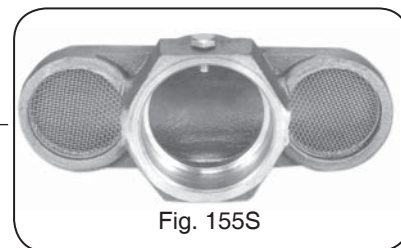


Fig. 155S

Fig. 155...threaded (NPT)
Fig. 155BSP...2" with British Pipe Threads
Fig. 155FA...2" with flash arrester
Fig. 155S...slip-on

Size	Weight
¾"	.25 lbs
1"	.50 lbs
1¼"	.50 lbs
1½"	.75 lbs
2"	1.0 lbs
3"	2.5 lbs

NOTE...Open vents will allow unrestricted evaporation of product.

WARNING...Do not fill or unload fuel from a storage tank unless it is certain that the tank vents will operate properly. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank. Normal vents such as pressure vacuum and updraft vents for aboveground storage tanks should be sized according to NFPA 30 (2008) 21.4.3



818 Series

Clock Gauge

Clock Gauge for measuring liquid level in aboveground storage tanks. Gauge mounts on top of tank and is activated by a float connected to a cable. Readout is on a 12 hour clock face.

Small hand = feet or meters
Large hand = inches or centimeters
Gauge can be read 20-30 ft away to within 1/8". Maximum measurement is 12 ft.

Fig. 818F...with female threads.

Fig. 818MET...with metric face.

Fig. 818MEF...with metric face and female threads.

Fig. 818MEB...with metric face and British pipe threads.

Fig. 818I...floating suction gauge.

Indicates change in liquid level.



Fig. 818



Fig. 818MET

Construction Details

Body...aluminum with 2" NPT/BSP Male/Female connection

Float...stainless steel

Cable...stainless steel

Standard Features

1. Vapor tight construction.
2. Swivel 360° for desired orientation.
3. High level/low level decals for application on lens cover.
4. Float fits through a 2" schedule 40 or 80 pipe nipple, and works with a Fig. 419, 2" Morrison drop tube.

Options (must specify)

1. Metric face plate (range = 3 m, 60 cm).
2. Extension leader for extended mounting above the tank.

918TCP

Overfill Alarm

Provides an audible alarm for either a high or low level warning. Incorporates an alarm box and a single-point level sensor. Contains a battery powered, intrinsically safe, alarm unit that is mounted remote from gauge.

The single point level sensor is immersed in the tank through a 2" NPT Female opening and is supported by a nylon liquid tight cable connector, Teflon tubing and wire.

The high or low activation point is set at the factory. The order length should be equal to the distance from the top of the 2" tank opening to the desired activation level.

The low level activation point can be set up to 113". The interstitial monitor level can be set up to 113" as well. Available with either 0-53" probe or 53"-113" probe.



Fig. 918TCP

918 Series

Clock Gauge Alarm

Utilizes the Fig. 818 style clock gauge with a built-in high level warning alarm. Contains a battery powered, intrinsically safe, alarm unit that is mounted remote from gauge. Alarm is set for desired level during installation and can be reset at any time for a change in alarm level requirements.

Fig. 918F...with female threads.

Fig. 918MEB...with metric face and British pipe threads.

Fig. 918MET...with metric face.

Fig. 918MEF...with metric face and female threads.

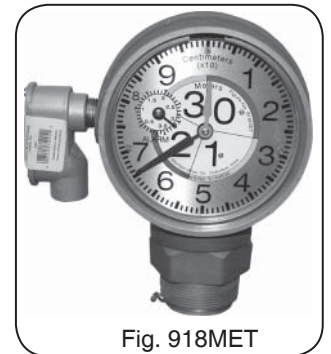


Fig. 918MET

Construction Details

Gauge Unit...Fig. 818 clock gauge style (same standard and optional features). Fig. 918 gauge has alarm dial and internal switch. Alarm dial is accessible on the clock face. Electrical junction box and lead wires for remote mounting are also included.

Alarm Unit... Plastic weatherproof housing, 90 decibel high pitched "beep" cycle alarm. Features a push-button test switch. Powered by two 9 volt batteries (included).

Code Compliance

Florida DEP EQ 527.

Only alarm box is UL Listed.

Construction Details

Sensor...The single point level sensor is immersed in the tank through a 2" NPT female opening and is supported by a nylon liquid tight cable connector, Teflon tubing and wire.

Alarm Box... Weatherproof, intrinsically safe, 90 decibel alarm that operates on two 9-volt batteries. It features a membrane-type test/cancel button.

Float and Weight... Stainless steel.

Code Compliance

Florida DEP EQ 527.

Only alarm box is UL Listed.



FMMASO-91 Series

Overfill Prevention Valve for Used Oil Systems

Patent 5007450...valve with optional alarm for use on used oil evacuation systems which use an air operated pump.



Operation

1. Valve installs in 2" bung opening at the top of the tank. Air supply is routed through the valve before going to the pump.
2. The valve will close off air supply to the pump when liquid level reaches 90% of tank capacity. Air is diverted to the audible signal on models FMMASO-91S and FMMASO-91EXS.
3. The valve will reset as liquid is removed from the tank and air pressure to the valve is turned off.

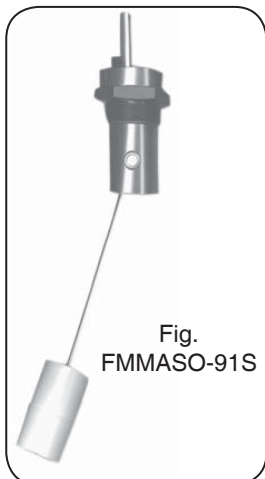


Fig. FMMASO-91S

Specifications

Valve Body and Collar...anodized aluminum
 Float...polypropylene
 Float Rod and Valve Spool...brass
 O-ring seals...Viton®
 Hardware... stainless and plated steel

Installation Collar...2" NPT
 Air inlet and outlet...¼" NPT
 Overall length (including float and audible signal)...20"
 Shipping weight...2.0 lbs
 Shipping weight (Fig. FMMASO-91EX)...4.5 lbs

Models

Fig. (FMMASO-91)...standard valve *without* audible signal.
 Fig. (FMMASO-91S)...standard valve *with* audible signal. BSP Part Number FMMASOB-91S.
 Fig. (FMMASO-91EX)...same as Fig. FMMASO-91, but with extended body for use on double wall or vaulted tanks.
 Fig. (FMMASO-91EXS)...same as Fig. FMMASO-91EX, but with audible signal.
 Fig. (FMMATO-91)...high level turn-on for sump applications (no signal).

Code Compliance

Florida DEP EQ 527.

618

Simplex Tank Gauge

Used for measuring liquid level in aboveground storage tanks. Best suited for vertical tanks over 12 ft high. Gauge readout by tape which passes over an indicator mounted at 3 ft height on the side of the tank. Activated mechanically by a float that rests on the liquid level. Float is connected to a cable that runs up through the top of the tank, across two pulleys, and down the side of the tank to the indicator position.

Construction Details

Tape sizes available: tape for up to 31' tank and tape for 31' to 50' tank

Standard Features

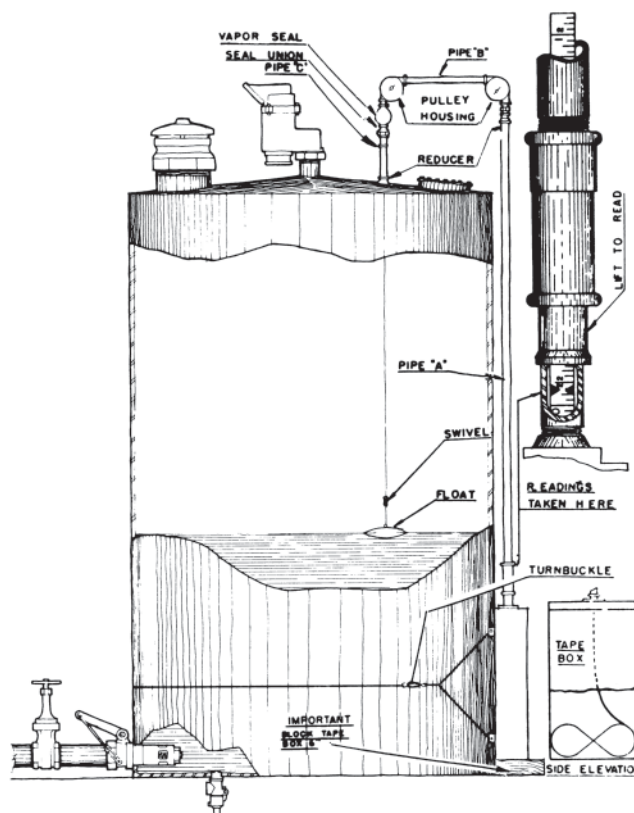
1. Round copper float
2. Tape
3. Stainless steel cable
4. Vapor seal

Options (must specify)

1. Round stainless steel float with swivel (10³/₈" diameter).
2. Brass cylindrical float (1¾" diameter, 32" long) with center swivel.
3. Stainless steel cylindrical float (1¾" diameter, 32" long) with center swivel.
4. Metric not available.

NOTE...Installation instructions are included, piping is not included.

NOTE...Cylindrical floats will pass through a 2" opening.





9095A



AST Overfill Prevention Valve

Installed at the fill port of an aboveground storage tank. Used in a tight fill application, the valve terminates flow of product when the liquid level reaches a preset warning level (90-95% full). The valve is installed on a standard NPT male connection when used with the quick disconnect or female adaptor. When installed to manufacturers requirements, the OPV valve can help eliminate environmentally hazardous spills. All models are supplied with an adaptor to mount to Morrison Fig. 419 aluminum drop tubes. A test mechanism is also sold separately. The test mechanism allows a technician to pull on the test line at any time during the filling process to actuate the float and stop the fill. This allows a technician to verify the valve is working properly. ULC listed.

Typical flow rate for 2" is 183 GPM at 10 PSI pressure drop. Typical flow rate for 3" is 566 GPM at 10 PSI pressure drop.

Fig 9095A-AV...compatible with aviation fuel systems and the Morrison Fig. 539 Diffuser.

Construction Details

- Adaptor...aluminum (hard-coat anodized)
- Female adaptor...ductile iron
- Body...anodized aluminum
- Plunger and dashpot...brass or nickel plated
- Shaft, linkages and hardware...stainless steel
- Piping...steel (epoxy coated)

Features

- Adjustable float (1½")...for setting the precise level of shutoff in the field and allowing it to be done using standard length pipe nipples.
- Immediate and cushioned shutoff...full flow up to within 1-2 seconds of closing and no abrupt kickback or jolt, or startling noise in the line when valve closes.
- One piece adaptor/coupler casting...no extra seams and joints to leak when top portion is under pressure from closing.
- Dry disconnect...after shut off product is allowed to automatically drain from the highest point so fill nozzle can be removed without spilling.
- Simple mechanics...minimum moving parts. Shutoff is activated by basic hydraulic principle with no springs, levers or complicated sequence leading to closure.

Code Compliance

NFPA 30, 30A, UFC, BOCA, SBCCI/SFC and PEI RP200.
Florida DEP EQ 356. CARB VR 402A (some models).

NOTE...For use on clean product only. Not suitable for motor oil.



Fig. 9095A



Fig. 9095A-EVR

Size	Weight
2" valve w/2" male quick disconnect x 4" female threads*	14.1 lbs
2" valve w/2" female threads x 4" female threads	14.1 lbs
2" valve w/2" female threads x 4" female threads, EVR	14.1 lbs
2" valve w/2" male quick disconnect remote fill adaptor	12.6 lbs
2" valve w/3" male quick disconnect x 4" female threads	14.1 lbs
2" valve w/3" female threads x 4" female threads	14.1 lbs
2" valve w/3" female threads x 4" female threads, EVR	21.25 lbs
2" valve w/2" dry disconnect adaptor x 4" female thds, EVR	21.25 lbs
2" valve less top and upper pipe, EVR	14.1 lbs
3" valve w/3" male quick disconnect x 6" female threads*	29.0 lbs
3" valve w/3" female threads x 6" female threads	38.0 lbs
3" valve w/3" female threads x 6" female threads, EVR	38.0 lbs
3" valve w/3" male quick disconnect remote fill adaptor	26.0 lbs
3" valve less top and upper pipe, EVR	21.25 lbs

*BSP Threads Available

Size	Maximum Pressure	Maximum Viscosity
2"	100PSI	150 Centistokes
3"	100PSI	60 Centistokes



9095S



AST Overfill Prevention Valve

Designed for use on low profile tanks that require a high level shut-off. The valve terminates the fill when the product reaches the preset level. The valve can be retrofitted on existing tanks and fits into a 2" opening. A tight fill connection is required for operation.

Sold with either a 2" Part F Male Threaded Adaptor or a 2" Part A Female Threaded Adaptor.

Typical flow rate is 110 GPM at 10 PSI pressure drop.

Size	Maximum Pressure	Maximum Viscosity
2"	100PSI	150 Centistokes

NOTE... For use on clean product only. Not suitable for motor oil.

NOTE... Cannot be installed in a drop tube.



Fig. 9095S

Construction Details

Adaptor...aluminum (hard-coat anodized)
 Body...anodized aluminum
 Float...polypropylene
 Plunger and dashpot...brass
 Upper tube and float guard...brass
 Shut off mechanism...anodized aluminum

Features

1. Adjustable float...for setting the precise level of shutoff in the field. The vertical float allows for installation in openings in close proximity to the tank walls.
2. Immediate and cushioned shutoff...full flow up to within 1-2 seconds of closing and no abrupt kickback or line shock when valve closes.
3. Dry disconnect...after shut off product is allowed to automatically drain from the highest point so fill nozzle can be removed without spilling.
4. Simple mechanics...minimum moving parts. Shutoff is activated by basic hydraulic principle with no springs, levers or complicated sequence leading to closure.

Code Compliance

Florida DEP EQ 696.

9095SS

AST Overfill Prevention Valve Stainless Steel

Designed for use on top loading storage tanks that require an overfill prevention valve. The valve terminates the fill when the product reaches the preset level. A tight fill connection is required for operation.

This valve can be retrofitted on existing tanks and fits a 2" opening.

Typical flow rate is 164 GPM at 10 PSI pressure drop.

For pressurized filling, a minimum 5 PSI and 5 GPM is required.

Size	Maximum Pressure	Maximum Viscosity
2"	100PSI	150 Centistokes

NOTE... For use on clean product only. Not suitable for motor oil.

NOTE... Cannot be installed in a drop tube.



Fig. 9095SS

Construction Details

Adaptor...stainless steel
 Body...stainless steel
 Float...polypropylene
 Plunger and dashpot...stainless steel
 Upper tube and float guard...stainless steel
 Shut off mechanism...stainless steel

Features

1. Adjustable float...for setting the precise level of shutoff in the field. The vertical float allows for installation in openings in close proximity to the tank walls.
2. Immediate and cushioned shutoff...full flow up to within 1-2 seconds of closing and no abrupt kickback or line shock when valve closes.
3. Dry disconnect...after shut off, product is allowed to automatically drain from the highest point so fill nozzle can be removed without spilling.
4. Simple mechanics...minimum moving parts. Shutoff is activated by basic hydraulic principle with no springs, levers or complicated sequence leading to closure.



9095DS

AST Overfill Prevention Valve

Designed for use on low profile top loading storage tanks that require a high level shut-off. Once the product reaches the preset level, the valve will close and allow minimal liquid to pass through to relieve the fill line pressure. A tight fill connection is required for operation.

The valve can be retrofitted on existing tanks and fits a 2" opening. This valve accepts a 1½ male threaded drop tube (not included).

Typical flow rate is 60 GPM at 60 PSI pressure drop. Typical flow rate is 26 GPM at 10 PSI pressure drop.

Minimum requirements: 10 PSI and 5 GPM.

Size	Maximum Pressure	Maximum Viscosity
2"	100PSI	150 Centistokes

NOTE... For use on clean product only. Not suitable for motor oil.



Fig. 9095DS

Construction Details

Adaptor... anodized aluminum
 Body...anodized aluminum
 Float...nitrophenyl-N
 Plunger and dashpot...brass
 Upper tube and float guard...aluminum
 Linkage...stainless steel
 Shut off mechanism...anodized aluminum

Features

1. Valve available in preset shut off heights of 2", 4", or 6".
2. Immediate and cushioned shutoff...full flow up to within 1-2 seconds of closing and no abrupt kickback or jolt, or startling noise in the line when valve closes.
3. Dry disconnect...after shut off product is allowed to automatically drain from the highest point so fill nozzle can be removed without spilling.
4. Simple mechanics...minimum moving parts. Shutoff is activated by basic hydraulic principle with no springs, levers or complicated sequence leading to closure.

9095C

AST Overfill Prevention Valve

Designed for use on low profile top loading storage tanks that require a high level shut-off up to 1.25 inches to the top of the tank. Once the product reaches the preset level, the valve will close and allow minimal liquid to pass through to relieve the fill line pressure. A tight fill connection is required for operation.

The valve can be retrofitted on existing tanks and fits a 4" opening. This valve accepts a 2" drop tube (not included).

Typical flow rate is 175 GPM at 10 PSI pressure drop.

Size	Maximum Pressure	Maximum Viscosity
2"	100PSI	300 Centistokes

NOTE... For use on clean product only.



Fig. 9095C

Construction Details

Adaptor...aluminum (hard-coat anodized)
 Body...anodized aluminum
 Float...nitrophenyl-N
 Plunger and dashpot...aluminum (hard-coated)
 Upper tube and float guard...e-coated steel
 Shut off mechanism...stainless steel

Features

1. Adjustable by increasing/decreasing the tank riser.
2. Immediate and cushioned shutoff...full flow up to within 1-2 seconds of closing and no abrupt kickback or jolt, or startling noise in the line when valve closes.
3. Dry disconnect...after shut off product is allowed to automatically drain from the highest point so fill nozzle can be removed without spilling.
4. Simple mechanics...minimum moving parts. Shutoff is activated by basic hydraulic principle with no springs, levers or complicated sequence leading to closure.



517 Series

3½ Gallon AST Spill Container

Installed on aboveground storage tanks for the purpose of containing small spills and drips from the fill nozzle. 3½ gallon capacity. Steel construction. Lockable and white powder coated. ULC listed.



Fig. 517



Fig. 517...spill containment. Male (NPT) x Male (NPT) connection.

Fig. 517F...spill containment. Female (NPT) x Female (NPT) connection.

Fig. 517WO...waste oil containment—Removable screen on inside of container so used filters, etc. can be allowed to drain. Male NPT riser connection.

Code Compliance

Florida DEP EQ 345.

Size	Weight
2" (517, 517F, and 517WO)	10.5 lbs
4" (517, 517F, and 517WO)	11.0 lbs

518 Series

7½ Gallon AST Spill Container

Installed on aboveground storage tanks for the purpose of containing small spills and drips from the fill nozzle. 7½ gallon capacity. Lockable with drain valve and vented lid. Connects to 4" male (NPT) riser, and is white powder coated. Female NPT x Female NPT.



Fig. 518

Fig. 518CC...same as 518 only with center tank mount opening.

Fig. 518M...2" or 4" Male.



Size	Weight
2"	20.0 lbs
4"	26.0 lbs

Code Compliance

Florida DEP EQ 345.

Construction Details

Body and lid (14 ga.)...steel
Drain Valve...brass
Drain O-ring...Viton®

516 Series

5 Gallon AST Spill Container

The Fig. 516 contains any spills that occur at the fill point on Aboveground Storage Tanks. It is designed to be mounted on top of the AST. The 5 gallon Fig. 516 has a lockable hinged cover. It is of steel construction and powdercoated white inside and out. It has an optional push type drain with a fluoroelastomer o-ring.



Fig. 516



Fig. 516...spill containment. Female (NPT) x Female (NPT) connection. Has a centered tank connection.

Fig. 516D...spill containment. Female (NPT) x Female (NPT) connection. Has a mechanical drain to the tank.

Fig. 516O...spill containment. Has an offset tank connection.

Fig. 516OD...spill containment. Offset with drain.

Fig. 516M...spill containment. Male centered.

Fig. 516MD...spill containment. Male with drain.

Fig. 516MO...spill containment. Male offset.

Fig. 516MOD...spill containment. Male offset with drain.

Code Compliance

Florida DEP EQ 725.

Size	Weight
2" (516, 516D, 516O, 516OD, and 516MO)	17 lbs
2" (516M)	16.5 lbs
2" (516MD and 516MOD)	17.5 lbs
4" (516, 516D, 516O, and 516OD)	21 lbs
4" (516M and 516MO)	19 lbs
4" (516MD and 516MOD)	20.5 lbs

Construction Details

Body and lid (14 ga.)...steel
Drain Valve...brass
Drain O-ring...Viton®



515 Series

AST Remote Spill Container

For use on aboveground storage tanks for the purpose of containing fuel spillage during remote tank filling operations. 15 gallon capacity. 12 gauge steel construction. Lockable lid, and powder coated white for durability. 1" NPT drain with locking ball valve included. Choice of one or two fill ports, 2", 3", 4" or combination. 2" bung for pump. Single column base is easily adjustable.

Fig. 515OEM...same as 515 but without the pedestal. Female threaded pipe openings enter on top of the container. Four 1/2" weld taps on the back. The 515OEM is not ULC Listed.



Fig. 515



Fig. 515OEM

Fig. 515 Front

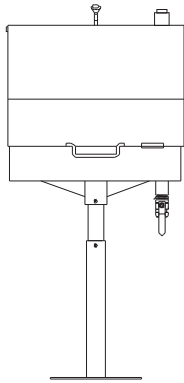


Fig. 515 Back (Single)

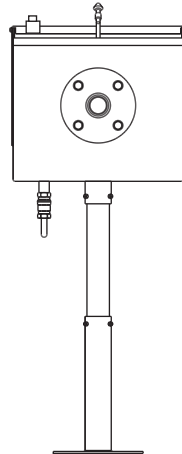
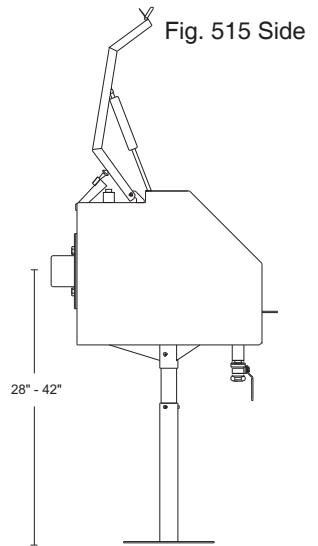
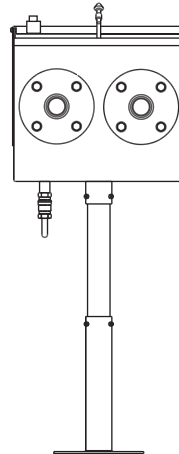


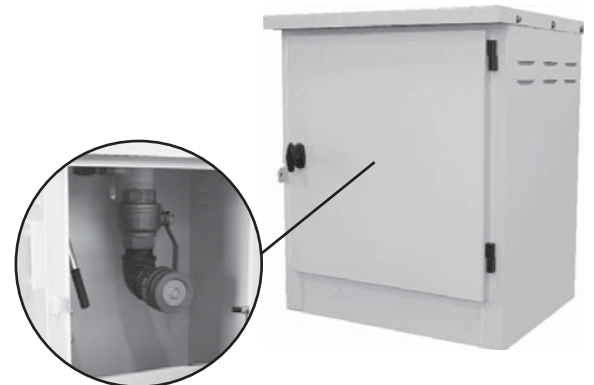
Fig. 515 Back (Double)



715 Series

AST Remote Fill Box

The Morrison 715 Series remote fill box is a simple 10 gallon capacity cabinet that provides containment of small spills during tank filling operations. The vented, weatherproof, lockable box is made of rugged 14 gauge steel and is powder coated for long lasting corrosion protection. The bottom is sloped toward the optional manually operated hand pump inlet allowing for easy product return of small spills to the tank. All models are supplied with a male threaded connection inside and outside. The 715 may be ordered with a ball valve and a choice between a female quick disconnect check valve coupler with dust plug, or a dry disconnect adaptor and cap factory installed. Vapor Recover adaptor and cap kit with U-bolts are also available. Each Unit is supplied with tank mount brackets for easy installation on storage tanks. ULC Listing is pending. Stainless steel models available in January 2012.



Size	Weight
3" 715 male threads (threads only)	101 lbs
2 & 3" 715 male threads with hand pump, female quick disconnect check and dust plug, and ball valve	
2 & 3" 715 male threads with hand pump, female quick disconnect check and dust plug, and ball valve, and vapor recovery cap & adaptor kit	
2 & 3" 715 male threads with hand pump, male dry disconnect adaptor, and ball valve	
2 & 3" 715 male threads with hand pump, male dry disconnect adaptor and ball valve, and vapor recovery cap & adaptor kit	

Construction Details

- Box & Door...14-gauge steel, powder coated white
- Ball Valve...Morrison 691 series brass
- Quick Disconnect Coupler & Cap...aluminum
- Dry Disconnect Adaptor & Cap...aluminum
- Vapor Recovery Adaptor...aluminum with Viton®
- Vapor Recovery Cap...die cast aluminum, powder coated orange
- Hand Pump... rugged steel construction, Teflon seals and Viton® o-rings

*Refer to our website for further details.



1018 Series

Electronic AST Gauge & Overfill Alarm

- Monitors 1 to 4 aboveground storage tanks per console. Each gauge can be located up to 1000 ft. from the console.
- Can measure tanks up to 35 ft. in height, including vertical or horizontal cylindrical tanks and rectangular tanks. Accurate to 0.1". Choose Feet-Inches, Inches or Gallons. Metric readout can also be selected as an option on the console.
- Easy-to-use software is capable of monitoring a network of 8 consoles and 32 tanks per site. Unlimited sites can be monitored from one PC. PC can be located up to 4,000 ft. from the console.
- Includes Windows XP compatible software for PC communication to console.
- Each gauge is numbered for visible tank identification. They are equipped with a mechanical readout of tank levels providing the ability to read tanks at a glance.
- A one-inch backlit LCD display allows for easy viewing from a distance, even at night. Arrows on the display indicate the tank being read and its current status.
- A Belden Cable #9842 for gauge heads and/or #9841 to PC or RCA is required for installation.
- Optional 9600 baud Remote Communications Adaptor (RCA) is also available.

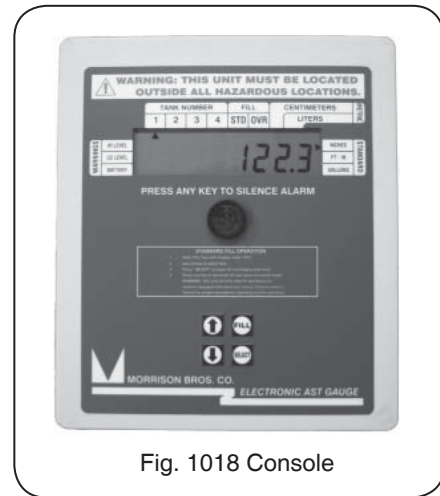


Fig. 1018 Console

Inventory Management

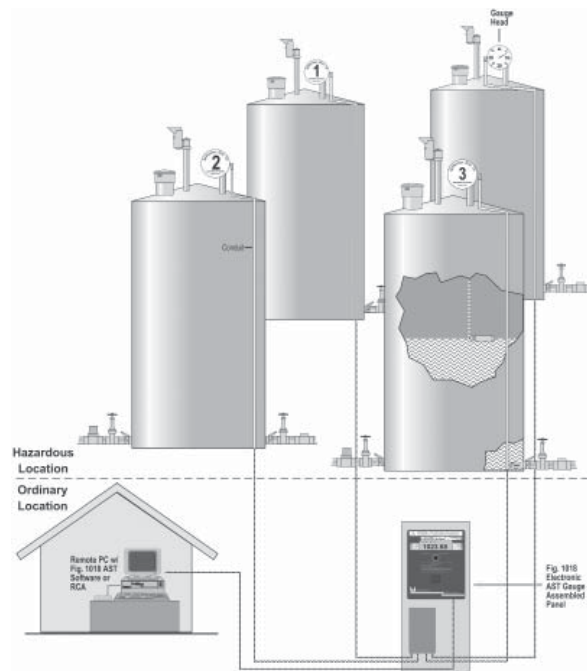
- In normal mode, console cycles through tanks and indicates product levels in each tank. During a fill, console provides real-time readout on active tank with ullage display prior to fill.
- Fill log database records the following:
 - Date and time at start of fill
 - Initial level of tank
 - Date and time at completion of fill
 - Ending level of tank
 - Indication if alarm was activated
- Tanks will be logged during filling and may be set to log up to three additional times per day.
- The console maintains memory of the last 100 events per tank. PC log will maintain indefinite log of tank activity and may be archived.
- Automatic memory save feature if power is lost or cut off.



Gauge Heads

Programming Features

- System can be programmed from console or PC. Once set, programming can be locked out at console to prevent tampering.
- System can be programmed to read your choice of gallons, inches, feet, inches, liters or centimeters.
- Programmable high and low level set points will activate when product level reaches preset height. Console is equipped with a 90 decibel alarm which activates at high level setting only.



Specifications

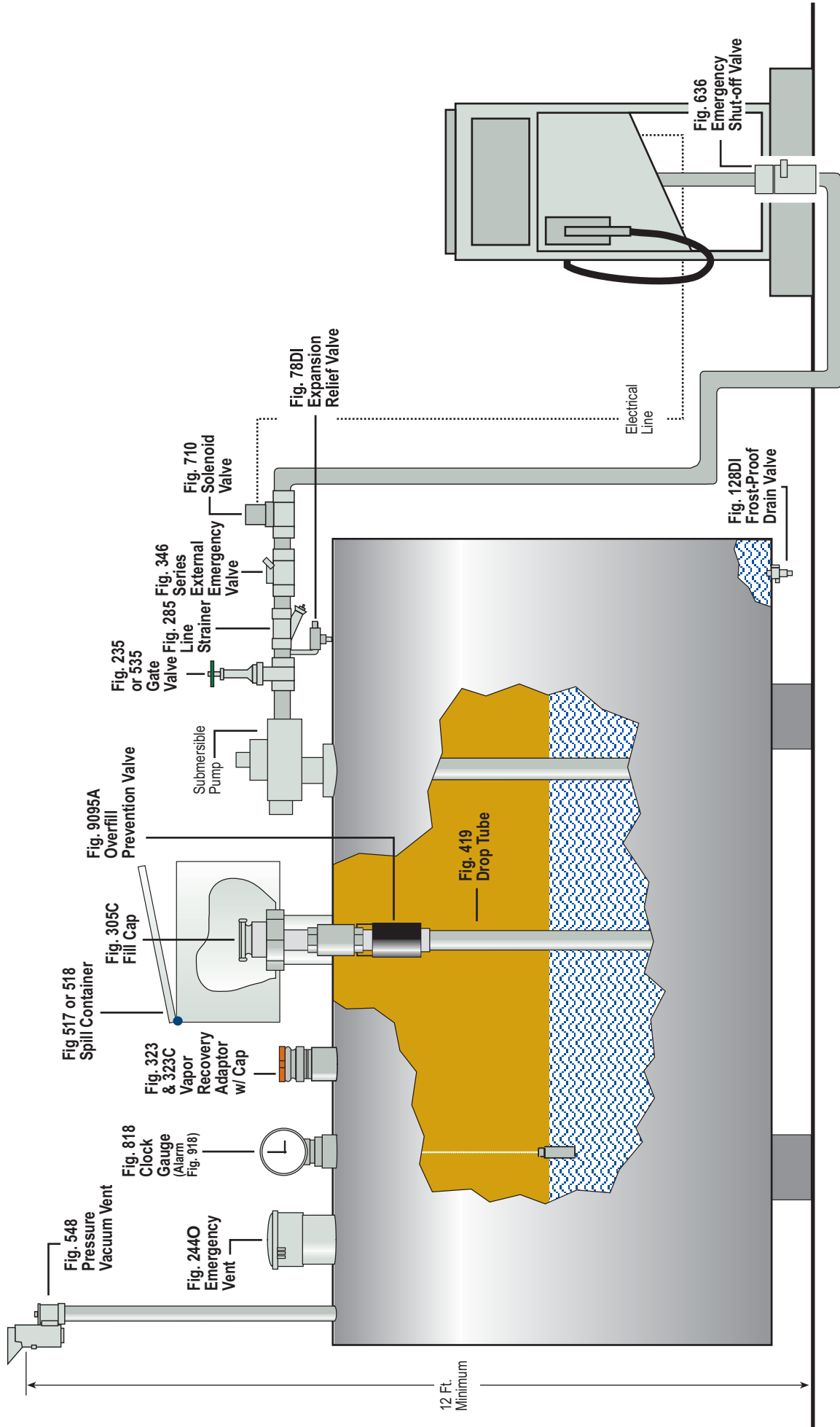
- Nominal outside dimensions of panel assembly: 17" W x 26" L x 7.25" D

Approvals & Safety Ratings

- Gauge Head: UL913 Edition 1, Class 1, Div 1, Group D, T4
- Barrier: UL913/UL and CSA Ordinary Location
- Console: UL and CSA 61010 Ordinary Location
- Temperature Range: -22^o to 140^o F or -30^o to 60^o C
- Voltage/Current Rating: 120 or 240 VAC/2A Max Per Assembled Panel

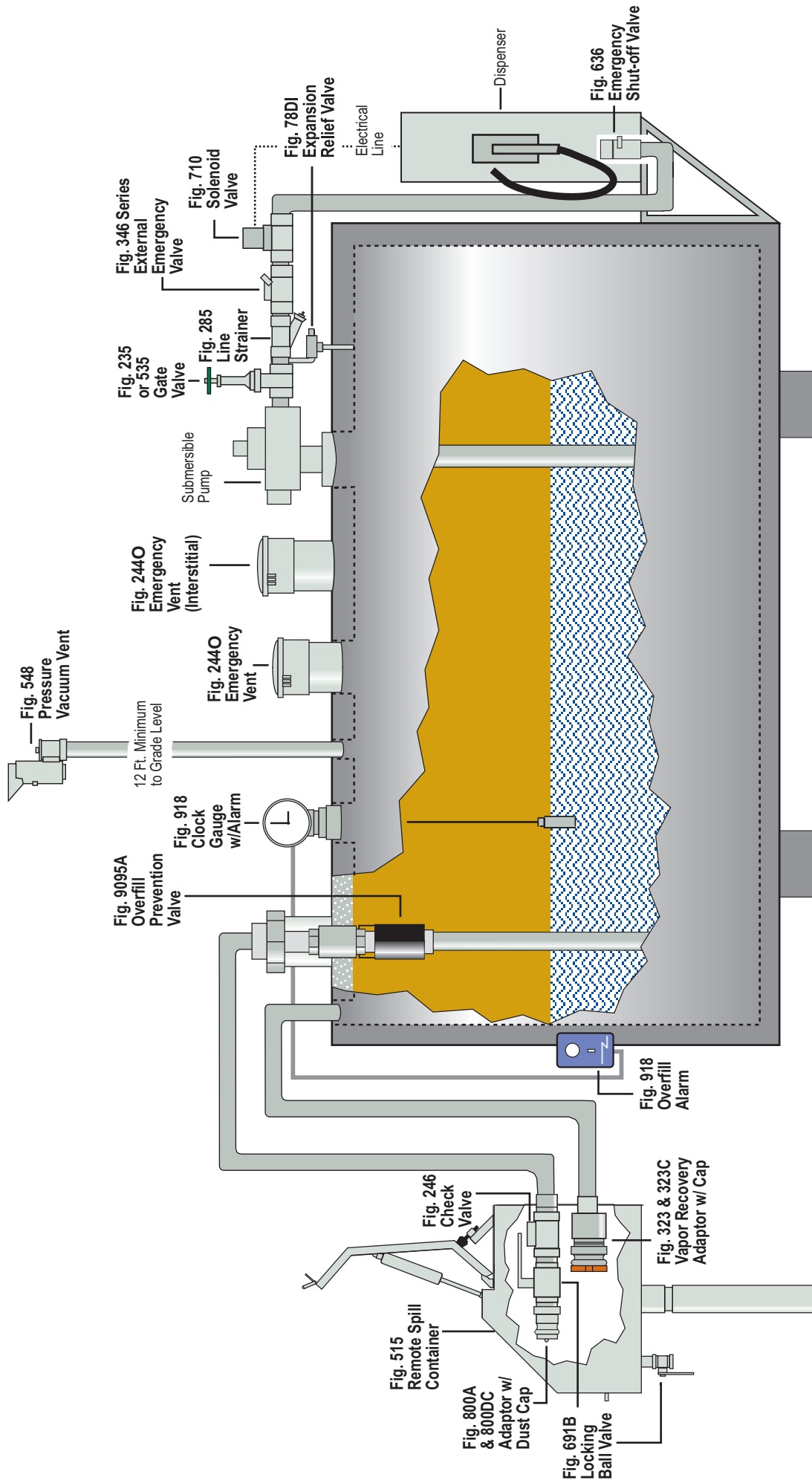
Aboveground Fuel Storage - Pressure System

Horizontal cylindrical tank with top fill and remote dispenser



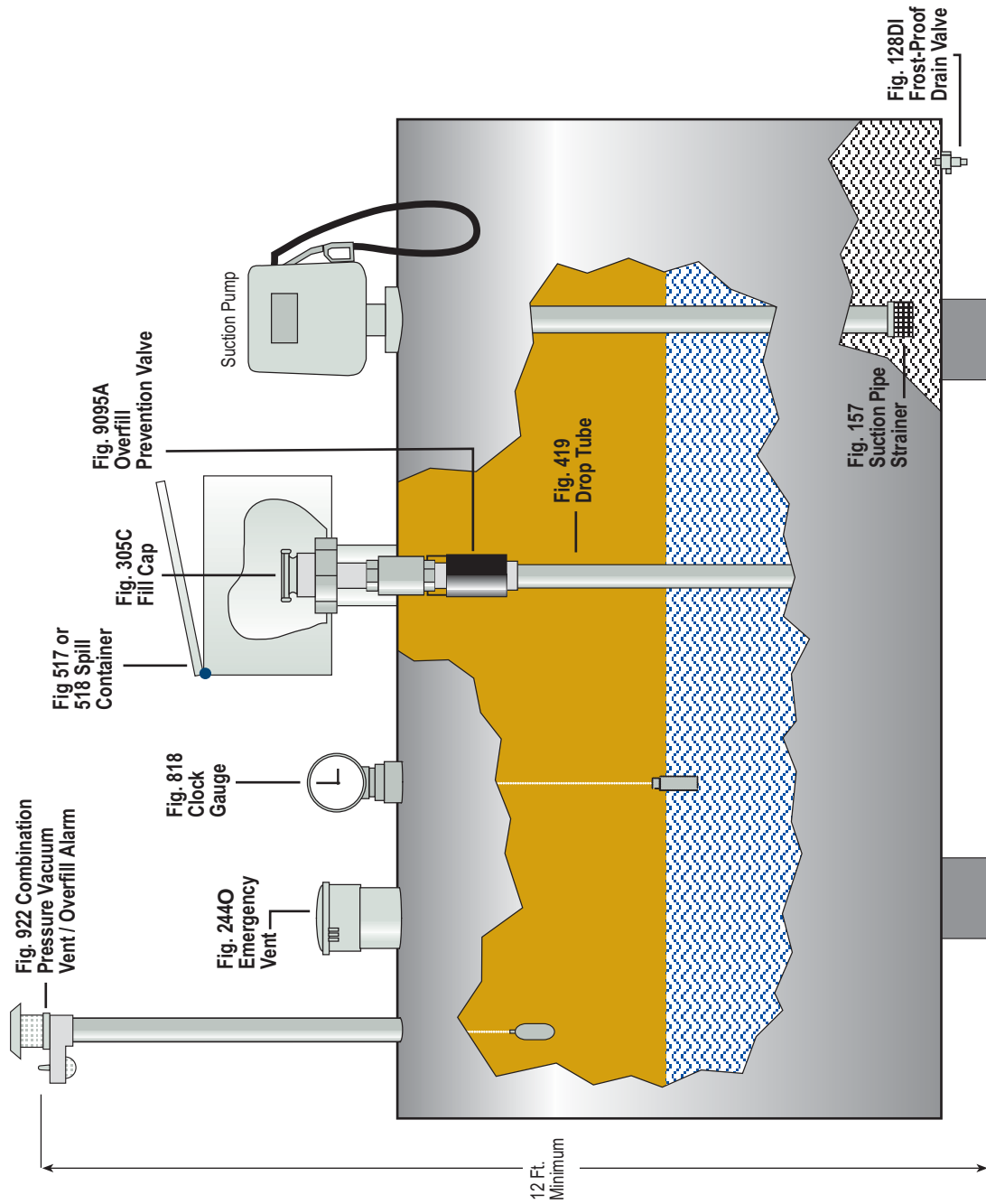
Aboveground Fuel Storage - Pressure System

Rectangular double-wall tank with remote fill and side mounted dispenser



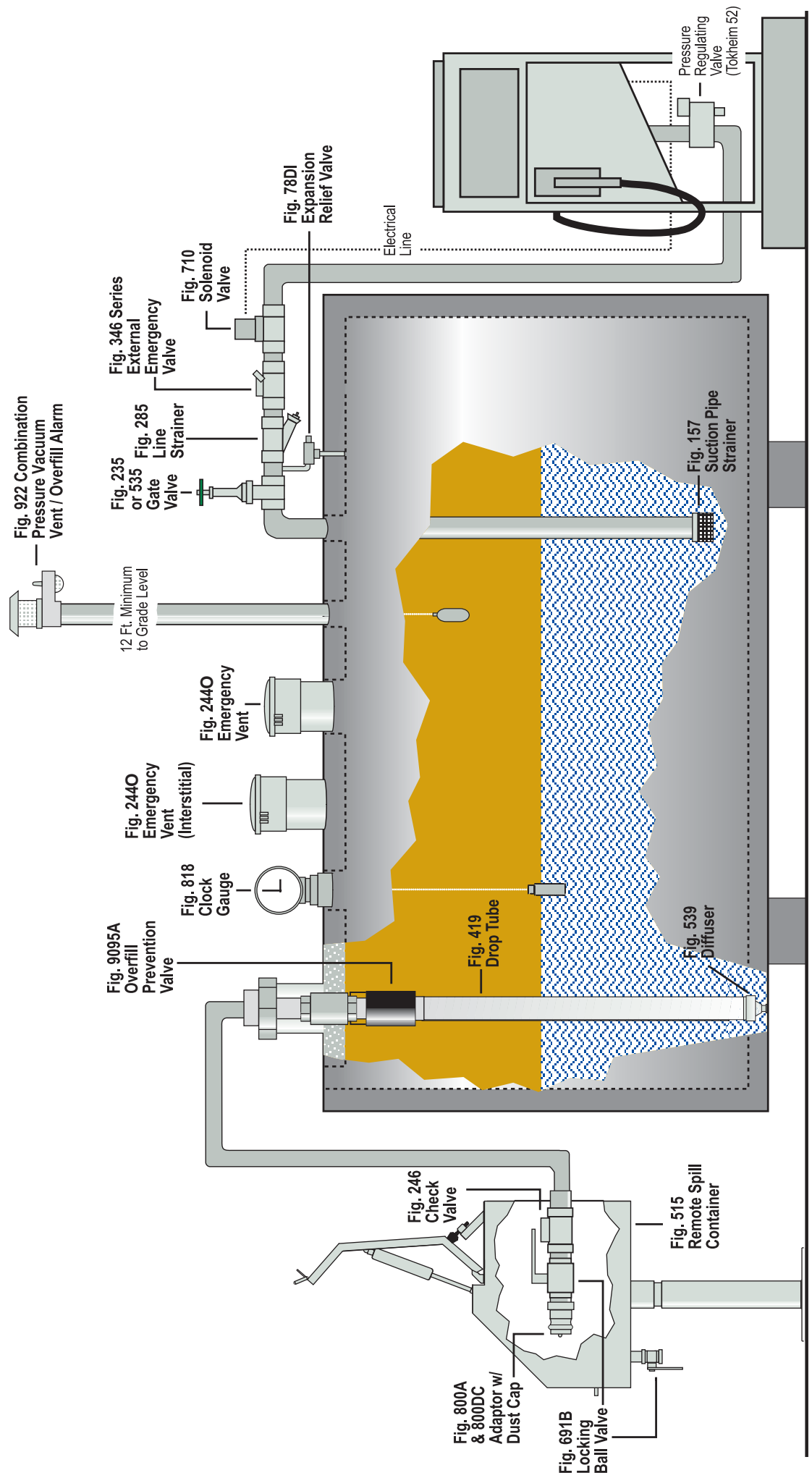
Aboveground Fuel Storage - Suction System

Horizontal cylindrical tank with top fill and top mounted pump



Aboveground Fuel Storage - Suction System

Rectangular Double-Wall Tank With Remote Fill and Remote Pump



AST Bulk Storage

Emergency Vent (Threaded or Flanged)



Allows tank to exhaust excessive pressure if exposed to pool fire. Size to be determined by tank size and type.

Internal Emergency Valve



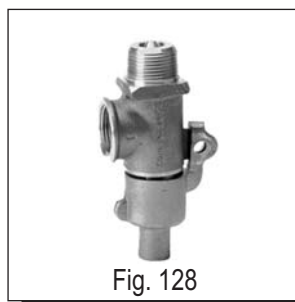
Automatic shut-off of product flow in event of fire and/or impact. Poppet is located inside tank.

Gate Valve with Expansion Relief



Expansion Relief feature allows excess pressure due to temperature gain to bleed back to tank.

Frost Proof Drain Valve

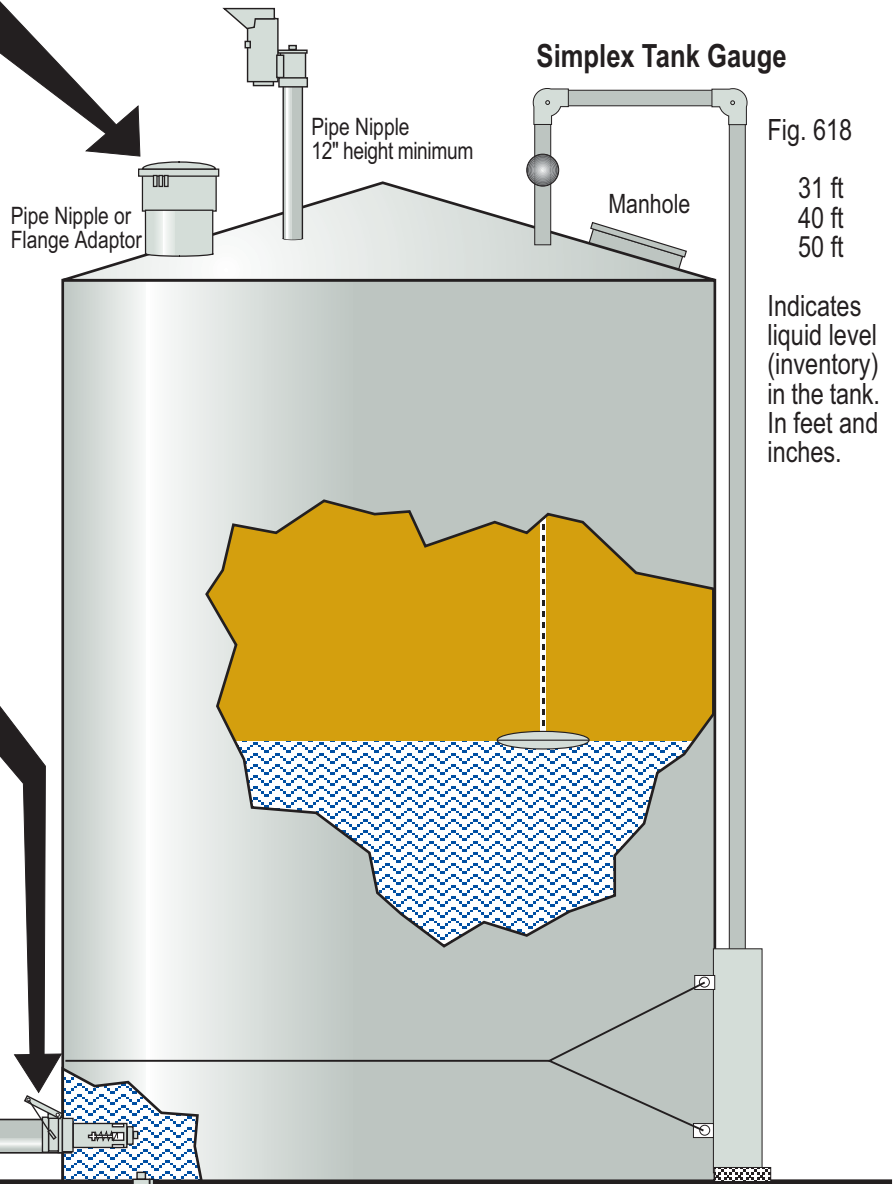


Allows water on bottom of tank to be drained off. Seat is located up inside the tank shell.

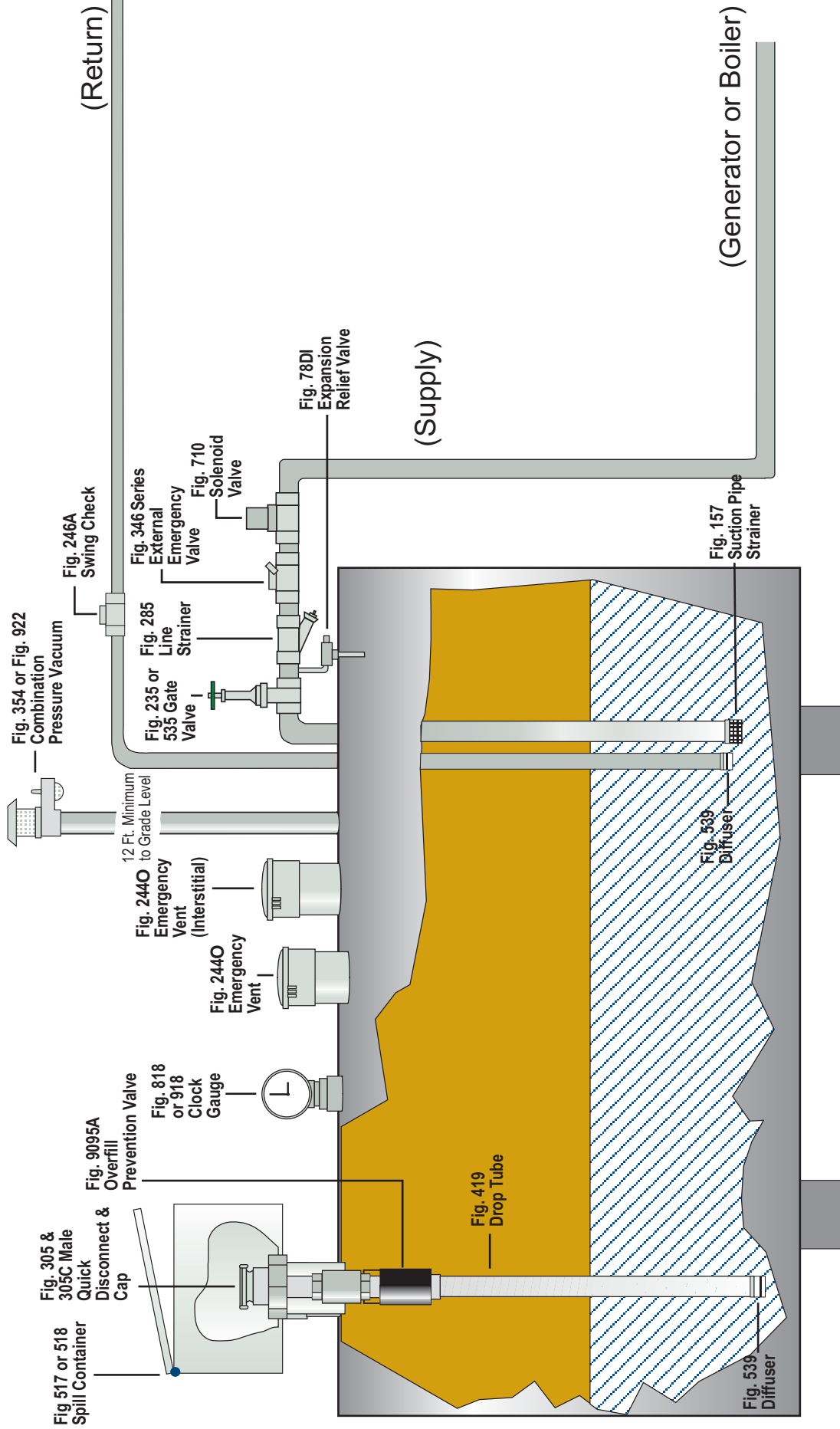
Normal (P/V) Vent - and with Flame Arrestor



Allows tank to breathe during normal filling and withdrawing operations. Match vent size to fill and withdrawal piping.



Emergency Generator or Fuel Oil Suction System





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