

Overfill Prevention for Shop Fabricated Aboveground Storage Tanks

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Western Regional Account Manager, Morrison Bros. Co.

Then

- Founded in 1855 Morrison has been in business 170 years
- Located in Dubuque, Iowa
- Originally a boiler manufacturer
- Then began manufacturing tanks and equipment for the oil industry

Now

- Leader in AST products
- Produce more than 1,200 different products
- Include equipment for ASTs, USTs, service stations, environmental applications and tank trucks.
- Employ approximately 130 people in Dubuque & Maquoketa, Iowa locations.
- Family owned



*Morrison Bros. Co.
Corporate Headquarters*

Shop-fabricated tanks are small enough to be produced in a tank shop and delivered to the site.



- Atmospheric Pressure Tanks—0-1 PSI operating pressure.
- Vertical Tank: The shell height shall not be more than 50 feet and shall not exceed 60,000 gallons. July 19, 2013 (UL 142).
- Horizontal Tank: The length of the shall not be greater than 6 times its diameter. Tank diameters exceeding 144 inches shall not exceed 72 feet in length. July 19, 2013 (UL 142).

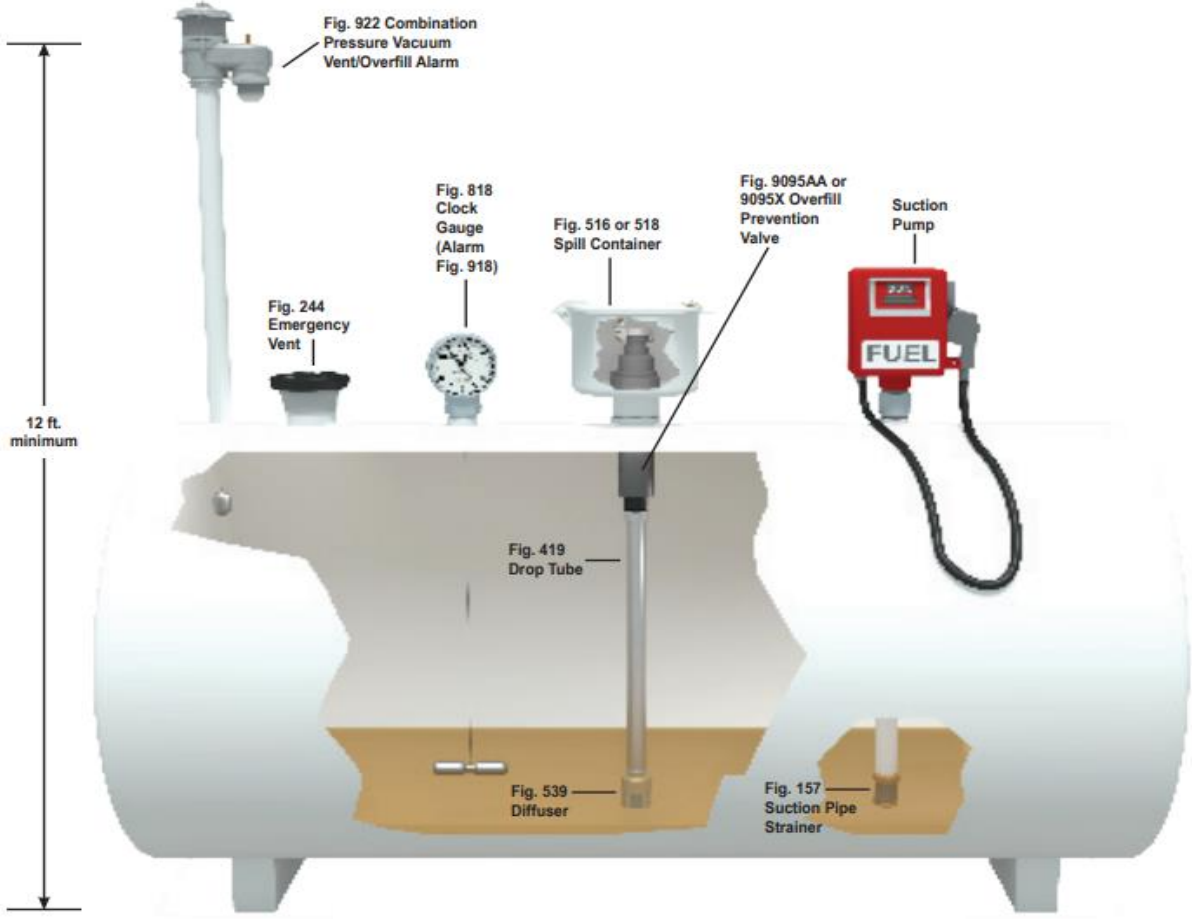
OVERFILL PREVENTION | METHODS

- Overfill Prevention Valves
- Tank Gauging
- Tank Gauging With High Level Alarms
- High Level Alarms
- High Level Alarms With Output Switches
- Any Of These Methods

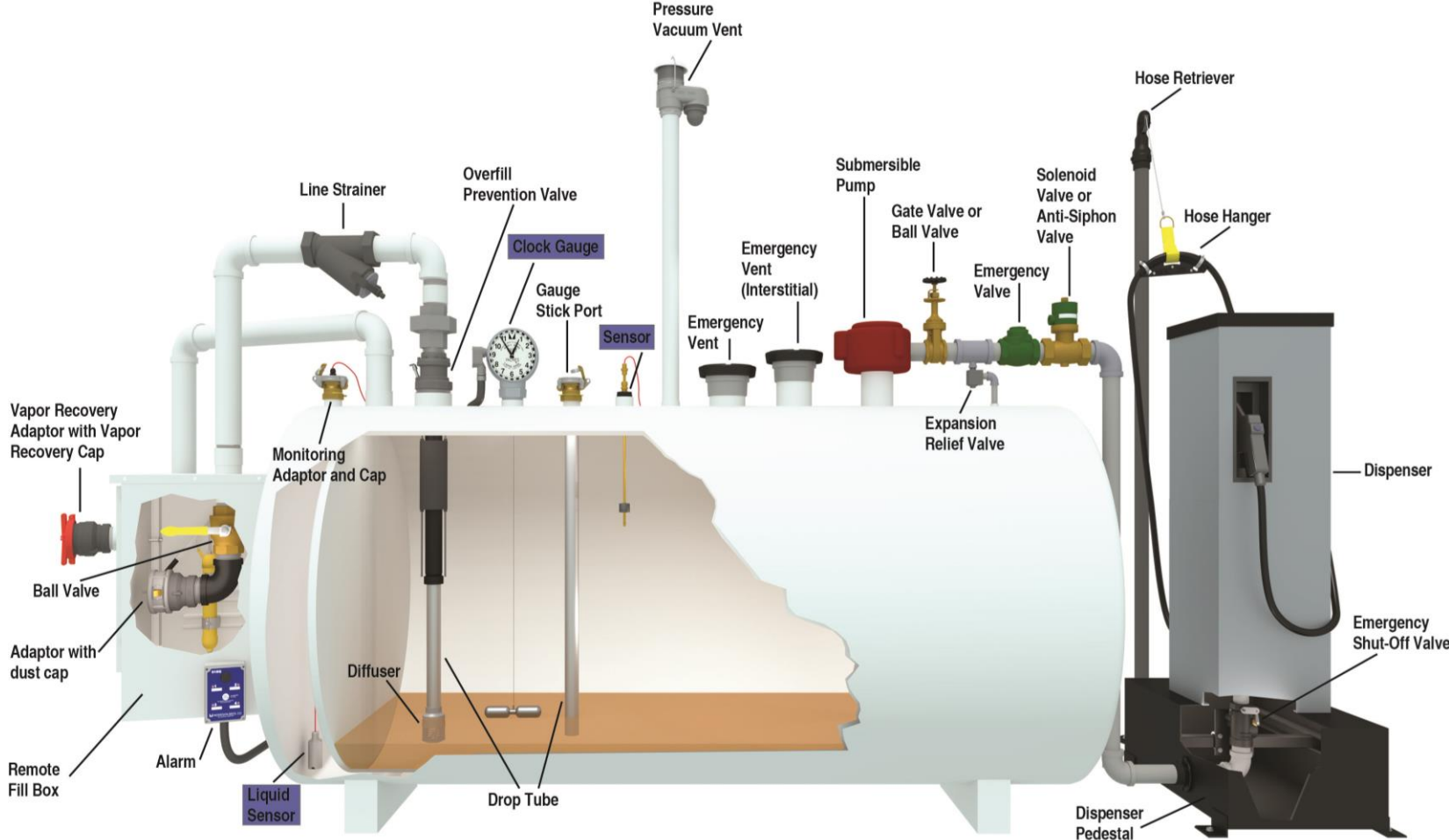
OVERFILL PREVENTION | OVERFILL VALVE AND GAUGE

Aboveground Fuel Storage - Suction System

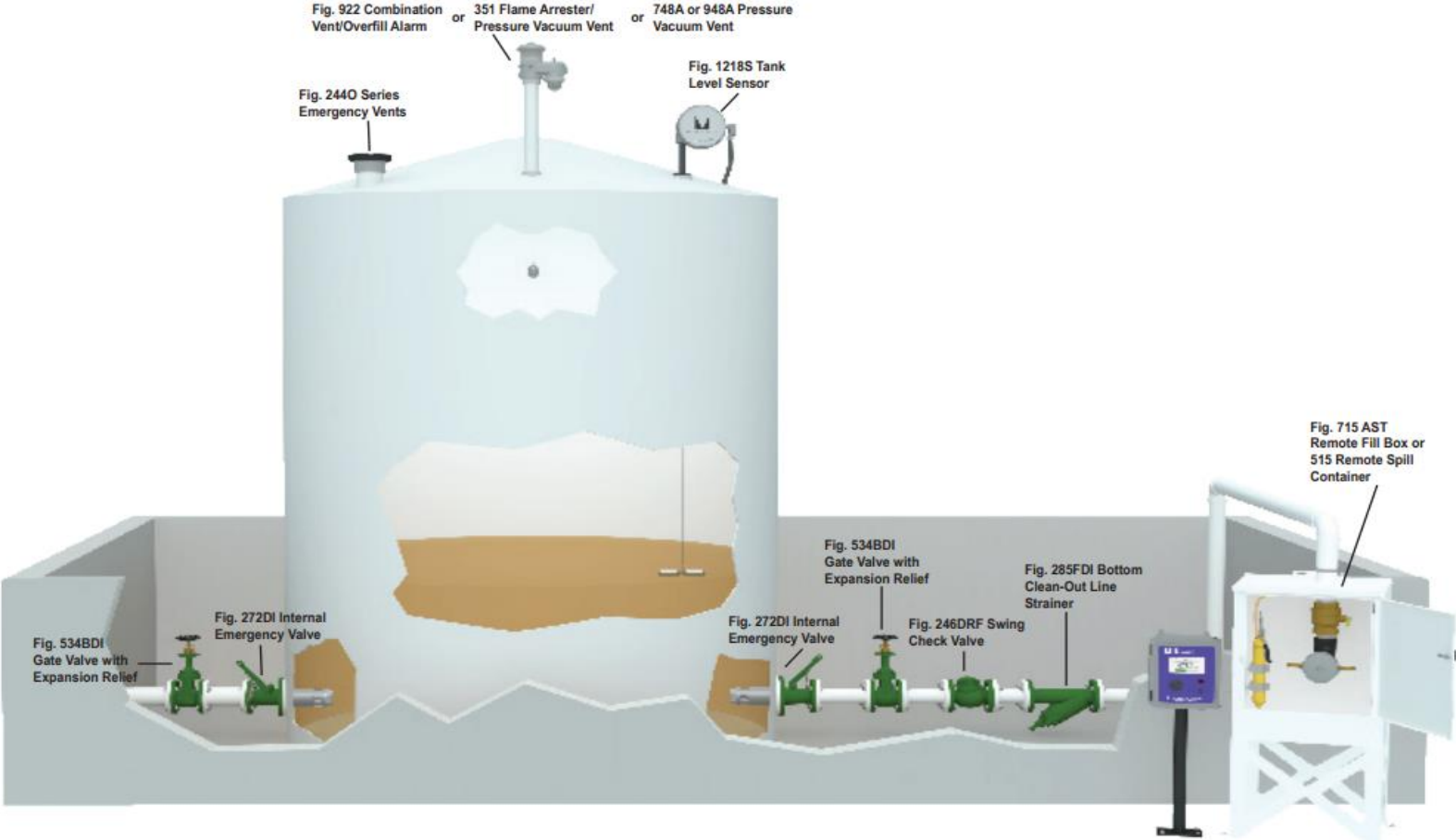
Horizontal cylindrical tank with top fill and top mounted pump



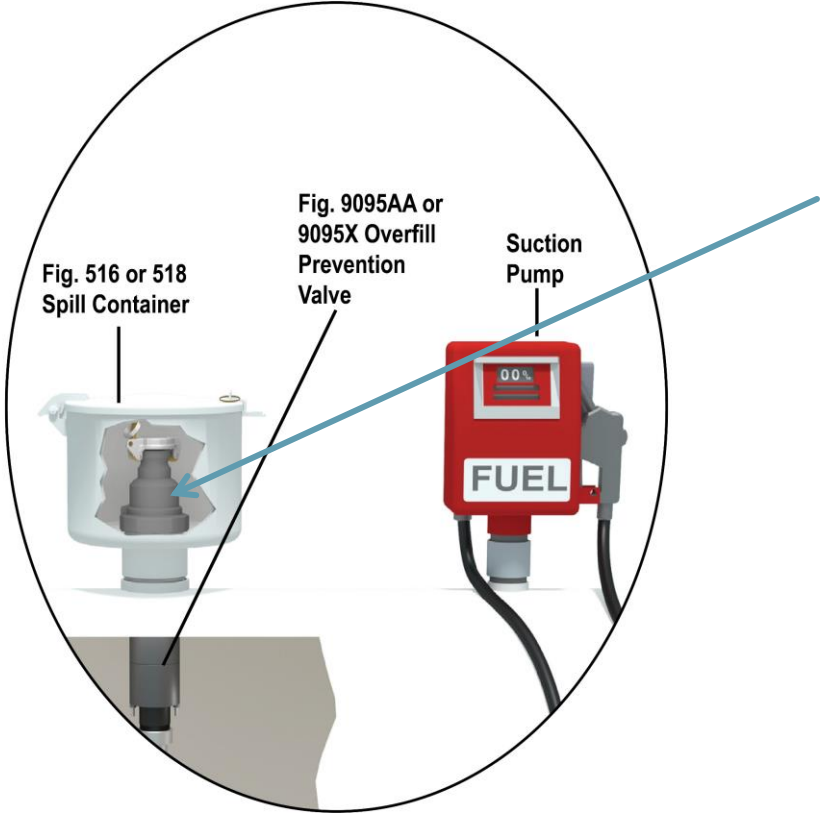
OVERFILL PREVENTION | OVERFILL VALVE | GAUGE | ALARM



OVERFILL PREVENTION | GAUGE AND ALARM



OVERFILL PREVENTION | DIRECT FILL







9095AA

OVERFILL PREVENTION | REMOTE FILL



OVERFILL PREVENTION | VALVE SELECTION

9095 Series Selection Guide

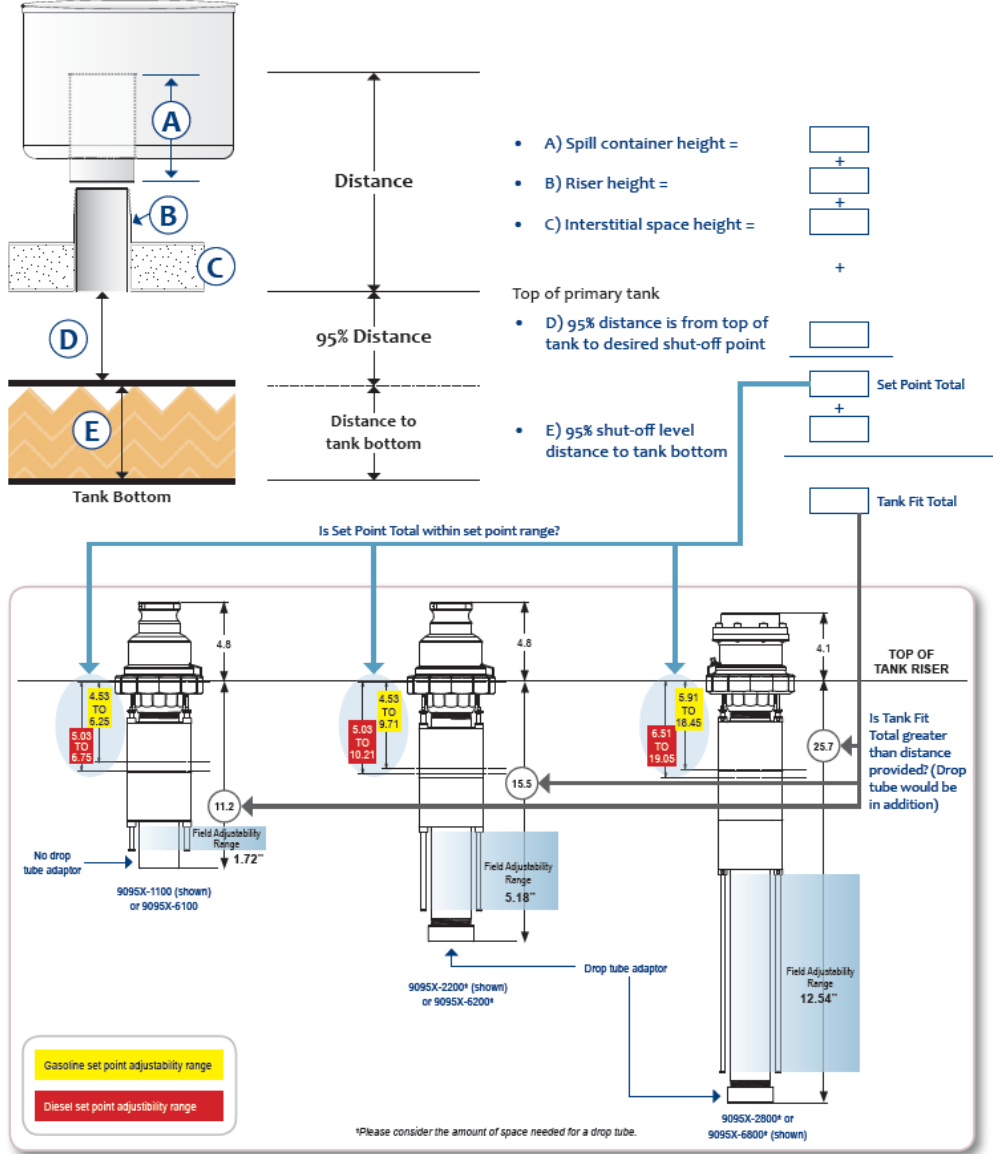
Model Series #	Tank Opening			Tight Fill Connection		Dry Disconnect Connection		Remote Fill Connection		Drop Tube Size			ULC Listed	CARB EFR Approved	Low Profile Tank	Fuel Compatibility					GPM Flow @ 10 PSI Pressure Drop
	2"	4"	6"	2"	3"	2"	2"	1½"	2"	3"	Aviation	E-85				DEF	B100	Methanol			
 9095AA	✓			✓	✓	✓	✓			✓			✓*			✓	✓		✓		230
9095AA			✓		✓		✓				✓		✓*			✓	✓		✓		550
 9095C	✓			✓		✓	✓			✓			✓	✓				✓		✓	175
9095C-A	✓			✓		✓	✓			✓			✓	✓	✓	✓	✓		✓		175
9095AM	✓						✓			✓†			✓			✓	✓		✓	✓	230
9095AM			✓				✓				✓†		✓			✓	✓		✓	✓	550
 9095DS	✓				✓					✓†				✓							26
9095X	✓				✓		✓			✓			✓*	✓		✓	✓		✓		230
9095SA	✓				✓		✓						✓	✓						✓	110
 9095SS	✓				✓									✓					✓	✓	164

OVERFILL PREVENTION | VALVE SELECTION

9095 Series Selection Guide

Model Series #	Tank Opening			Tight Fill Connection		Dry Disconnect Connection	Remote Fill Connection	Drop Tube Size			ULC Listed	CARB EVR Approved	Low Profile Tank	Fuel Compatibility					GPM Flow @ 10 PSI Pressure Drop
	2"	4"	6"	2"	3"	2"	2"	1½"	2"	3"				Aviation	E-85	DEF	B100	Methanol	
9095AA		✓		✓	✓	✓	✓		✓		✓	✓*		✓	✓		✓		230
9095AA			✓		✓		✓			✓	✓	✓*		✓	✓		✓		550





OVERFILL PREVENTION | VALVE SELECTION



2-inch 9095AA





9095AA Aluminum Series - 2"

Item Number	Inlet Size	Tank Connection Size	Drop Tube	Fill Connection	Other Distinctions
9095AA0200 AV	2"	4"	2"	Direct fill	Valve with 2" male quick disconnect x 4" female threads
9095AA3200AVEVR 	2"	4"	2"	Remote fill	Valve with 2" female threads x 4" female threads
9095AA5200AVEVR 	2"	4"	2"	Direct fill	Valve with 2" dry disconnect x 4" female threads
9095AA4000 AV	3"	4"	2"	Direct fill	Valve with 3" male quick disconnect x 4" female threads
9095AA4200AVEVR 	3"	4"	2"	Remote fill	Valve with 3" female quick disconnect x 4" female threads
9095AA9200AVEVR 	2"	4"	2"	---	Without adaptor or bushing *
9095ATM0100 AM	Mechanical test mechanism for 9095AA (does not include valve top)				
9095ATM0200 AK	Mechanical test mechanism; includes AA 0200 top, aluminum with 2" male quick disconnect x 4" female threads				
9095ATM3200 AK	Mechanical test mechanism; includes AA 3200 top, ductile iron with 2" female threaded x 4" female threaded connection				
9095AF3201 AAPW	Adaptor 2" male thread to 2" raised face flange (for use with 9095AA3200AVEVR)				

OVERFILL PREVENTION | VALVE SELECTION



9095AA Aluminum Series - 3"

Item Number	Inlet Size	Tank Connection Size	Drop Tube	Fill Connection	Other Distinctions
9095AA0300 AV	3"	6"	3"	Direct fill	
9095AA3300AVEVR 	3"	6"	3"	Remote fill	
9095AA9300AVEVR 	3"	6"	3"	---	Without adaptor or bushing *
9095ATM0100 AM	Mechanical test mechanism for 9095AA (does not include valve top)				
9095ATM0300 AK	Mechanical test mechanism; includes AA 0300 top, aluminum with 3" male quick disconnect x 6" female threads				
9095ATM3300 AK	Mechanical test mechanism; includes AA 3300 top, ductile iron with 3" female threaded x 6" female threaded connection				
9095AF3301 AAPW	Adaptor 3" male thread to 3" raised face flange (for use with 9095AA3300AVEVR)				

OVERFILL PREVENTION | VALVE SELECTION



9095X-1100

9095X-2200

9095X-6200

9095X-6800



TESTED AND APPROVED
FOR FLUIDS WITH
VISCOSITIES UP TO
3000 centistokes

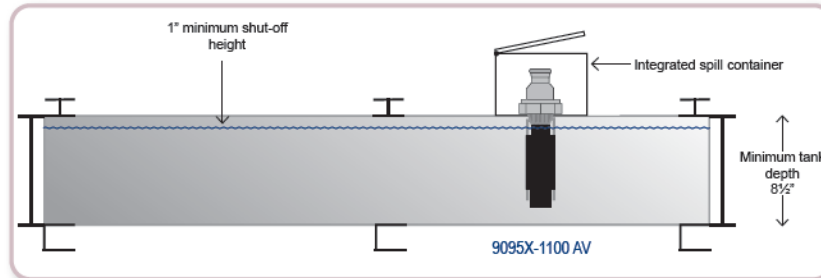
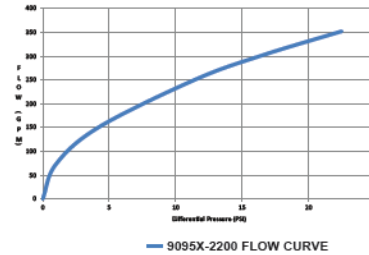
9095X Aluminum, Integrated Adaptor Series - 2"

Item Number	Inlet Size	Tank Connection Size	Drop Tube	Fill Connection	Application
9095X-1100 AV	2"	4"	No	Direct fill	Generator base tanks with integrated spill container
9095X-6100 AV	2"	4"	No	Remote fill	Generator base tanks with integrated spill container
9095X-2200 AV	2"	4"	2"	Direct fill	Low profile tanks; integrated spill container
9095X-6200AVEVR	2"	4"	2"	Remote fill	Low profile tanks; integrated spill container
9095X-2800 AV	2"	4"	2"	Direct fill	General purpose and aviation
9095X-6800AVEVR	2"	4"	2"	Remote fill	General purpose and aviation
9095ATM1000 AK					Mechanical Test Mechanism Kit For All 9095X Series (X only) Overfill Valves

EXAMPLES OF OIL & MINIMUM TEMPERATURE FOR USE WITH 9095X





Oil Type	Temp (°F)	CentiStokes (cSt)
15W-40	28	2720
10W-40	25	2800
10W-60	28	2850
5W-40	25	2750
0W-30	15	2900
SAE 30	28	2950

2" 9095X FLOW CURVE (CV=74)



OVERFILL PREVENTION | VALVE SELECTION

9095C (for low profile tanks, 2" Fill, 4" Connection)

Item Number	Valve Size	Tank Opening	Drop Tube	Fill Connection	Weight (lbs)
9095C-0200 AV	2"	4"	2"	Direct fill	9.0
9095C-3200AVEVR 	2"	4"	2"	Remote fill	12.50
9095C-5200AVEVR 	2"	4"	2"	Direct fill	9.64
9095C-9100AVEVR 	2"	4"	2"	Less top adaptor	8.0
9095C-9200AVEVR 	2"	4"	2"	Less top adaptor	8.37
9095CTM0100 AM	Mechanical test mechanism				1.0



OVERFILL PREVENTION | VALVE SELECTION



9095SA (Aluminum) Series - 2"

SA Model Number	Inlet Size	Tank Connection Size	Fill Connection	Drop Tube	Other Distinctions
9095SA0200 AV	2"	2"	Direct fill	No	Cam-n-groove adaptor style with male threads
9095SA0500 AV	2"	2"	Remote fill	No	Cam-n-groove adaptor style with female threads
9095SA9200 AV	2"	2"	---	No	Without adaptor *

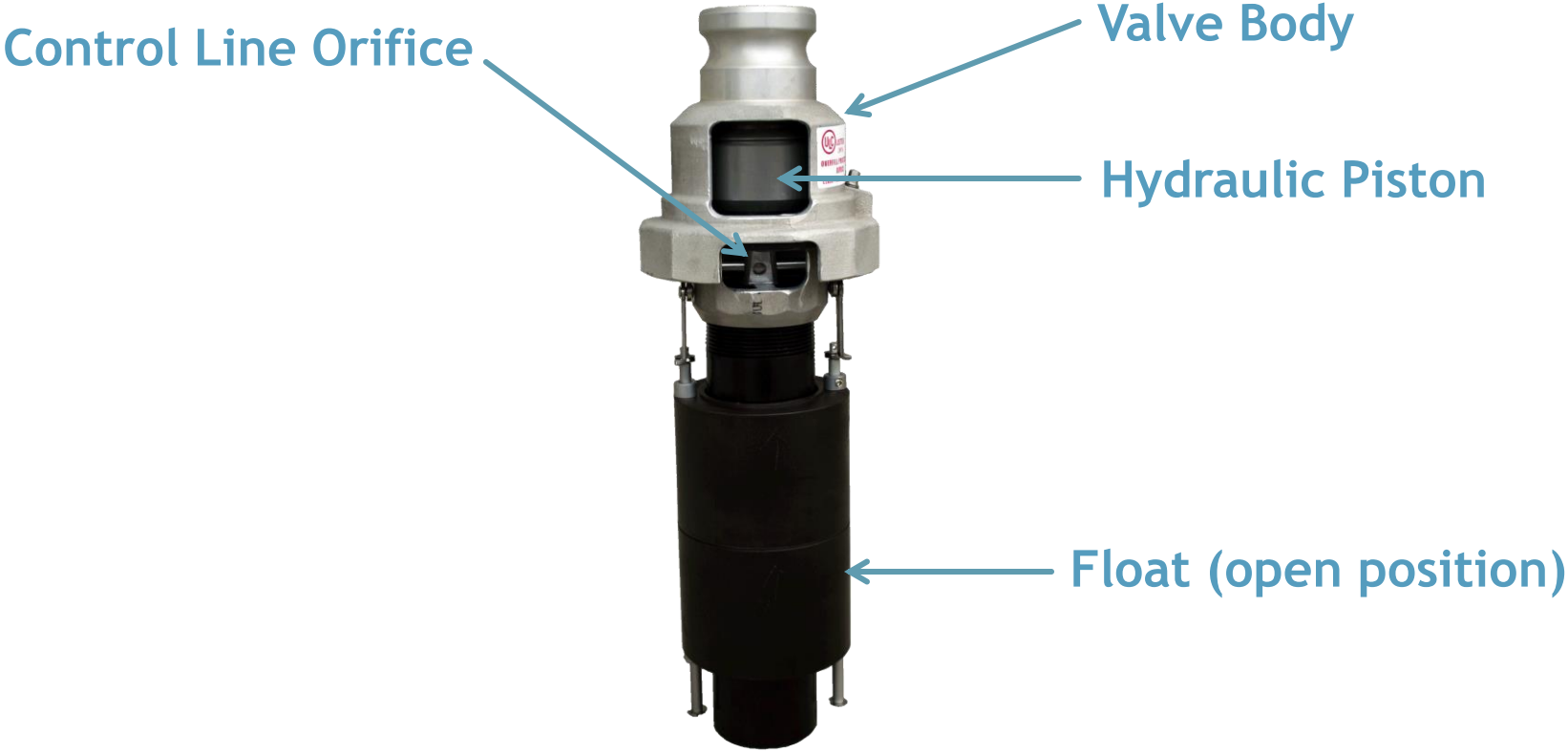
OVERFILL PREVENTION | VALVE SELECTION



9095DS (2" Fill, 2" Connection)

	Item Number	Valve Size	Tank Opening	Drop Tube	Inlet Size & Type	Weight (lbs)
with Part F	9095DS0200 AV	2"	2"	1½" threaded pipe	Valve with 2" shut-off height	8.50
	9095DS0400 AV	2"	2"	1½" threaded pipe	Valve with 4" shut-off height	9.0
	9095DS0600 AV	2"	2"	1½" threaded pipe	Valve with 6" shut-off height	9.50
with Part A	9095DS2200 AV	2"	2"	1½" threaded pipe	Valve with 2" shut-off height	8.50
	9095DS2400 AV	2"	2"	1½" threaded pipe	Valve with 4" shut-off height	9.0
	9095DS2600 AV	2"	2"	1½" threaded pipe	Valve with 6" shut-off height	9.50

OVERFILL PREVENTION | PRESSURE FILL VALVE



TANK FILLING | OVERFILL PREVENTION VALVES



Manual Test Device

9095AA

OVERFILL PREVENTION | MAINTENANCE

If valve is fitted with the optional test mechanism you can simulate a high product level by pulling the test mechanism lever during a fill. If the valve does not prevent product transfer when the test mechanism is pulled, or the valve is not fitted with a test mechanism, please do the following:

1. Remove valve from the tank.
2. Inspect the float and float linkages for any damage and make sure the float can move up and down freely. If the float or the float linkages have been damaged, or the float cannot move up and down freely, the valve must be sent back to the factory for evaluation.
3. Look down into the top of the valve to inspect for any debris or foreign objects that may have entered the valve. If you can see any debris or foreign objects, the valve must be returned to the factory for evaluation.
4. Check for freedom of plunger movement by securing float, turning unit upside down, and looking through the body opening at the plunger. The plunger should slide freely to contact the seal surface of the body and drop back down into the dash pot when turned to the upright position. You may also hear a clunking/clicking sound when turning valve upside down and right side up. If you cannot see the plunger move freely or if this clunking/click sound is not present, it may indicate that the valve plunger is stuck and the valve must be returned to the factory for evaluation.
5. Inspect the vent warning tag located near the tank fill point. If the tag is damaged or difficult to read, contact Morrison Bros. Co. at (800) 553-4840 for a free replacement tag.

TANK FILLING | DROP TUBE AND DIFFUSER

Drop Tube



419

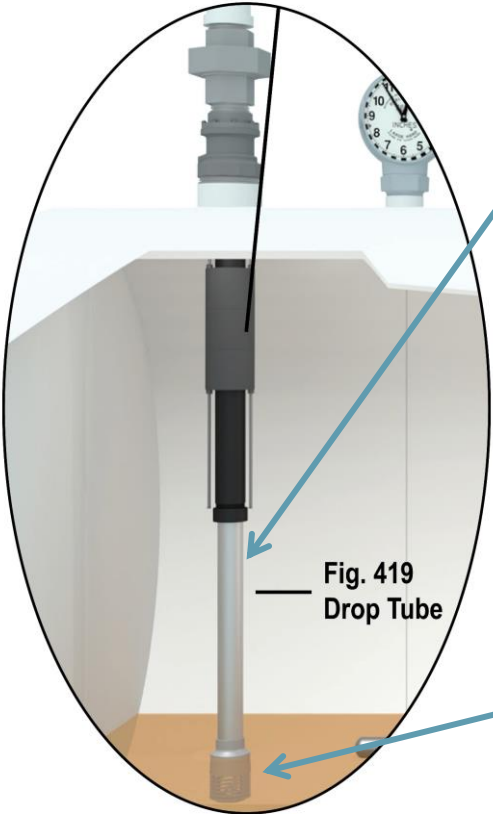


419E

Diffuser



539



OVERFILL PREVENTION | VISUAL INDICATOR



724 Overfill Indicator

OVERFILL PREVENTION METHODS | LEVEL GAUGES



- ✓ Fuel oil
- ✓ Diesel
- ✓ Oil
- ✓ Waste oil

718 with standard float

Red numbers on gallon models indicate when liquid reaches high level (above 90%) or low level (below 10%) capacities.



718G

OVERFILL PREVENTION | LEVEL GAUGES



OVERFILL PREVENTION | LEVEL GAUGE WITH ALARM



918

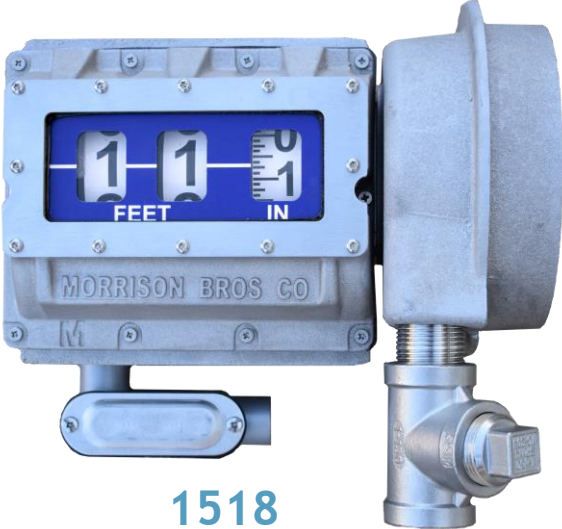
OVERFILL PREVENTION | LEVEL GAUGE WITH ALARM

- Mechanical Tank Gauges



1519
(with Power Module)

The level alarm relay output wiring from the gauge has to be connected to an external alarm box (sold separately).



1518

OVERFILL PREVENTION | LEVEL GAUGE WITH ALARM



1218C Console | 1218S Sensor

OVERFILL PREVENTION | HIGH LEVEL ALARM WITH SENSOR

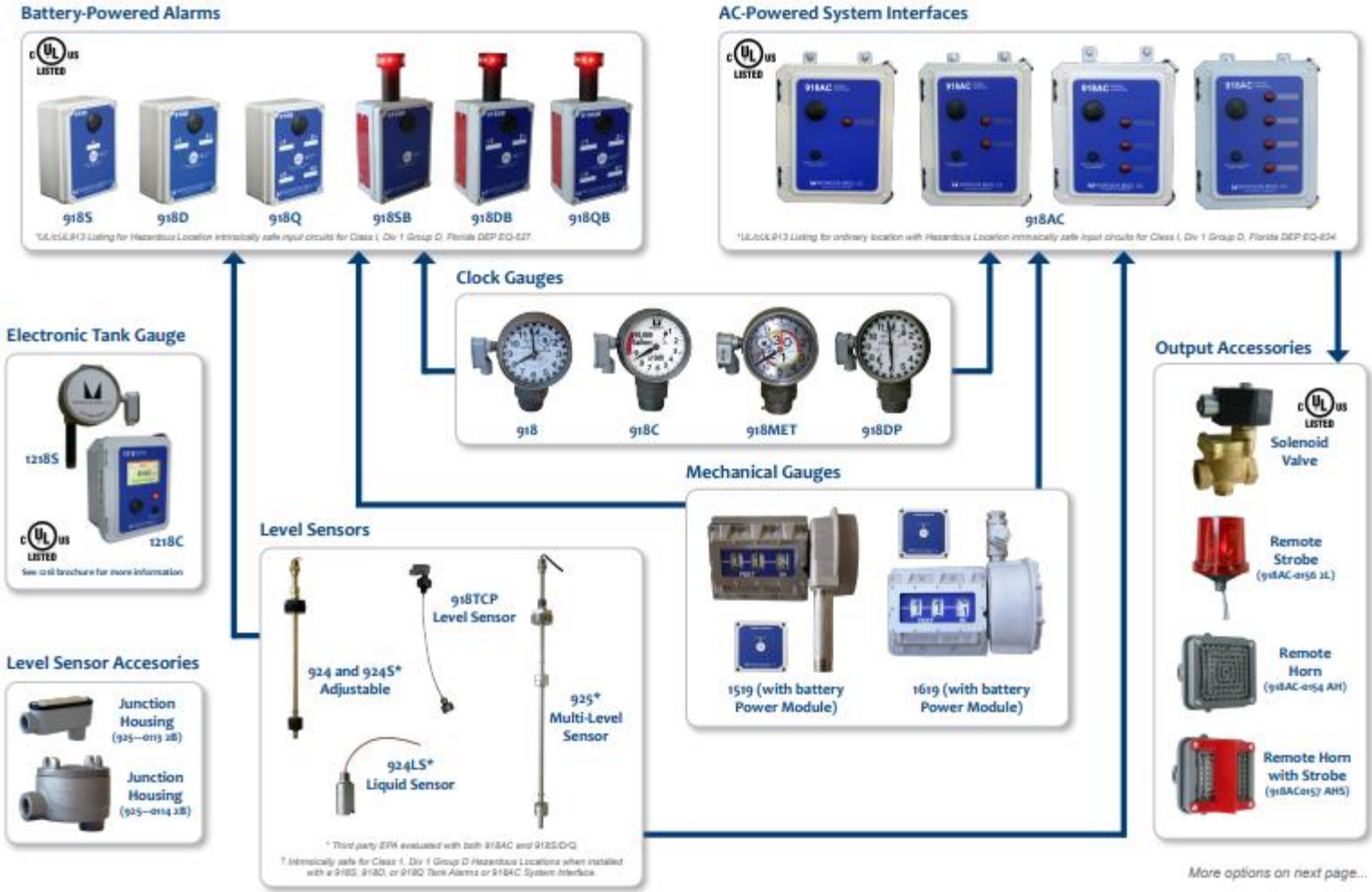
918S/918TCP Kit



918S/924 Kit



OVERFILL PREVENTION METHODS | GAUGING



OVERFILL PREVENTION | ALARM WITH SENSORS



OVERFILL PREVENTION | ALARMS WITH SENSORS



915 console (1 input channel)



915 console (2 input channels)



915S Solenoid



915ST Solenoid with timer



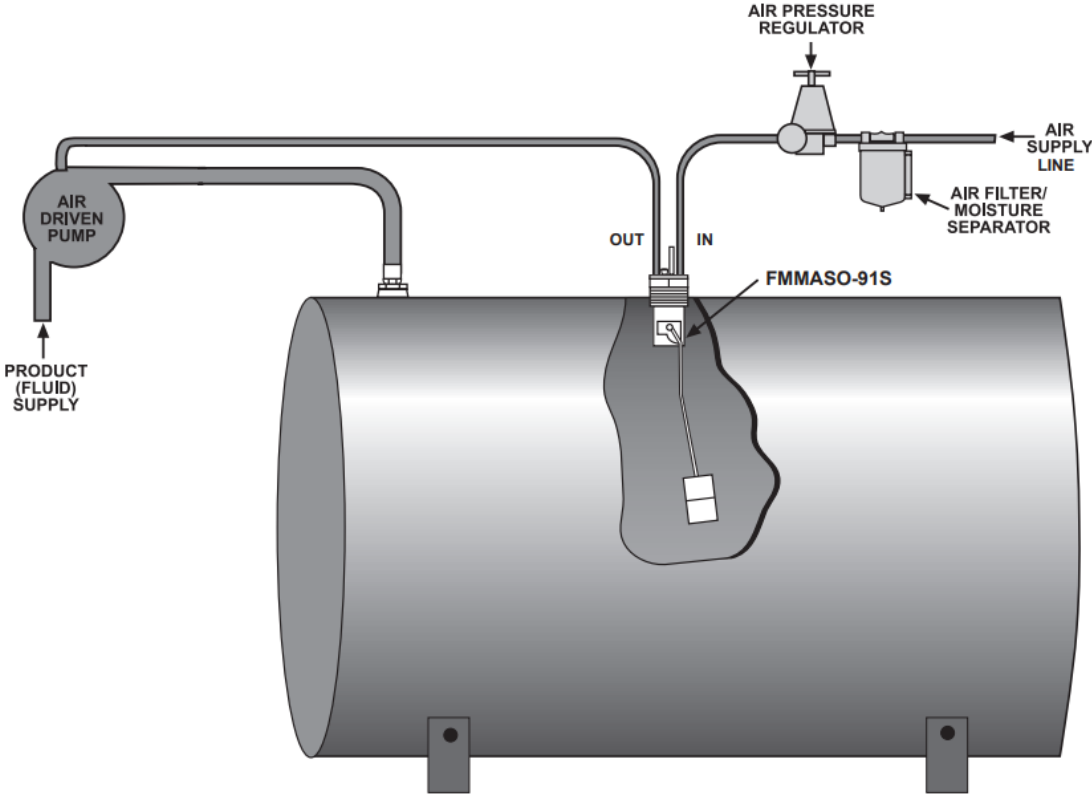
915HB Horn and beacon



915 Sensor

OVERFILL PREVENTION | AIR SHUT-OFF VALVES

The ASO series of valves is used to shut-off the air supply to an AOD (Air Operated Diaphragm) pump when the liquid level approaches full capacity.



FMMASO (2")

OVERFILL PREVENTION | OVERFILL VALVE | GAUGE | ALARM



OVERFILL PREVENTION | ALARMS

- 918 Alarm Boxes (battery powered)



918S Single Input
918D Dual Input
918Q Quad Input

OVERFILL PREVENTION | SENSORS

Level Sensors



** Third party EPA evaluated with both 918AC and 918S/D/Q.*

† Intrinsically safe for Class 1, Div 1 Group D Hazardous Locations when installed with a 918S, 918D, or 918Q Tank Alarms or 918AC System Interface.

OVERFILL PREVENTION | ALARMS | SENSORS | OUTPUT RELAYS

- 918 System Interface Alarm Boxes (AC powered)



**UL/cUL913 Listing for ordinary location with Hazardous Location intrinsically safe input circuits for Class I, Div 1 Group D, Florida DEP EQ-834.*

918AC
1 to 4 Input Relays
0 to 4 Output Relays

VENTING AND GAUGING | LEVEL GAUGES

At the network connection...

- Wireless Client (1218C-0163 2C)
- Antenna
- Base Station
- Wireless Access Point (1218C-0154 2A)
- Long Range Wireless Base Station Kit (1218C-0164 AK)
- FUEL CLOUD

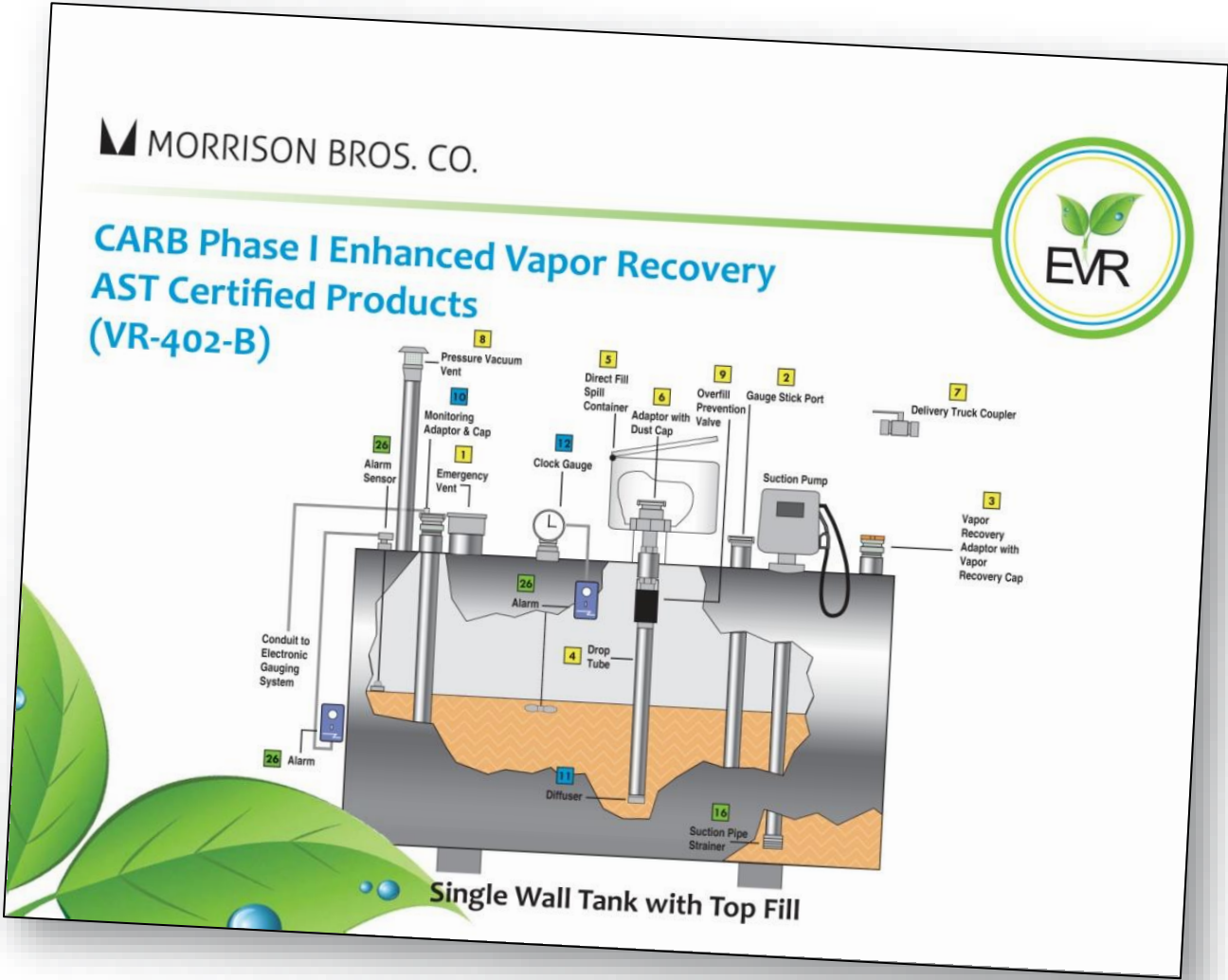
At the tank...

- 924 and 924S Adjustable
- 925 Multi-Level Sensor (1 or 2 float only)
- 924LS Liquid Sensor
- 918TCP Level Sensor
- 1218 Sensor
- 918 Clock Gauge

At the console...

- 1218 Console (2 tanks: 1218C-0200 AC, 4 tanks: 1218C-0400 AC)
- Cellular Gateway Assembly (1218C-0169 AG)
- External Input/Output Expansion Module (1218C-6600 AM)
- Wireless Client (1218C-0163 2C)
- Remote Horn with Strobe (918AC-0157 AHS)
- Remote Horn (918AC-0154 AH)
- Outdoor Ethernet Switch Assembly (5-Port: 1218C-0171 AS, 8-Port: 1218C-0172 AS)
- Remote Strobe (918AC-0156 2L)
- 711 Solenoid Valve
- Belden 7933A Cable

ADDITIONAL REQUIREMENTS | CARB, E.V.R.



OVERFILL PREVENTION | CARB, E.V.R. AND UL

Additional requirements

- California Air Resource Board Enhanced Vapor Recovery
- CP 201 (Certification Procedure)
- System tested and monitored for 180 days.
- UL Listed Products Often Required

ADDITIONAL REQUIREMENTS | CARB, E.V.R.

EVR Certified Required Products

1. Emergency Vents
2. Caps & Adaptors
3. Vapor Caps & Adaptors
4. Drop Tubes
5. Spill Buckets
6. Dry Disconnect adaptors/caps
7. Dry Disconnect Couplers
8. Pressure Vacuum Vents
9. Overfill Preventions Valves



ADDITIONAL REQUIREMENTS | CARB, E.V.R.

EVR Certified Optional Products

- 10. Tanks Monitor Cap & Adaptors
- 11. Diffusers
- 12. Gauges
- 13. Extractor Connections
- 14. Bushings

CERTIFIED OPTIONAL PRODUCTS

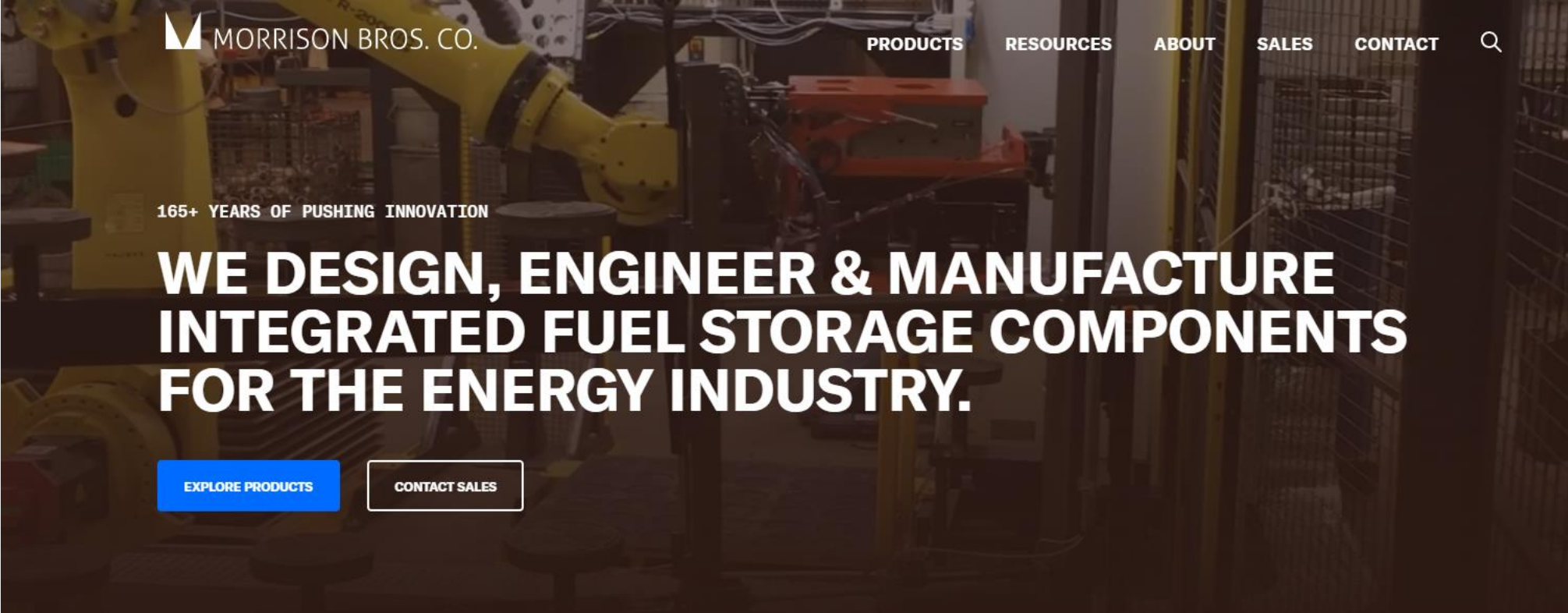
10 Fig. 305 Series Monitoring Adaptor & Cap 

11 Fig. 539 Series Drop Tube Diffuser 

12 Fig. 818, 818C, 918, 918C, & 918DP Series Mechanical Tank Gauge
(Note: The mechanical gauge can be substituted for the gauge stick port.) 

13 Fig. 560, 561, 562, & 563 Series Extractors 

14 Fig. 184 & 184S Series Bushings 



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PRODUCTS RESOURCES ABOUT SALES CONTACT

165+ YEARS OF PUSHING INNOVATION

WE DESIGN, ENGINEER & MANUFACTURE INTEGRATED FUEL STORAGE COMPONENTS FOR THE ENERGY INDUSTRY.

EXPLORE PRODUCTS CONTACT SALES

Thank you!

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