



Installation, Operation and Maintenance Manual

For

Executive Order

VR-402-A

Morrison Phase 1 Enhanced Vapor Recovery System

For

Aboveground Storage Tanks



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Section 1

244 Series Emergency Vents

Morrison Fig. No. 244 Series Emergency Vent

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

The 244 Series Emergency Vent is designed for use on aboveground storage tanks, as a code requirement that helps prevent tanks from becoming over-pressurized or rupturing if exposed to fire.

INSTALLATION: Mounting piping and connections to the tank must be fabricated so the emergency vent is in a vertical (plumb) position. Check interior of vent for foreign matter. O-ring surface should be clean and free of any dirt or particles. Verify cover is moving freely before and after placing into the system. Do not paint vent unless necessary. If painting, extreme caution must be exercised to make sure that the paint does not inhibit proper vent operation.

Note: There should be no reduction of pipe size between the storage tank and the Fig. 244 Series Emergency Vent.

Important: Install the included warning tag where it will be visible to the operator filling or unloading the tank that is fitted with this vent.

Threaded Connection:

Use standard piping practices when installing vents with threaded ends. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to body threads. Morrison recommends thread sealant rather than Teflon® tape. Avoid over-torque, which may damage the vent.

Flange Connection:

The vent must be visually centered with respect to the flange faces. A gasket must be placed between the flange faces. Flanged bolting should be tightened gradually in a crisscross pattern. Bolting should be tightened sufficiently to prevent leakage and loosening of the joint.

Failure to follow any or all of the warnings or instructions in this document could result in a hazardous product spill, which could result in property damage, environmental contamination, fire explosion, serious injury or death.

Warnings

- Fire Hazard – Death or serious injury could result from spilled liquids.
- Install only on shop fabricated atmospheric tanks built and tested in accordance to industry standards such as UL142, NFPA 30 & 30A, and API 650.
- Install in accordance with all applicable local, state, and federal laws.
- 244 Series vents only provide emergency pressure relief and must be used in conjunction with a normal vent or pressure vacuum vent.
- 244 Series vents as well as normal vents and pressure vacuum vents must be properly sized and selected for each specific tank application.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on vents.
- Do not paint or cover vent. This will inhibit proper vent operation and may lead to personal injury/property damage.

MAINTENANCE: Annual inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of the storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank. If painting, extreme caution must be exercised to make sure that the paint does not inhibit proper vent operation.

WARNINGS

- Fire Hazard – Death or serious injury could result from spilled liquids.
- Clogged or restricted vents could cause damage to tanks and piping releasing liquids which could catch fire.
- Dust, debris, freezing rain, freezing condensation or other contaminants could clog or restrict the vents.
- In freezing conditions, inspect the vents immediately before filling or unloading a tank.
- Follow your employer's instructions for making sure vents are not clogged or restricted.
- You must be trained to inspect the vents. Stop now if you have not been trained.
- Do not fill or unload from a tank unless you are certain that the tank vents will operate correctly.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing maintenance. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on vents.

Steps

1. Lift the cover of the vent all the way up and lower back down onto the body several times. The cover must move freely for the vent to work properly.
2. Replace the unit if sticking or binding occurs during step 1 above.
3. Inspect the vent, including the seal area, for dust, debris, snow or ice. Remove any that is found.
4. Inspect all vent components and surfaces for damage, corrosion or excessive wear. If any is found replace the vent.
5. Inspect the vent warning tag located near the tank fill and offloading area. If the tag is damaged or difficult to read, contact Morrison Bros. Co. at (800) 553-4840 for a free replacement tag.

OPERATING INSTRUCTIONS: The emergency vent requires no assistance during operation. During operation the cover will not open until internal pressure in the tank reaches approximately 16 ounces per square inch pressure.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this vent has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



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Dubuque, Iowa 52001

800.553.4840 • 563.583.5028 Fax • custserv@morbros.comwww.morbros.com

244O--0115 PP EVR Rev. C



Section 2

515 Series Remote Spill Containers

516 Series Direct Fill Spill Containers

Morrison Fig. No. 515/516 Series Spill Container INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

FIG. NO. 515 INSTALLATION: Bolt base to stable footing that will not rise or sink from outdoor conditions. Adjust height of box so ports on rear of box align with system piping. Use standard piping practices when installing fittings with threaded ends. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to fitting threads. Morrison recommends thread sealant rather than Teflon® tape. Avoid over-torque, which may damage the fittings. Adjoining piping must be properly supported and positioned so minimal piping stresses are transmitted to the box during or after installation. The spill container is not made to secure the weight of the piping structure. Bolt flanges to rear of spill container box. Flanged bolting should be tightened gradually in a crisscross pattern. Bolting should be tightened sufficiently to prevent loosening of the joint. Thread pipes from the system into companion flanges. Mount fittings internal to box to the inside face of the companion flange. It is highly recommended that the whole installation be tested before being released for use.

FIG. NO. 516 INSTALLATION: Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to pipe threads. Morrison recommends thread sealant rather than Teflon® tape. Avoid over-torque, which may damage the fittings. Thread spill container on to tank. Mount fittings internal to container. Avoid over-torque, which may damage the fittings. It is highly recommended that the whole assembly be tested before being released for use.

Failure to follow any or all of the warnings may render the spill container nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this spill container other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on spill containers.

MAINTENANCE: Ensure product is properly installed. Observe the container to assure proper performance. Visually inspect exterior and interior of container on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Clean and remove any dirt, debris or spilled product from the spill container after each delivery. Product should not be drained to the ground or into the atmosphere. All hazardous materials need to be properly disposed according to local, state, or federal regulations. Additionally for the Fig. No.515, place a small amount of water in the spill container to verify the drain valve is holding liquid in the box. Drain water.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids.
- You must be trained to maintain this spill container **Stop** now if you have not been trained
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on spill containers.

OPERATING INSTRUCTIONS: The tank operator must ensure that all federal, state and local codes are met during the filling of this tank. Only experienced operators familiar with tank filling procedures should be allowed to fill or transfer product in this system. It is the responsibility of the operator to continuously monitor the tank filling process and take all necessary precautions to prevent any spill. The operator shall ensure that the delivery hose from the tank's fill pipe is not disconnected until the hose has been drained completely. During unloading operations, the operator must remain in constant view of the transfer nozzle and fill pipe, and be in constant attendance at the discharge control valve. To evacuate spilled product from containment unit, bailing or mopping may be necessary. If unit is equipped with a drain valve, place a separate container under valve and open valve to drain contents. Product should not be drained to the ground or into the atmosphere. All hazardous materials need to be properly disposed according to local, state, or federal regulations.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



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Dubuque, Iowa 52001

800.553.4840 • 563.583.5028 Fax • custserv@morbros.com

www.morbros.com

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Section 3

9095A Series Overfill Prevention Valves

9095A 2" Overfill Prevention Valve With 4" Tank Adaptor Installation, Maintenance & Operating Instructions

The 9095A Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve terminates flow of product when the liquid level reaches a pre-set warning level (90-95% full). The valve also has a built-in bleed hold that provides anti-syphoning protection. The valve is installed on a standard 4" NPT male connection. The valve can be used in conjunction with Morrison AST Spill Containers for added spill protection. When installed to manufacturers requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.

This valve is ULC listed and complies with the following codes: NFPA 30, 30A, UFC, IFC, and PEI RP2000.



Failure to follow any or all of the warnings may render the valve nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

Installation & Operation



Warnings

- **Fire Hazard**—Death or serious injury could result from spilled liquids.
- Any modification to this valve other than stated in these installation instructions will void the product warranty.
- This device is intended to be used only as a secondary shutoff and should not be the only system in place to prevent a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the valve.
- The valve must be used with clean product. Contamination from products such as used oil may cause the valve to function improperly. Line strainers or filters should be used in the fill piping or delivery vehicle to insure clean product.
- Minimum requirements for valve operation: 5 GPM inlet flow at 5 PSI inlet pressure.
- Maximum pressure is 100 PSI.
- Maximum allowable viscosity is 150 centistokes.
- A tight fill is required for the valve to operate. Do not substitute any other fill adaptors for the special adaptor supplied.
- Once closed the valve will allow up to 1.5 GPM to pass through to relieve fill line pressure.
- All by-pass and or limit valves of the delivery system must be functional and properly set prior to filling.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves.

Operating Instructions

1. Make sure the fill nozzle is equipped with the appropriate mating coupler to form a secure connection with the tight fill adaptor.
2. Attach the nozzle to the tight fill adaptor making sure the connection is secure.
3. Switch on the pumping system.
4. Open the fill nozzle and begin product transfer.
5. Continually monitor the liquid level measurement device during the fill.
6. If the liquid level reaches the preset level of the 9095A valve, and the valve shuts off, the operator may see a slight movement of the fill hose and/or hear the pump by-pass activate.
7. If the 9095A shuts off during the tank fill, perform the overfill disconnect procedure.

Overfill Disconnect Procedure

1. If 9095A shut-off has occurred, close the fill nozzle immediately.
2. Turn off the pumping system.
3. Slowly release one arm of the quick coupler. This will introduce air into the fill line and allow product between nozzle and valve to drain (wait a minimum of (1) minute for product to drain).
4. Completely uncouple and remove the nozzle after the line has drained. Attempting to disconnect the coupler from the tight fill adaptor with pressure in the hose will result in a product spill.

Installation Instructions

1. Take the valve out of the box and remove all packaging material. Check the valve for any shipping damage. Remove the adaptor and nipple from the valve. 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 dashpot when turned to the upright position. Set the valve upright and move the float up and down to insure there is no binding.
2. Determine the SHUTOFF HEIGHT at 90 or 95% full. (See Fig. 1 below & Mfg. tank chart).
3. Find the SHUTOFF HEIGHT in Table 1. Use Table 1 to determine RISER PIPE HEIGHT FROM TOP OF THE TANK and proper NIPPLE LENGTH (for applicable stored fluid) required to adapt the unit to your application. Note: A 4" long nipple is provided with the valve. (See Nipple Length Table 1).
4. If your existing riser pipe height is different from the RISER PIPE HEIGHT required, see step 5. If the RISER PIPE HEIGHT is applicable to your tank configuration then go to step 6. IMPORTANT: THE TANK MUST HAVE A RISER PIPE WITH 4"-8 NPT MALE THREADS TO FIT THE TIGHT FILL ADAPTOR.
5. Two rules apply when adjusting the riser pipe height; 1) the RISER PIPE HEIGHT must not be less than 3 inches and, 2) the NIPPLE LENGTH must not be less than 2 inches. For every 1 inch adjustment to the RISER PIPE HEIGHT, the NIPPLE LENGTH must be adjusted 1 inch in the same direction. See example and proceed to step 6.

EXAMPLE: You are installing this overfill prevention valve (with tight fill adaptor) on a gasoline storage tank and you determine your SHUTOFF HEIGHT to be 7 inches. According to Table 1, a SHUTOFF HEIGHT of 7 inches requires a RISER PIPE HEIGHT of 6 inches and a 4 inch long NIPPLE (provided). If your tank has a 10 inch RISER PIPE HEIGHT (instead of 8 inches), you need to add 2 more inches to the required NIPPLE LENGTH in order to maintain the proper shutoff height.

FIGURE 1

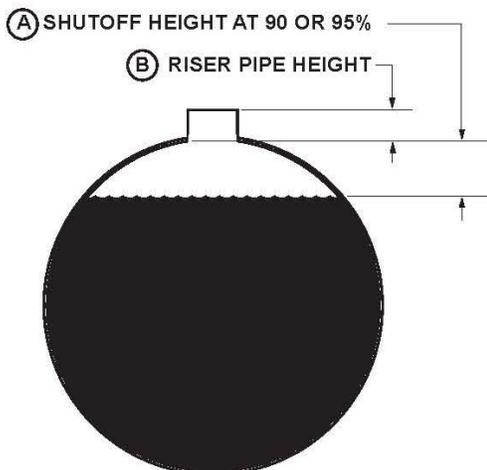


TABLE 1

A Shutoff Height <small>Note: All lengths are inches.</small>	B Riser Pipe Height		C Nipple Length	
	Gasoline	Diesel	Gasoline	Diesel
2"	11"	12"	4"	4"
3"	10"	11"	4"	4"
4"	9"	10"	4"	4"
5"	8"	9"	4"	4"
6"	7"	8"	4"	4"
7"	6"	7"	4"	4"
8"	3"	6"	2"	4"
9"	3"	3"	3"	2"
10"	3"	3"	4"	3"
11"	3"	3"	5"	4"
12"	3"	3"	6"	5"
13"	3"	3"	7"	6"
14"	3"	3"	8"	7"
15"	3"	3"	9"	8"
16"	3"	3"		9"
17"	3"	3"		
18"	3"	3"		
19"	3"	3"		
20"	3"	3"		
21"	3"	3"		
22"	3"	3"		
23"	3"	3"		
24"	3"	3"		
25"	3"	3"		

6. Use care with floats and linkage during installation. Apply a non-hardening gasoline resistant sealant sparingly to all male threads. Attach the drop tube to the bottom of the valve. Assemble piping and install valve in the tank at distance determined in steps above.

Caution: Excessive use of thread sealant may cause the valve to function improperly, application of thread sealant should be to male threaded members of the system only (to reduce the possibility of sealant being forced inside the system).

7. Attach warning tag at fill point, with supplied cable tie, in location visible to operator filling the tank.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Optional Inspection

If required, this valve should be inspected according to local codes or to API Recommended Practice 2350.



Warnings

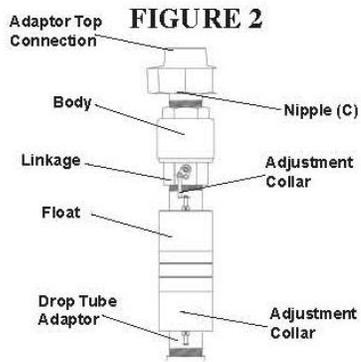
- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to inspect this valve. Stop now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing inspection. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves

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:

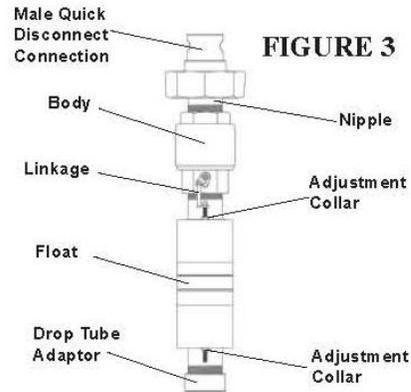
1. Remove valve from the tank.
2. Inspect the float and float linkages for any damage and make sure the float can move up and down freely. If the float or the float linkages have been damaged, or the float cannot move up and down freely, the valve must be sent back to the factory for evaluation.
3. Look 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.

If you need further information on applications, special configurations, approvals, etc... please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



	CONNECTION	
	Adaptor Top-Female	Adaptor Bottom-Female
9095A-4200 AVEVR	3"- 8 NPT	4"- 8 NPT
9095AV4200 AVEVR	3"- 8 NPT	4"- 8 NPT
9095A-3200 AVEVR	2"- 11.5 NPT	4"- 8 NPT
9095AV3200 AVEVR	2"- 11.5 NPT	4"- 8 NPT



	CONNECTION	
	Male Quick Disconnect	Adaptor Bottom-Female
9095A-5200 AVEVR	2.5"	4"- 8 NPT
9095AV5200 AVEVR	2.5"	4"- 8 NPT

9095A 3" Overfill Prevention Valve With 6" Tank Adaptor Installation, Maintenance & Operating Instructions

The 9095A Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve terminates flow of product when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed on a standard 6" NPT male connection. When installed to manufacturers requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.

This valve is ULC listed and complies with the following codes: NFPA 30, 30A, UFC, IFC, and PEI RP2000.



Failure to follow any or all of the warnings may render the valve nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

Installation & Operation



Warnings

- **Fire Hazard**—Death or serious injury could result from spilled liquids.
- Any modification to this valve other than stated in these installation instructions will void the product warranty.
- This device is intended to be used only as a secondary shutoff and should not be the only system in place to prevent a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the valve.
- The valve must be used with clean product. Contamination from products such as used oil may cause the valve to function improperly. Line strainers or filters should be used in the fill piping or delivery vehicle to insure clean product.
- Minimum requirements for valve operation: 5 GPM inlet flow at 5 PSI inlet pressure.
- Maximum pressure is 100 PSI.
- Maximum allowable viscosity is 60 centistokes.
- A tight fill is required for the valve to operate. Do not substitute any other fill adaptors for the special adaptor supplied.
- Once closed the valve will allow up to 1.5 GPM to pass through to relieve fill line pressure.
- All by-pass and or limit valves of the delivery system must be functional and properly set prior to filling.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves.

Operating Instructions

1. Make sure the fill nozzle is equipped with the appropriate mating coupler to form a secure connection with the tight fill adaptor.
2. Attach the nozzle to the tight fill adaptor making sure the connection is secure.
3. Switch on the pumping system.
4. Open the fill nozzle and begin product transfer.
5. Continually monitor the liquid level measurement device during the fill.
6. If the liquid level reaches the preset level of the 9095A valve, and the valve shuts off, the operator may see a slight movement of the fill hose and/or hear the pump by-pass activate.
7. If the 9095A shuts off during the tank fill, perform the overfill disconnect procedure.

Overfill Disconnect Procedure

1. If 9095A shut-off has occurred, close the fill nozzle immediately.
2. Turn off the pumping system.
3. Slowly release one arm of the quick coupler. This will introduce air into the fill line and allow product between nozzle and valve to drain (wait a minimum of (1) minute for product to drain).
4. Completely uncouple and remove the nozzle after the line has drained. Attempting to disconnect the coupler from the tight fill adaptor with pressure in the hose will result in a product spill.

Installation Instructions

1. Remove the valve from the box and remove all packaging material. Check the valve for any shipping damage. Remove the adaptor and nipple from the valve. 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 dashpot when turned to the upright position. Set the valve upright and move the float up and down to insure there is no binding.
2. Determine the SHUTOFF HEIGHT at 90 or 95% full. (See Fig. 1 below & Mfg. tank chart).
3. Find the SHUTOFF HEIGHT in table 1. Use Table 1 to determine RISER PIPE HEIGHT FROM TOP OF THE TANK and proper NIPPLE LENGTH (for applicable stored fluid) required to adapt the unit to your application. Note: A 4" long nipple is provided with the valve. (See Nipple Length Table 1.)
4. If your existing riser pipe height is different from the RISER PIPE HEIGHT required, see step 5. If the RISER PIPE HEIGHT is applicable to your tank configuration then go to step 6. IMPORTANT: THE TANK MUST HAVE A RISER PIPE WITH 6"-8 NPT MALE THREADS TO FIT THE TIGHT FILL ADAPTOR.
5. Two rules apply when adjusting the riser pipe height; 1) the RISER PIPE HEIGHT must not be less than 3 inches and, 2) the NIPPLE LENGTH must not be less than 3 inches. For every 1 inch adjustment to the RISER PIPE HEIGHT, the NIPPLE LENGTH must be adjusted 1 inch in the same direction. See example and proceed to step 6.

EXAMPLE: You are installing this overfill prevention valve (with tight fill adaptor) on a gasoline storage tank and you determine your SHUTOFF HEIGHT to be 7 inches. According to Table 1, a SHUTOFF HEIGHT of 7 inches requires a RISER PIPE HEIGHT of 6 inches and a 4 inch long NIPPLE (provided). If your tank has a 10 inch RISER PIPE HEIGHT (instead of 8 inches), you need to add 2 more inches to the required NIPPLE LENGTH in order to maintain the proper shutoff height.

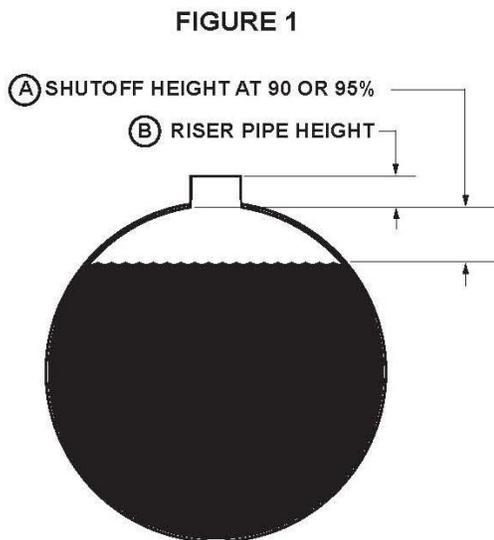


TABLE 1

A Shutoff Height	B Riser Pipe Height		C Nipple Length	
	Gasoline	Diesel	Gasoline	Diesel
Note: All lengths are inches.				
2"	13"	13.25"	4"	4"
3"	12"	12.25"	4"	4"
4"	11"	11.25"	4"	4"
5"	10"	10.25"	4"	4"
6"	9"	9.25"	4"	4"
7"	8"	8.25"	4"	4"
8"	6"	6.25"	3"	3"
9"	5"	5.25"	3"	3"
10"	5"	5.25"	4"	4"
11"	3"	3.25"	3"	3"
12"	3"	3.25"	4"	4"
13"	3"	3.25"	5"	5"
14"	3"	3.25"	6"	6"
15"	3"	3.25"	7"	7"
16"	3"	3.25"	8"	8"
17"	3"	3.25"	9"	9"
18"	3"	3.25"		
19"	3"	3.25"		
20"	3"	3.25"		
21"	3"	3.25"		
22"	3"	3.25"		
23"	3"	3.25"		
24"	3"	3.25"		
25"	3"	3.25"		

6. Use care with floats and linkage during installation. Apply a non-hardening gasoline resistant sealant sparingly to all male threads. Attach the drop tube to the bottom of the valve. Assemble piping and install valve in the tank to distance determined in steps above.

Caution: Excessive use of thread sealant may cause the valve to function improperly, application of thread sealant should be to male threaded members of the system only (to reduce the possibility of sealant being forced inside the system).

7. Attach warning tag at fill point, with supplied cable tie, in location visible to operator filling the tank.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Optional Inspection

If required, this valve should be inspected according to local codes or to API Recommended Practice 2350.



Warnings

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to inspect this valve. Stop now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing inspection. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves

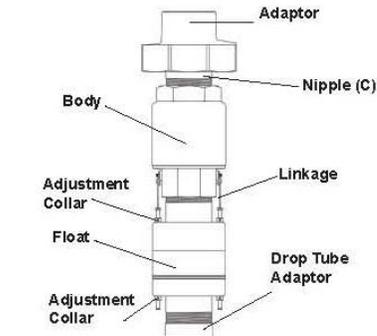
If valve is fitted with the optional test mechanism you can simulate a high product level by pulling the test mechanism lever during a fill. If the valve does not prevent product transfer when the test mechanism is pulled, or the valve is not fitted with a test mechanism, please do the following:

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.

If you need further information on applications, special configurations, approvals, etc... please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.

FIGURE 2



	CONNECTION	
	Adaptor Top-Female	Adaptor Bottom-Female
9095A-3300 AVEVR	3"	6" 8 NPT
9095AV/3300 AVEVR	3"	6" 8 NPT

9095A 2" Overfill Prevention Valve Without 4" Tank Adaptor Installation, Maintenance & Operating Instructions

The 9095A Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve terminates flow of product when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed through a 4" riser pipe or a 4" bunghole when used with the tight fill adaptor. When installed to manufacturers requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.

This valve is ULC listed and complies with the following codes: NFPA 30, 30A, UFC, IFC, and PEI RP2000



Failure to follow any or all of the warnings may render the valve nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury, or death.

Installation & Operation



Warnings

- **Fire Hazard**—Death or serious injury could result from spilled liquids.
- Any modification to this valve other than stated in these installation instructions will void the product warranty.
- This device is intended to be used only as a secondary shutoff and should not be the only system in place to prevent a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the valve.
- The valve must be used with clean product. Contamination from products such as used oil may cause the valve to function improperly. Line strainers or filters should be used in the fill piping or delivery vehicle to insure clean product.
- Minimum requirements for valve operation: 5 GPM inlet flow at 5 PSI inlet pressure.
- Maximum pressure is 100 PSI.
- Maximum allowable viscosity is 150 centistokes.
- A tight fill is required for the valve to operate. Do not substitute any other fill adaptors for the special adaptor supplied.
- Once closed the valve will allow up to 1.5 GPM to pass through to relieve fill line pressure.
- All by-pass and or limit valves of the delivery system must be functional and properly set prior to filling.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves.

Operating Instructions

1. Make sure the fill nozzle is equipped with the appropriate mating coupler to form a secure connection with the tight fill adaptor.
2. Attach the nozzle to the tight fill adaptor making sure the connection is secure.
3. Switch on the pumping system.
4. Open the fill nozzle and begin product transfer.
5. Continually monitor the liquid level measurement device during the fill.
6. If the liquid level reaches the preset level of the 9095A valve, and the valve shuts off, the operator may see a slight movement of the fill hose and/or hear the pump by-pass activate.
7. If the 9095A shuts off during the tank fill, perform the overfill disconnect procedure.

Overfill Disconnect Procedure

1. If 9095A shut-off has occurred, close the fill nozzle immediately.
2. Turn off the pumping system.
3. If using a quick coupler, slowly release one arm of the coupler. This will introduce air into the fill line and allow product between nozzle and valve to drain, (wait a minimum of (1) minute for product to drain).
4. Completely uncouple and remove the nozzle after the line has drained. Attempting to disconnect the coupler from the tight fill adaptor with pressure in the hose will result in a product spill.

Installation Instructions

1. Take the valve out of the box and remove all packaging material. Check the valve for any shipping damage. Remove the adaptor and nipple from the valve. 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 dashpot when turned to the upright position. Set the valve upright and move the float up and down to insure there is no binding.
2. Determine the SHUTOFF HEIGHT at 90 or 95% full. (See Fig. 2 or Fig. 3 below & Mfg. tank chart).
3. If your SHUTOFF HEIGHT is less than 12 inches (for use in gasoline), or less than 13 inches (for use in diesel fuel), then YOU MUST INSTALL THE OVERFILL DEVICE ON A RISER PIPE using Table 2 and Fig. 2 to determine THE DISTANCE FROM THE TOP OF THE OVERFILL VALVE TO THE TOP OF THE TANK.
4. If your SHUTOFF HEIGHT is 12 inches or more (for gasoline use), or 13 inches or more (for diesel use), then use Table 3 and Fig. 3 to determine THE DISTANCE FROM THE TOP OF THE TANK TO THE TOP OF THE OVERFILL VALVE.
5. Use care with floats and linkage during installation. Apply a non-hardening gasoline resistant sealant sparingly to all male threads. Attach the drop tube to the bottom of the valve. Assemble piping and install valve in the tank at distance determined in steps above. Excessive use of thread sealant may cause the valve to function improperly, application of thread sealant should be to male threaded members of the system only (to reduce the possibility of sealant being forced inside the system).
6. Attach warning tag at fill point, with supplied cable tie, in location visible to operator filling the tank.

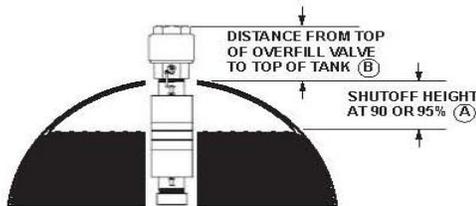


FIGURE 2

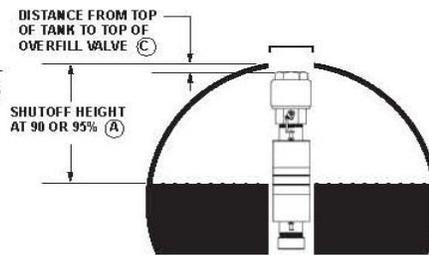


FIGURE 3

TABLE 2

Ⓐ Shutoff Height <small>Note: All lengths are inches.</small>	Ⓑ Distance from top of Overfill Valve to top of Tank	
	Gasoline	Diesel
2"	9.25"	10.25"
3"	8.25"	9.25"
4"	7.25"	8.25"
5"	6.25"	7.25"
6"	5.25"	6.25"
7"	4.25"	5.25"
8"	3.25"	4.25"
9"	2.25"	3.25"
10"	1.25"	2.25"
11"	0.25"	1.25"
12"	—	0.25"

TABLE 3

Ⓐ Shutoff Height <small>Note: All lengths are inches.</small>	Ⓒ Distance from top of Tank to top of Overfill Valve	
	Gasoline	Diesel
12"	0.75"	—
13"	1.75"	0.75"
14"	2.75"	1.75"
15"	3.75"	2.75"
16"	4.75"	3.75"
17"	5.75"	4.75"
18"	6.75"	5.75"
19"	7.75"	6.75"
20"	8.75"	7.75"
21"	9.75"	8.75"
22"	—	9.75"
23"	—	—
24"	—	—
25"	—	—



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Optional Inspection

If required, this valve should be inspected according to local codes or to API Recommended Practice 23.



Warnings

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to inspect this valve. Stop now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing inspection. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves

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:

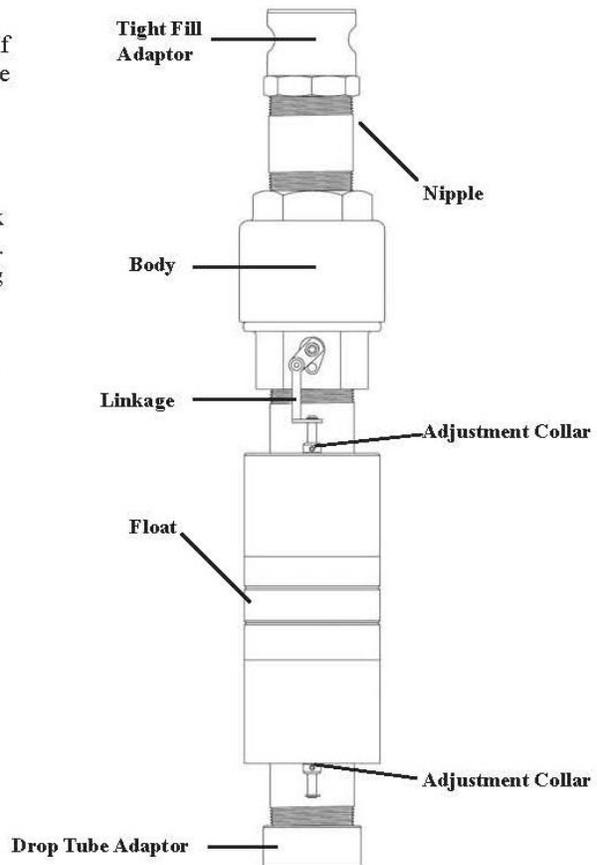
1. Remove valve from the tank.
2. Inspect the float and float linkages for any damage and make sure the float can move up and down freely. If the float or the float linkages have been damaged, or the float cannot move up and down freely, the valve must be sent back to the factory for evaluation.
3. Look 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.

	CONNECTION
9095A-9200 AVEVR	2"
9095AV9200 AVEVR	2"

Models sold w/o Nipple & Tight Fill Adaptor

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.

If you need further information on applications, special configurations, approvals, etc... please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.



WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misppapplication of the product.

9095A 3" Overfill Prevention Valve Without 6" Tank Adaptor Installation, Maintenance & Operating Instructions

The 9095A Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve terminates flow of product when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed through a 6" riser pipe or a 6" bunghole when used with the tight fill adaptor. When installed to manufacturers requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.

This valve is ULC listed and complies with the following codes: NFPA 30, 30A, UFC, IFC, and PEI RP2000



Failure to follow any or all of the warnings may render the valve nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

Installation & Operation



Warnings

- **Fire Hazard**—Death or serious injury could result from spilled liquids.
- Any modification to this valve other than stated in these installation instructions will void the product warranty.
- This device is intended to be used only as a secondary shutoff and should not be the only system in place to prevent a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the valve.
- The valve must be used with clean product. Contamination from products such as used oil may cause the valve to function improperly. Line strainers or filters should be used in the fill piping or delivery vehicle to insure clean product.
- Minimum requirements for valve operation: 5 GPM inlet flow at 5 PSI inlet pressure.
- Maximum pressure is 100 PSI.
- Maximum allowable viscosity is 60 centistokes.
- A tight fill is required for the valve to operate. Do not substitute any other fill adaptors for the special adaptor supplied.
- Once closed the valve will allow up to 1.5 GPM to pass through to relieve fill line pressure.
- All by-pass and or limit valves of the delivery system must be functional and properly set prior to filling.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves.

Operating Instructions

1. Make sure the fill nozzle is equipped with the appropriate mating coupler to form a secure connection with the tight fill adaptor.
2. Attach the nozzle to the tight fill adaptor making sure the connection is secure.
3. Switch on the pumping system.
4. Open the fill nozzle and begin product transfer.
5. Continually monitor the liquid level measurement device during the fill.
6. If the liquid level reaches the preset level of the 9095A valve, and the valve shuts off, the operator may see a slight movement of the fill hose and/or hear the pump by-pass activate.
7. If the 9095A shuts off during the tank fill, perform the overfill disconnect procedure.

Overfill Disconnect Procedure

1. If 9095A shut-off has occurred, close the fill nozzle immediately.
2. Turn off the pumping system.
3. If using a quick coupler, slowly release one arm of the coupler. This will allow product between nozzle and valve to drain, (wait a minimum of (1) minute for product to drain).
4. Completely uncouple and remove the nozzle after the line has drained. Attempting to disconnect the coupler from the tight fill adaptor with pressure in the hose will result in a product spill.

Installation Instructions

1. Take the valve out of the box and remove all packaging material. Check the valve for any shipping damage. Remove the adaptor and nipple from the valve. 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 dashpot when turned to the upright position. Set the valve upright and move the float up and down to insure there is no binding.
2. Determine the SHUTOFF HEIGHT at 90 or 95% full. (See Fig. 2 or Fig. 3 below & Mfg. tank chart).
3. If your SHUTOFF HEIGHT is less than 13" for use in gasoline or diesel fuel, then; YOU MUST INSTALL THE OVERFILL DEVICE ON A RISER PIPE using Table 2 and Fig. 2 to determine THE DISTANCE FROM THE TOP OF THE OVERFILL VALVE TO THE TOP OF THE TANK .
4. If your SHUTOFF HEIGHT is 13" or more for use in gasoline or diesel fuel, then use Table 3 and Fig. 3 to determine THE DISTANCE FROM THE TOP OF THE TANK TO THE TOP OF THE OVERFILL VALVE .
5. Use care with floats and linkage during installation. Apply a non-hardening gasoline resistant sealant sparingly to all male threads. Attach the drop tube to the bottom of the valve. Assemble piping and install valve in the tank at distance determined in steps above.

Caution: Excessive use of thread sealant may cause the valve to function improperly, application of thread sealant should be to male threaded members of the system only (to reduce the possibility of sealant being forced inside the system).

6. Attach warning tag at fill point, with supplied cable tie, in location visible to operator filling the tank.

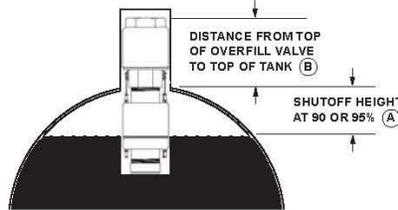


FIGURE 2

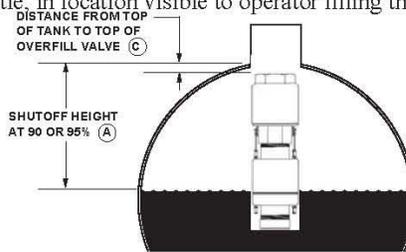


FIGURE 3

TABLE 2

Ⓐ Shutoff Height Note: All lengths are inches.	Ⓑ Distance from top of Overfill Valve to top of Tank	
	Gasoline	Diesel
2"	11"	11.25"
3"	10"	10.25"
4"	9"	9.25"
5"	8"	8.25"
6"	7"	7.25"
7"	6"	6.25"
8"	5"	5.25"
9"	4"	4.25"
10"	3"	3.25"
11"	2"	2.25"
12"	1"	1.25"
13"	—	0.25"

TABLE 3

Ⓐ Shutoff Height Note: All lengths are inches.	Ⓒ Distance from top of Tank to top of Overfill Valve	
	Gasoline	Diesel
14"	1"	0.75"
15"	2"	1.75"
16"	3"	2.75"
17"	4"	3.75"
18"	5"	4.75"
19"	6"	5.75"
20"	7"	6.75"
21"	8"	7.75"
22"	9"	8.75"
23"	10"	9.75"
24"	11"	10.75"
25"	12"	11.75"



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Optional Inspection

If required, this valve should be inspected according to local codes or to API Recommended Practice 2350.



Warnings

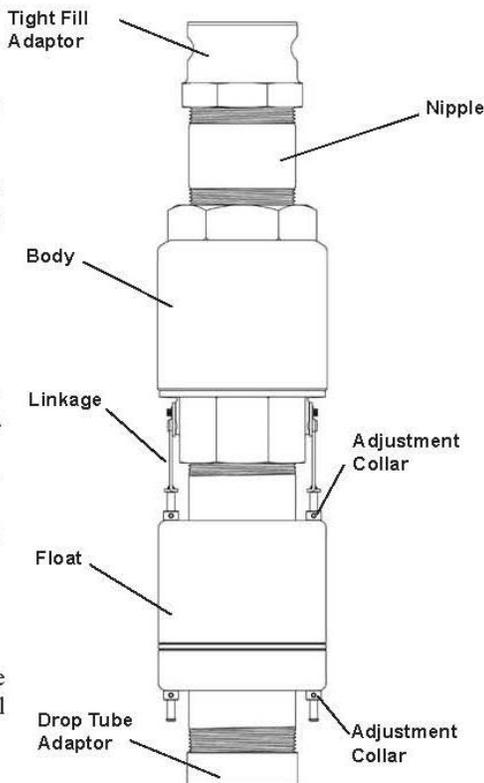
- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to inspect this valve. Stop now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing inspection. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on valves.

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.

If you need further information on applications, special configurations, approvals, etc... please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage



resulting from purchase, installation or misapplication of the product.

	CONNECTION
9095A-9300 AVEVR	3"
9095AV9300 AVEVR	3"

Models sold w/o Nipple & Tight Fill Adaptor



Section 4

419 Series Drop Tube

Morrison Fig. No. 419 Drop Tube

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

- INSTALLATION:**
1. Check drop tube for any defects or damage that may have occurred in shipping.
 2. Measure the distance from the top of the riser pipe to the bottom of the tank.
 3. Using the Drop Tube Length Calculator at below, Calculate the length of the drop tube and cut the end of the drop tube at a 45 degree angle. (Cut end of drop tube should not be more than 6 inches from bottom of tank.)
 4. Place drop tube into riser pipe.

<u>Drop Tube Length Calculator</u>	
_____	= Measured distance from top of riser pipe to bottom of tank.
- 6 inches	=

= <input style="width: 100px; height: 20px;" type="text"/>	Required length of drop tube.

Failure to follow any or all of the warnings may render the drop tube nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this drop tube other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on drop tubes.

MAINTENANCE: No maintenance is required for this product, but local codes may require specific procedures. It should be verified during installation that the bottom of the drop tube is at the proper distance from the bottom of the tank.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids.
- You must be trained to maintain this drop tube **Stop** now if you have not been trained
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on drop tubes.

OPERATING INSTRUCTIONS: The drop tube does not require any assistance during operation.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this drop tube has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Section 5

927 Series Product Adaptor And 735DC Series Product Cap

Morrison Fig. No. 735DC/927 Series Product Cap & Adaptor

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

Adaptor: Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to body threads. Morrison recommends thread sealant rather than Teflon® tape. Thread adaptor on to riser pipe until handtight then tighten per the following specifications.

Thread Tightening Specifications

SIZE	Wrench Makeup* (Number of Turns)
2" NPT Threads	3.25
3" NPT Threads	2
4" NPT Threads	2.12

* - All sizes should have handtight engagement before Wrench Makeup is applied. A tolerance of plus or minus one turn is allowed. This information is to be used as guide only. The number of turns may vary depending on the quality of thread form.

Cap: Set cap on adaptor. Push lever arms inward to body to secure and seal cap to the adaptor.

Failure to follow any or all of the warnings may render the cap and adaptor nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this cap and adaptor other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on caps and adaptors.

MAINTENANCE: Ensure product is properly installed. Visually inspect both cap and adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the cap and adaptor are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary. The adaptor will require that the poppet be manually pushed in to inspect the whole seal.

WARNING: Tank may be under pressure. Product may be expelled out from the port opening as the adaptor poppet is depressed.

OPERATING INSTRUCTIONS: Pull out lever arms to remove cap. Push in lever arms to seal cap.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Dubuque, Iowa 52001
 800.553.4840 • 563.583.5028 Fax •
 custserv@morbros.com
www.morbros.com

927---0211 PP EVR Rev. C



Section 6

928 Series Product Coupler

Morrison Fig. No. 928 Series Dry Disconnect Coupler

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

1. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to hose end or pipe threads. Morrison recommends thread sealant rather than Teflon® tape.
2. Thread coupler on to hose end or pipe.

OPERATING INSTRUCTIONS:

1. Inspect the coupler gasket and adaptor face to be smooth and free of contamination.
2. Attach the female coupler over the mating male adaptor until the gasket in the couple makes contact with the front face of the adaptor.
3. The connection is secured by pushing the lever arms in toward the body simultaneously. Lever arms must be positioned parallel with the coupler body to fully lock.



WARNING: Care must be taken to insure proper connection and a positive seal. Improperly fitted or applied connections can result in a serious accident or product spillage. Under no circumstances shall the pressure rating of the couplings be exceeded.



Failure to follow any or all of the warnings may render the coupler nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.



WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this coupler other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- Follow local regulations for (un)loading product.
- Coupler to be used for its designed purpose only.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Product flow may result in static electricity; therefore grounding of equipment is required.
- Tanks could be under pressure. Vapors could be expelled from tank adaptor, vents, piping, valves or fittings while performing (un)loading. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on couplers.

MAINTENANCE: Ensure product is properly installed. Visually inspect coupler on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on coupler are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary. Inspect lever arms and pins for excessive wear or damage. Replace any parts that are deteriorated, worn, or damaged.



WARNING: Tank may be under pressure. Vapors may be expelled out from the mating adaptor as the coupler is attached or removed

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Section 7

323 Series Vapor Recovery Adaptor And 323C Vapor Recovery Cap

Morrison Fig. No. 323C/323 Series Vapor Cap & Adaptor

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

- Adaptor: 1. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to body threads. Morrison recommends thread sealant rather than Teflon® tape.
2. Thread adaptor on to riser pipe until handtight then tighten per the following specifications.

Thread Tightening Specifications	
SIZE	Wrench Makeup* (Number of Turns)
3" NPT Threads	2
4" NPT Threads	2.12

* - All sizes should have handtight engagement before Wrench Makeup is applied. A tolerance of plus or minus one turn is allowed. This information is to be used as guide only. The number of turns may vary depending on the quality of thread form.

Cap: Set cap on adaptor. Push down lever arms until they snap down securing cap to the adaptor.

Failure to follow any or all of the warnings may render the cap and adaptor nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this cap and adaptor other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on caps and adaptors.

MAINTENANCE: Ensure product is properly installed. Visually inspect both cap and adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the cap and adaptor are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary. The adaptor will require that the poppet be manually pushed in to inspect the whole seal.

WARNING: Tank may be under pressure. Vapors may be expelled out from the port opening as the adaptor poppet is depressed.

OPERATING INSTRUCTIONS: Pull up on cap ring to remove cap. Push down on lever arms to seal cap.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Dubuque, Iowa 52001
 800.553.4840 • 563.583.5028 Fax •
 custserv@morbros.com
www.morbros.com

323---0309 PP EVR Rev. C



Section 8

818/918 Series Tank Gauge

818 Clock Gauge

Installation, Maintenance & Operating Instructions

The 818 Clock Gauge is designed to be used to measure liquid level in an aboveground storage tank. The gauge mounts on top of the tank and is activated by a float connected to a cable.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Installation



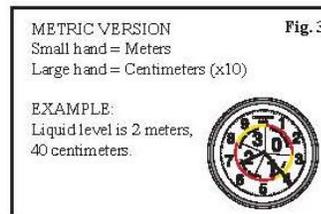
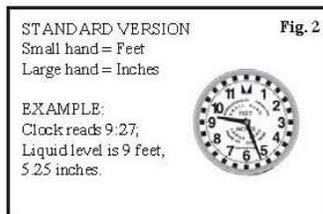
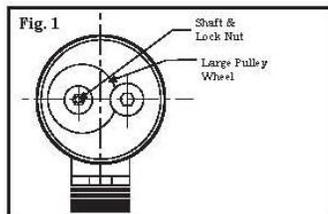
Warnings

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- Any modification to this gauge other than those stated in these installation instructions will void the product warranty.
- This device is intended to be used as a liquid level indicator to the operator and should not be the only system in place to prevent a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the gauge.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on gauge.

Steps

1. Verify contents of box. You should have received the gauge, float, installation instructions, and re-order/overflow stickers. Inspect the items for shipping damage. **DO NOT** use if damage is found. **DO NOT** pull and release cable like a Yo-Yo. This can cause the spring to unload. **ALWAYS** hold onto cable and move it in a slow steady motion.
2. Locate the opening on the top of the tank where the gauge is to be installed. If possible, select a location away from the fill port to avoid excessive turbulence from affecting the float. Also make certain that there are no objects inside the tank, near the selected opening, upon which the float and cable could get tangled.
3. Once an opening is selected, stick the tank to determine the actual level of liquid in the tank. Record this level as you will need it to set the gauge once it is installed.
4. Apply pipe dope or Teflon tape to the male threads on the gauge. If you have a gauge with female threads, apply the pipe dope or Teflon tape to the male threads of the pipe on the tank. **DO NOT** get pipe dope on the cable of the gauge.
5. Attach the float to the snap on the end of the cable. Make sure the snap clip is securely closed.
6. Slowly lower the float into the tank. Guide the cable through your fingers letting the cable slide through slowly. **DO NOT** allow the float to free fall into the tank as this will cause the cable to come off of the pulley mechanism and render the gauge inoperable.
7. Once the float is resting on the liquid level (or tank bottom if the tank is empty) thread the gauge into, or onto, the tank fitting. Use a pipe wrench or strap wrench, on the large hex at the bottom of the gauge, to tighten the gauge into, or onto, the tank fitting.

8. Remove the retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the nut (Fig. 1). Insert a small screwdriver into the slot on the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hands, until the gauge hands on the clock read the level that you recorded earlier (see Fig. 2 and 3).



9. Once you have the hands in the correct position, hold the screwdriver firmly in position and tighten the nut on the shaft.

10. Reinstall the metal back plate making certain the side with the date label is positioned to the inside. Replace the retaining ring making certain the ring snaps all the way down into the groove. You may need to use pliers to squeeze the ring into the groove. You will know that the retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.

11. Rotate the entire gauge so the face can be read by the operator on the ground.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Maintenance

This gauge should be maintained per applicable codes or at least once each year.



WARNINGS

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to maintain this gauge. **Stop** now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing maintenance. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on gauge.

Steps

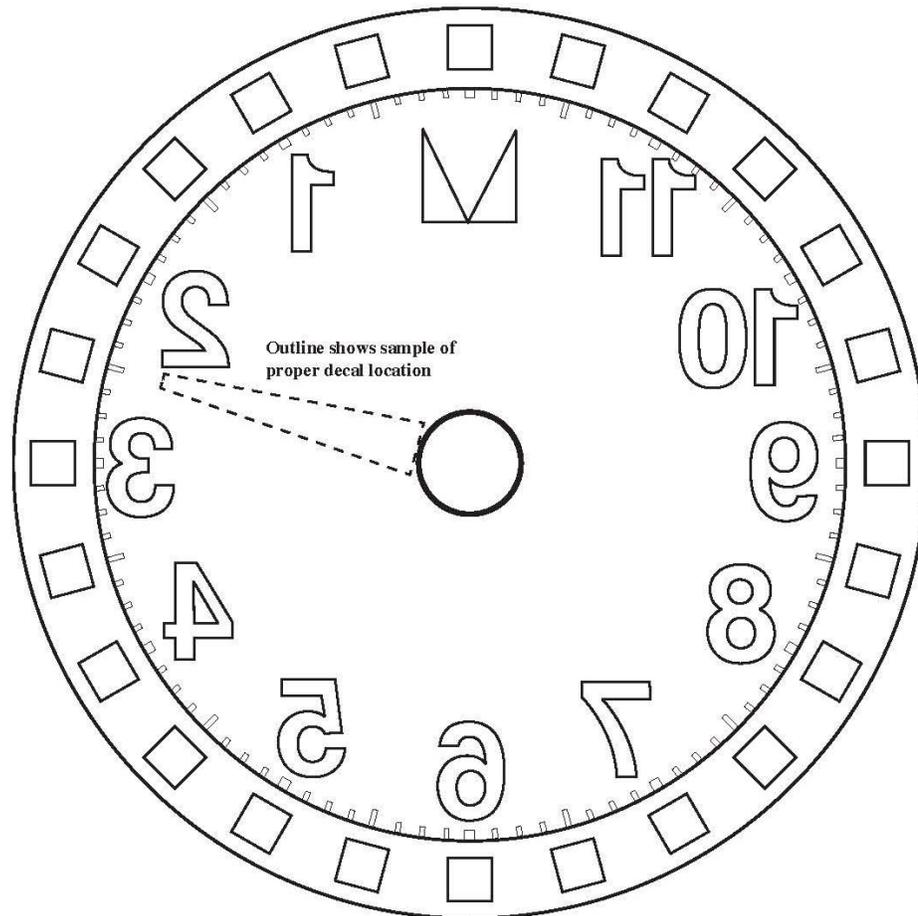
1. Visually inspect the gauge for damage or excessive wear. If either is found replace the gauge.
2. If necessary clean the clear front cover with a damp cloth.
3. Manually stick the tank to verify gauge readout. If readings do not match adjust the gauge setting according to the installation instructions.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

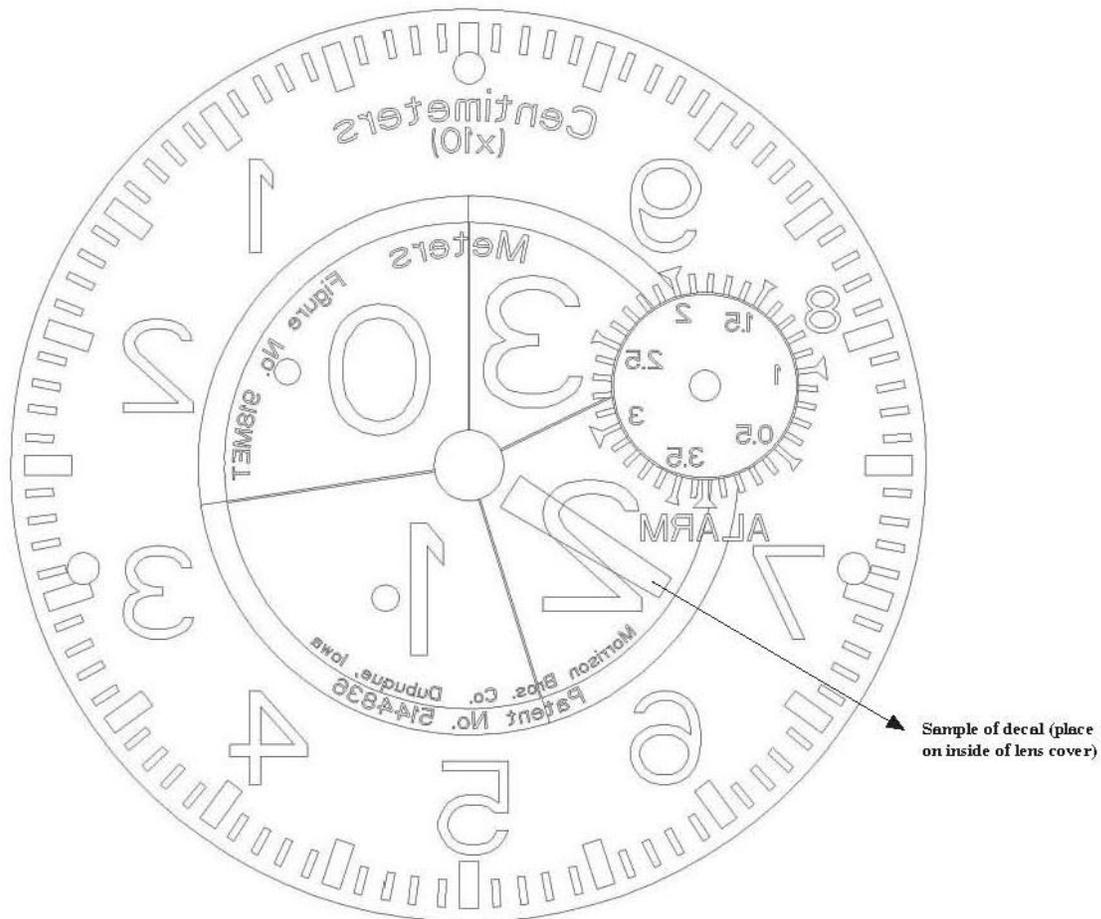
WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation, or misapplication of the product.

Optional Over-fill and Re-order Sticker Installation (Standard)

**Steps**

1. Remove front (clear) lens cover.
2. Place lens onto template aligning outside edge to outside circle.
3. Remove decal backing and place decal on lens as shown on template. Align wide end against inside circle and narrow end pointing toward level you want to indicate. (NOTE: template is set for inside reading out and lettering on decal will read backwards.)
4. Decals represent small hand on clock which indicates feet. If both high level and low level decals are used, make sure each points to the correct level you want to indicate.
5. Reinstall lens cover with decals on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service.

Optional Over-fill and Re-order Sticker Installation (Metric)



Steps

1. Remove front (clear) lens cover.
2. Place lens onto template aligning outside edge to outside circle.
3. Remove decal backing and place decal on lens as shown on template. Align wide end against inside circle and narrow end pointing toward level you want to indicate. (NOTE: template is set for inside reading out and lettering on decal will read backwards.)
4. Decals represent small hand on clock which indicates feet. If both high level and low level decals are used, make sure each points to the correct level you want to indicate.
5. Reinstall lens cover with decals on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service.

918 Clock Gauge Alarm

Installation, Maintenance & Operating Instructions

The 918 Clock Gauge Alarm is designed to be used to measure liquid level in an aboveground storage tank. The gauge mounts on top of the tank and is activated by a float connected to a cable. The 918 includes an alarm box that can be used to provide a high level audible alarm at a desired level that is set during installation.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Installation



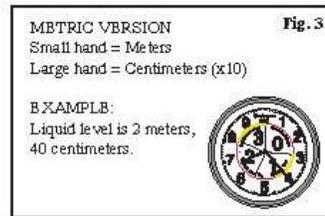
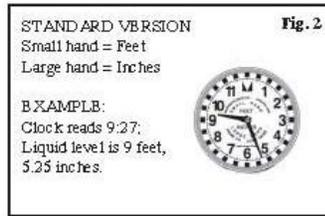
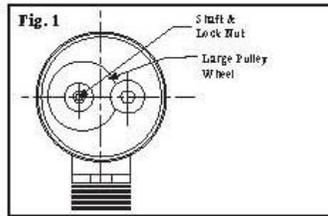
Warnings

- Fire Hazard – Death or serious injury could result from spilled liquids.
- Any modification to this gauge other than those stated in these installation instructions will void the product warranty.
- This device is intended to be used as an auxiliary warning to the operator of a possible overfill situation and should not be the only system in place to prevent a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the gauge.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on gauge.

Steps

1. Verify contents of box. You should have received the gauge, float, alarm box, installation instructions, warning tag, cable tie, and re-order/overfill stickers. Inspect the items for shipping damage. Do not use if damage is found.
2. Locate the opening on the top of the tank where the gauge is to be installed. If possible, select a location away from the fill port to avoid excessive turbulence from affecting the float. Also make certain that there are no objects inside the tank, near the selected opening, upon which the float and cable could get tangled.
3. Once an opening is selected, stick the tank to determine the actual level of liquid in the tank. Record this level as you will need it to set the gauge once it is installed.
4. Apply pipe dope or Teflon tape to the male threads on the gauge. If you have a gauge with female threads, apply the pipe dope or Teflon tape to the male threads of the pipe on the tank. **DO NOT** get pipe dope on the gauge cable.
5. Attach the float to the snap on the end of the cable. Make sure the snap clip is securely closed.
6. **Slowly** lower the float into the tank. Guide the cable through your fingers letting the cable slide through slowly. **DO NOT** allow the float to free fall into the tank as this will cause the cable to come off of the pulley mechanism and render the gauge useless.
7. Once the float is resting on the liquid level (or tank bottom if the tank is empty) thread the gauge into, or onto, the tank fitting. Use a pipe wrench or strap wrench, on the large hex at the bottom of the gauge, to tighten the gauge into, or onto, the tank fitting.

8. Remove the retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the nut. Insert a small screw driver into the slot in the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hands, until the gauge hands on the clock read the level that you recorded earlier.



9. Once you have the hands in the correct position, hold the screwdriver firmly in position and tighten the nut on the shaft.
10. Reinstall the metal back plate making certain the side with the date label is positioned to the inside. Replace the retaining ring making certain the ring snaps all the way down into the groove. You may need to use pliers to squeeze the ring into the groove. You will know that the retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.
11. Rotate the entire gauge so the face can be read by the operator on the ground.
12. Set the alarm hand by following Option A or Option B shown below. Gauge **MUST** be installed upright on tank prior to setting alarm hand.

Note: High level alarm requirements may differ from one location to the next. Be certain to follow all Federal, State, and Local code requirements governing this installation.

Setting The Alarm Dial OPTION A

10' 0" – Tank Ht
9' 0" – 90% High Level Alarm
3' 0" Difference
6' 0" – Existing Liquid Level

90% Full
Alarm set to go off at this level
Liquid level

TANK

ALARM DIAL

ALARM

Compute the difference between the required high level alarm limit and actual liquid level in the tank.
(Example shown 9Ft. - 6 Ft. = 3Ft.)

Remove lens plate on the Gauge Unit and set the Alarm Dial to the mark. (Example set to numeral 3.)

Set Alarm Dial by pulling it out, rotating it to desired setting, and letting it "snap back in gear." The gear spread allows settings to the nearest 4 inches.

Do not disrupt the position of the clock hands. If the clock hands are in the way with this option, use OPTION B for setting dial.

Setting The Alarm Dial OPTION B

10' 0" – Tank Ht
9' 0" – 90% High Level Alarm
6' 0" – Existing Liquid Level

90% Full
Alarm set to go off at this level
Liquid level

TANK

ALARM DIAL

ALARM

Remove lens plate and back plate off of the Clock Gauge. Clock Gauge should be set for current liquid level in tank. If not, do so. Using thumb tips rotate large pulley wheel counter-clockwise lifting float off of the liquid as if filling the tank.

When clock reaches point of high level alarm, hold it on that mark. (In this example, it would be 9:00.)

Set Alarm Dial by pulling it out, rotating it to the arrow (pointing directly down) as shown, and letting it "snap back in gear." Slowly lower float back to tank level.

Take care not to disrupt the position of the clock hands. If the clock hands are in the way with this option, use OPTION A

13. Run two oil and gas resistant wires from the gauge to the location where the alarm box will be mounted. Do **NOT** attach the wires to the wires in the junction box on the gauge. You will do this later in these instructions. Although not required, it is recommended to run the wires in some type of conduit in order to protect them against possible damage and environmental conditions.

Note: As defined in article 501 – Class 1 Locations of the National Electric Code, this apparatus and its connected wiring are intrinsically safe. Under normal conditions this apparatus and its wiring cannot release sufficient energy to ignite a specific ignitable atmospheric mixture by opening, shorting, or grounding.

Warning: Interconnect wiring between the gauge and the alarm unit must be kept totally isolated and separate from any other wiring. This wiring must not share any junction box, conduit, raceway, or fixtures with circuits other than those defined by NEC as being intrinsically safe for all Class 1 locations.

Location: NEC ARTICLE 501-3-CLASS 1 Locations exempt intrinsically safe enclosures in paragraph 501-3(b)(1)(c), and therefore may be placed in the most convenient location but must be within reach of the operator and within audible range.

Mounting: Since a general purpose NEMA 4X enclosure is used to protect the alarm circuits and batteries, any mounting holes, conduit, or fasteners must be sealed in order to maintain the waterproof integrity of the enclosure. All penetrations into the enclosure must be made at the bottom of the alarm box.

14. Separate the two halves of the Alarm Unit box. Attach the rear half of the box to a suitable fixture.
15. Connect the two wires from the Clock Gauge to the two screw terminals located on the alarm circuit board on the front half of the box.
16. Install the two supplied 9V batteries into the battery terminals on the circuit board.
17. Test the alarm by pressing the Test/Cancel button on the front of the alarm box.
18. Test the connection by shorting the two wires together at the gauge end. This should cause the alarm to sound until the Test/Cancel button is pushed. If the alarm fails to sound, check the connections and the batteries and retest until results are satisfactory.
19. Remove the cover of the junction box on the gauge and connect the wires from the alarm box to the wires in the junction box. Replace the junction box cover.
20. Reassemble the two halves of the alarm box.
21. If desired you can simulate a tank fill to trigger the alarm by removing the back cover of the gauge and rotating the large pulley in a counter-clockwise direction to lift the float thus simulating a fill. Keep constant control of the pulley to avoid having the pulley free spin and the cable unwind. Observe the hands and the alarm dial hand to verify that they are moving with the pulley movement. Allow the alarm dial hand to pass over the "Point of Alarm." The alarm should sound. If alarm fails to sound at the desired level, adjust the dial until operation is satisfactory. Once satisfied, let the float down slowly to the liquid level and replace the back cover on the gauge.
22. **Important:** Install the included **warning tag** where it will be visible to the operator filling or unloading the tank that is fitted with this gauge and alarm.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Maintenance

This gauge should be maintained per applicable codes or at least once each year.



WARNINGS

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- You must be trained to maintain this gauge. **Stop** now if you have not been trained.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing maintenance. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on gauge.

Steps

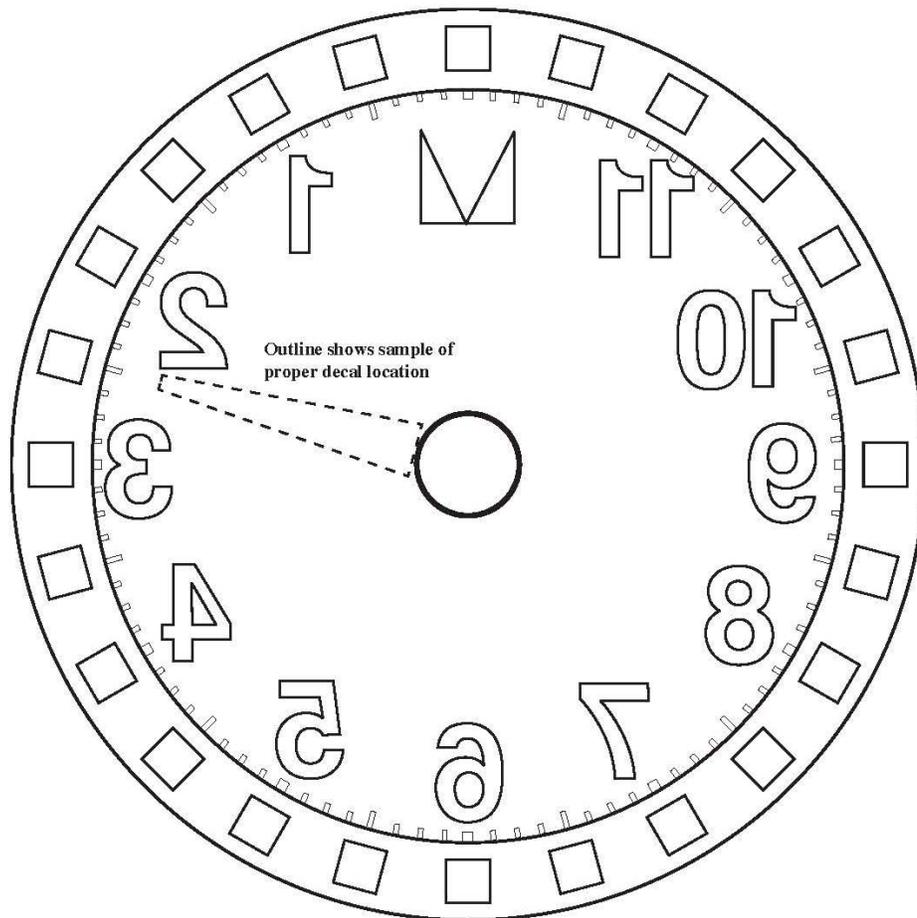
1. Visually inspect the gauge and alarm for damage or excessive wear. If either is found replace the gauge or alarm.
2. If necessary clean the clear front cover with a damp cloth.
3. Manually stick the tank to verify gauge readout. If readings do not match adjust the gauge setting according to the installation instructions.
4. Test the alarm by pushing the Test/Cancel button. If alarm does not sound, replace the 9V batteries found on the circuit board inside the alarm box. Acceptable replacement battery part numbers are listed on the red tag on the side of the alarm box. Press the Test/Cancel button after replacing the batteries. If the alarm still does not sound replace the alarm box with a new one.
5. Inspect the **warning tag** located near the tank fill and off-loading area. If the tag is damaged or difficult to read, contact Morrison Bros. Co. at (800) 553-4840 for a free replacement tag.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

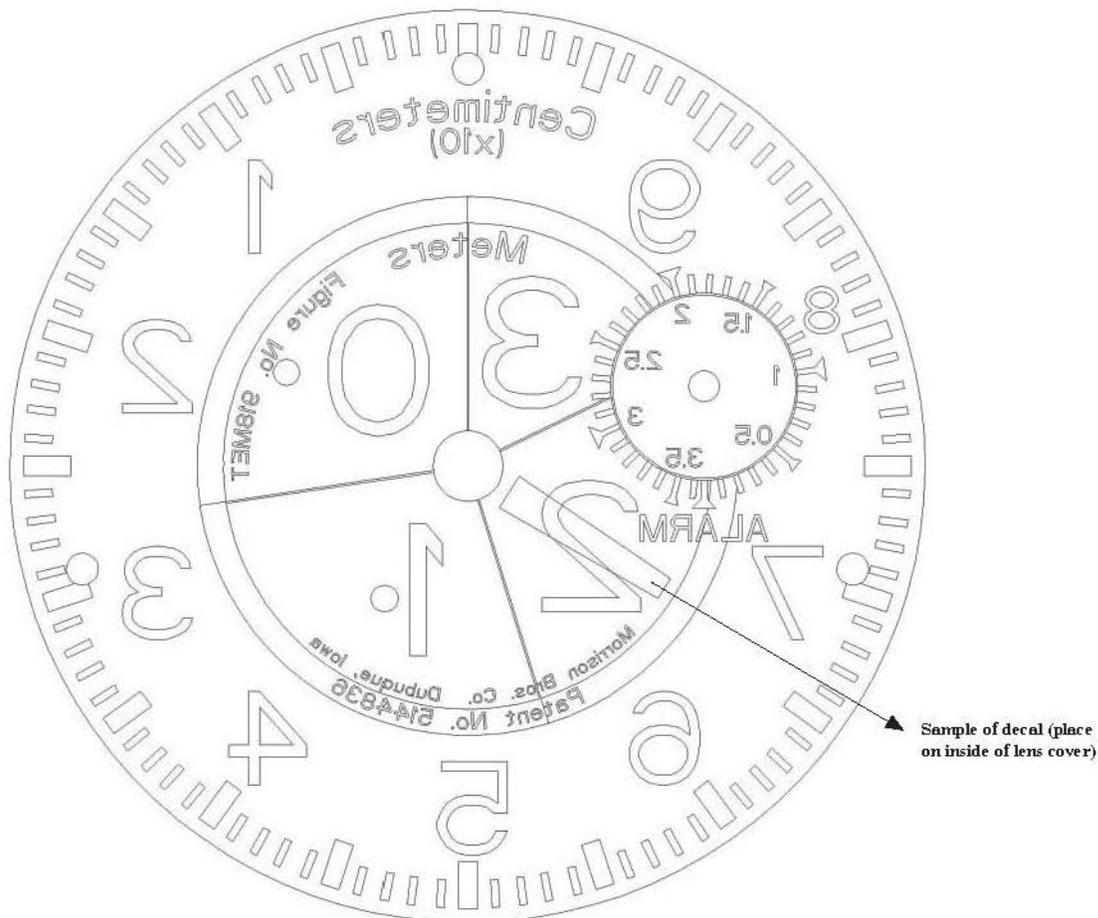
WARRANTY: If you believe this valve has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation, or misapplication of the product.

Optional Over-fill and Re-order Sticker Installation (Standard)

**Steps**

1. Remove front (clear) lens cover.
2. Place lens onto template aligning outside edge to outside circle.
3. Remove decal backing and place decal on lens as shown on template. Align wide end against inside circle and narrow end pointing toward level you want to indicate. (NOTE: template is set for inside reading out and lettering on decal will read backwards.)
4. Decals represent small hand on clock which indicates feet. If both high level and low level decals are used, make sure each points to the correct level you want to indicate.
5. Reinstall lens cover with decals on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service.

Optional Over-fill and Re-order Sticker Installation (Metric)



Steps

1. Remove front (clear) lens cover.
2. Place lens onto template aligning outside edge to outside circle.
3. Remove decal backing and place decal on lens as shown on template. Align wide end against inside circle and narrow end pointing toward level you want to indicate. (NOTE: template is set for inside reading out and lettering on decal will read backwards.)
4. Decals represent small hand on clock which indicates feet. If both high level and low level decals are used, make sure each points to the correct level you want to indicate.
5. Reinstall lens cover with decals on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service.



Section 9

305 Series Monitoring Cap and Adaptor

Morrison 2" Fig. No. 305 Series Vapor Cap & Adaptor

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

- Adaptor: 1. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to body threads. Morrison recommends thread sealant rather than Teflon® tape.
2. Make sure the end of riser pipe is not sharp or it may cut and damage body gasket. File end of riser pipe smooth before installing riser pipe into tank to prevent filings entering tank.
3. Thread adaptor on to riser pipe until handtight then tighten per the following specifications.

Thread Tightening Specifications	
SIZE	Wrench Makeup* (Number of Turns)
2" NPT Threads	3.25

- * - All sizes should have handtight engagement before Wrench Makeup is applied. A tolerance of plus or minus one turn is allowed. This information is to be used as guide only. The number of turns may vary depending on the quality of thread form.

Cap: Set cap on adaptor. Push in lever arm securing cap to the adaptor.

Failure to follow any or all of the warnings may render the cap and adaptor nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this cap and adaptor other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on valves.

MAINTENANCE: Ensure product is properly installed. Visually inspect both cap and adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the cap and adaptor are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.

WARNING: Tank may be under pressure. Vapors may be expelled out from the port opening as the cap is removed. Grip cap firmly as it is removed from the adaptor.

OPERATING INSTRUCTIONS: Push out on cap lever arm to remove cap. Push in on cap lever arm to seal cap.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.

Morrison 4" Fig. No. 305 Series Tank Monitoring Cap & Adaptor INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

Adaptor:

1. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to body threads. Morrison recommends thread sealant rather than Teflon® tape.
2. Make sure the end of riser pipe is not sharp or it may cut and damage body gasket. File end of riser pipe smooth before installing riser pipe into tank to prevent filings entering tank.
3. Thread adaptor on to riser pipe until handtight then tighten per the following specifications.

Thread Tightening Specifications

SIZE	Wrench Makeup* (Number of Turns)
4" NPT Threads	2.12

* - All sizes should have handtight engagement before Wrench Makeup is applied. A tolerance of plus or minus one turn is allowed. This information is to be used as guide only. The number of turns may vary depending on the quality of thread form.



- Cap: 1. Apply a fuel resistant, non-hardening, anti-seize sealant (non adhesive) to cable connector threads. Follow manufacturer's instructions for installation of monitoring system.
2. Set cap on adaptor. Push down lever arms securing cap to the adaptor.

Failure to follow any or all of the warnings may render the cap and adaptor nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this cap and adaptor other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on valves.

MAINTENANCE: Ensure product is properly installed. Visually inspect both cap and adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the cap and adaptor are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.

WARNING: Tank may be under pressure. Vapors may be expelled out from the port opening as the cap is removed. Grip cap firmly as it is removed from the adaptor.

OPERATING INSTRUCTIONS: Pull up on cap ring to remove cap. Push down on lever arms to seal cap.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Section 10

539 Series Drop Tube Diffuser

Morrison 2" Fig. No. 539AS Series Drop Tube Diffuser

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

1. The diffuser is made for an aluminum drop tube with an outside diameter of no more than 2".
2. Measure the distance from the top of the riser pipe to the bottom of the tank.
3. Using the Drop Tube Length Calculator at the right, calculate the length of the drop tube and cut the end of the drop tube square. (Cut end of drop tube should be 6 inches from bottom of tank.)
4. Place the attached Hole Location Template onto the tube so the bottom edge of the sheet is flush with the bottom edge of the tube.
5. Using the template, lightly center punch hole locations and drill through the tube with a 7/32" drill.
6. Remove the template from the drop tube.
7. Place nut clips on tube and align with holes in tube.
8. Place diffuser on tube, align holes and secure with enclosed screws.

<u>Drop Tube Length Calculator</u>	
_____	= Measured distance from top of riser pipe to bottom of tank.
- 6 inches	=
_____	.
= <input type="text"/>	Required length of drop tube.

Failure to follow any or all of the warnings may render the diffuser nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this diffuser other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on valves.
- You must be trained to maintain this diffuser **Stop** now if you have not been trained

MAINTENANCE: None required.

OPERATING INSTRUCTIONS: The diffuser does not require any assistance during operation.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.

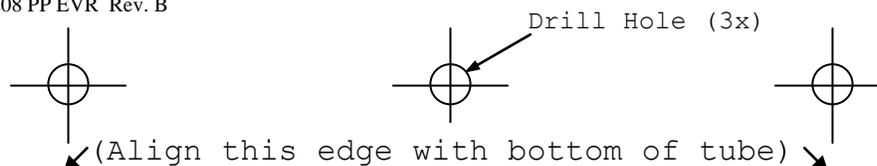


Dubuque, Iowa 52001
 800.553.4840 • 563.583.5028 Fax •
 custserv@morbros.com
www.morbros.com

539AS-0208 PP EVR Rev. B

2" Hole Location Template

539AS-0208 PP EVR Rev. B



Morrison 3" Fig. No. 539AS Series Drop Tube Diffuser

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION:

9. The diffuser is made for an aluminum drop tube with an outside diameter of no more than 3".
10. Measure the distance from the top of the riser pipe to the bottom of the tank.
11. Using the Drop Tube Length Calculator at the right, calculate the length of the drop tube and cut the end of the drop tube square. (Cut end of drop tube should be 6 inches from bottom of tank.)
12. Place the attached Hole Location Template onto the tube so the bottom edge of the sheet is flush with the bottom edge of the tube.
13. Using the template, lightly center punch hole locations and drill through the tube with a 7/32" drill.
14. Remove the template from the drop tube.
15. Place nut clips on tube and align with holes in tube.
16. Place diffuser on tube, align holes and secure with enclosed screws.

Drop Tube Length Calculator

_____ = Measured distance from top of riser pipe to bottom of tank.

- 6 inches =

= Required length of drop tube.

Failure to follow any or all of the warnings may render the diffuser nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this diffuser other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on valves.
- You must be trained to maintain this diffuser **Stop** now if you have not been trained

MAINTENANCE: None required.

OPERATING INSTRUCTIONS: The diffuser does not require any assistance during operation.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.

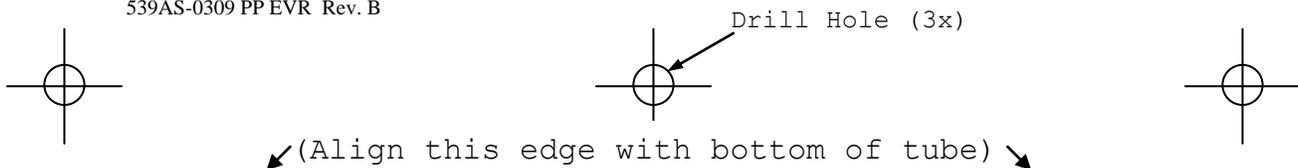


Dubuque, Iowa 52001
 800.553.4840 • 563.583.5028 Fax •
 custserv@morbros.com
www.morbros.com

539AS-0309 PP EVR Rev. B

3" Hole Location Template

539AS-0309 PP EVR Rev. B



Morrison Fig. No. 539AT Series Drop Tube Diffuser INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS

INSTALLATION: The diffuser is made for a pipe with male N.P.T threads. The end of pipe should be 5" to 6" from the bottom of the tank for 3" size and 5 ½" to 6 ½" from the bottom of the tank for 2" size. Screw diffuser onto threaded pipe and wrench tight.

Failure to follow any or all of the warnings may render the diffuser nonfunctional and could result in a hazardous product spill, which may result in property damage, environmental contamination, fire, explosion, injury or death.

WARNINGS

- **Fire Hazard** - Death or serious injury could result from spilled liquids. Any modification to this diffuser other than stated in these installation instructions will void the product warranty.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. **Avoid** sparks, open flame, or hot tools when working on valves.
- You must be trained to maintain this diffuser **Stop** now if you have not been trained

MAINTENANCE: None required.

OPERATING INSTRUCTIONS: The diffuser does not require any assistance during operation.

If you need any further information on applications, special configurations, approvals, etc. please consult Morrison's catalog, contact Morrison, or visit our website at www.morbros.com.

WARRANTY: If you believe this product has a defect due to material or workmanship, please contact Morrison for a return authorization. All products are thoroughly tested before shipment. Material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Appendix

EVR Product Warranty Card
Morrison Standard Product Warranty
Morrison Vent Guide For ASTs
Reference Table
Maintenance Guide
EVR Installation Check List

MORRISON BROS. CO. WARRANTY CARD

All Morrison products are thoroughly tested before shipment and only material found to be defective in manufacture will be repaired or replaced. Claims must be made within one year from the date of installation, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.

TO BE FILLED OUT BY INSTALLER/MAINTENANCE PERSON

Installation Date: _____

Installation Company: Name _____

Address _____

City _____ State _____ Zip _____

Business At Installation Site: Name _____

Address _____

City _____ State _____ Zip _____

Morrison Product(s) I.D Numbers _____

This card must be returned to manufacturer for warranty to be honored.

WARRANTY-100 PP Rev. A

(Front)

Place
Postage
Stamp

Morrison Bros. Co.
P.O. Box 238
Dubuque, IA 52004-0238

(Back)

Product Warranty

Morrison Bros. Co.

WARRANTY—All Morrison products are thoroughly tested before shipment and only material found to be defective in manufacture will be replaced or repaired at our discretion. Claims must be made within one year from the date of installation. Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product.



Venting Guide

for

Aboveground Storage Tanks

This guide is intended for reference use only. All final details of design and construction must meet the requirements of federal, state and local codes. In case where plan approval is required, such approval must be obtained from the authority having jurisdiction before any work is performed. The equipment presented in the Guide applies only to shop fabricated tanks.

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References

- NFPA 30 "Flammable and Combustible Liquids Code" 2003 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
- 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,
Tel (918) 494-9696
- Morrison 325 East 24th Street, Dubuque, Iowa 52001. Tel (563) 583-5701

Background Information

The Morrison 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.

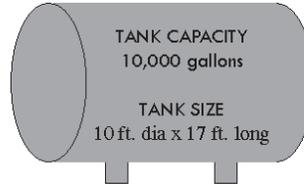
Wetted Area — Exposed surface or shell area of a tank used in determining the venting requirements needed for that size tank in event of an exposure fire. In a horizontal tank, the wetted area is calculated as 75% of the exposed surface area. In a vertical tank, the wetted area is calculated as the first 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 5. 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 5, wetted area can also be found on Table D, page 8. 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 10. 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

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

Total CFH Required: (6,840 + 354,000) = 360,840 CFH

STEP 5 Vent Selection

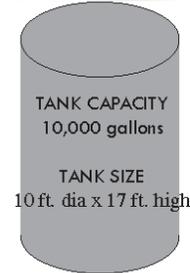
Options based on size of piping, type of product, flow requirements, required venting capacity and mounting. For the sake of this example, use 2" piping, Class 1B liquid. The normal vent size should be no smaller than the system piping, so a Morrison 2" Fig. 548 (20,200 CFH) is selected.

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 12. 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 244 (16 oz pressure)	<u>504,818</u>	CFH
Total Venting Provided	525,018	CFH

Vent Selection/Capacity Example 2

Vertical Cylindrical Storage Tank



STEP 1 Precalculated Data for Common Sizes

Find tank size on Table A which can be found on page 5. 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 A, page 5, wetted area can also be found on Table D, page 8. 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 10. 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 12. 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 244	504,818	CFH
(16 oz pressure)		
Total Venting Provided	525,018	CFH

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 7. 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 7, 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:

$$\text{Wetted area} = \frac{(L \times W) + 2(L \times H) + 2(W \times H)}{1.44}$$

L = length, W = width, H = height

$$\frac{(274 \times 130) + 2(274 \times 65) + 2(130 \times 65)}{1.44}$$

Wetted Area = 612 Sq. ft.

STEP 3 Determine CFH Requirement

Use Table F: Venting Capacity Chart on page 10. Wetted area must be known (612 sq. ft.). Since 534 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 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 396,320 CFH. Normal venting and emergency venting may be combined to reach this total. Morrison Vent Capacities are listed on Table H, page 12. 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 244 (16 oz pressure)	<u>504,818</u>	CFH
Total Venting Provided	525,018	CFH

Table A: Pre-Calculated Data

Horizontal Cylindrical Tanks

TANK			WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE (Inches)
CAPACITY (Gallons)	DIAMETER (Ft or In)	LENGTH (Ft-In)			
280	36"	5'-2"	47	49,520	3
300	38"	5'-0"	49	51,640	3
500	48"	5'-5"	69	72,650	4
530	46"	6'-0"	71	74,750	4
550	48"	6'-0"	75	78,950	4
1,000	48"	10'-8"	119	124,950	5
1,000	64"	6'-0"	109	114,450	5
1,500	64"	9'-0"	147	154,350	5
2,000	64"	12'-0"	184	193,200	6
2,500	64"	15'-0"	222	223,320	6
3,000	64"	18'-0"	259	243,680	6
3,000	6'-0"	14'-0"	240	233,400	6
4,000	64"	24'-0"	335	281,100	8
4,000	6'-0"	19'-0"	311	270,060	6
5,000	8'-0"	13'-4"	326	276,960	6
6,000	8'-0"	16'-0"	376	300,480	8
8,000	8'-0"	21'-4"	477	344,340	8
10,000	8'-0"	27'-0"	584	385,920	8
10,000	9'-0"	21'-0"	540	369,200	8
10,000	10'-0"	17'-0"	518	360,840	8
10,000	10'-6"	15'-7"	515	359,700	8
12,000	8'-0"	32'-0"	678	420,080	8
12,000	9'-0"	25'-0"	625	401,000	8
12,000	10'-0"	20'-6"	600	392,000	8
12,000	11'-0"	17'-0"	583	385,540	8
15,000	8'-0"	40'-0"	829	470,990	8
15,000	10'-6"	23'-5"	703	429,020	8
20,000	10'-0"	34'-2"	922	499,820	8
20,000	10'-6"	31'-0"	896	491,760	8
20,000	11'-0"	28'-0"	868	483,080	8
25,000	10'-6"	38'-6"	1,082	537,530	10
30,000	10'-6"	46'-3"	1,274	568,100	10

Table B: Pre-Calculated Data

Vertical Cylindrical Tanks

TANK			WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE (Inches)
CAPACITY (Gallons)	DIAMETER (Ft or In)	LENGTH (Ft-In)			
280	36"	5'-2"	48	50,580	3
300	38"	5'-0"	49	51,640	3
500	48"	5'-5"	68	71,600	4
530	46"	6'-0"	72	75,800	4
550	48"	6'-0"	75	78,950	4
1,000	48"	10'-8"	134	140,700	5
1,000	64"	6'-0"	100	105,000	5
1,500	64"	9'-0"	151	158,550	5
2,000	64"	12'-0"	201	213,100	6
2,500	64"	15'-0"	251	239,520	6
3,000	64"	18'-0"	301	265,460	6
3,000	6'-0"	14'-0"	263	245,760	6
4,000	64"	24'-0"	402	312,840	8
4,000	6'-0"	19'-0"	358	291,840	8
5,000	8'-0"	13'-4"	335	281,100	8
6,000	8'-0"	16'-0"	402	312,840	8
8,000	8'-0"	21'-4"	536	367,680	8
10,000	8'-0"	27'-0"	678	420,080	8
10,000	9'-0"	21'-0"	593	389,340	8
10,000	10'-0"	17'-0"	534	366,920	8
10,000	10'-6"	15'-7"	514	359,320	8
12,000	8'-0"	32'-0"	754	446,360	8
12,000	9'-0"	25'-0"	706	430,040	8
12,000	10'-0"	20'-6"	644	407,840	8
12,000	11'-0"	17'-0"	587	387,060	8
15,000	8'-0"	40'-0"	754	446,360	8
15,000	10'-6"	23'-5"	764	449,760	8
20,000	10'-0"	34'-2"	942	506,020	10
20,000	10'-6"	31'-0"	990	520,900	10
20,000	11'-0"	28'-0"	967	513,770	10
25,000	10'-6"	38'-6"	990	520,900	10
30,000	10'-6"	46'-3"	990	520,900	10

Table C: Pre-Calculated Data

Horizontal Rectangular Tanks

TANK				WETTED AREA (Sq Ft)	REQ'D VENT CAPACITY (CFH)	EMERGENCY VENT SIZE (Inches)
CAPACITY (Gallons)	LENGTH (Ft-In)	WIDTH (Ft-In)	HEIGHT (Ft-In)			
125	6'-8"	2'-9"	1'-0"	37	38,950	3
186	2'-8"	2'-8"	3'-6"	44	46,340	3
250	4'-4"	4'-0"	1'-11"	49	51,640	3
250	6'-8"	2'-9"	1'-11"	54	56,900	3
500	7'-6"	3'-0"	3'-0"	86	90,560	4
500	10'-0"	3'-6"	2'-0"	89	93,740	4
1,000	9'-8"	4'-8"	3'-0"	131	137,550	5
1,000	10'-0"	4'-7"	3'-	133	139,650	5
2,000	10'-2"	6'-11"	3'-10"	201	211,560	6
2,000	10'-8"	6'-4"	4'-0"	204	213,240	6
2,500	10'-2"	6'-11"	4'-9"	233	229,480	6
3,000	8'-6"	6'-10"	7'-2"	278	253,560	6
3,000	13'-9"	5'-5"	5'-5"	282	255,640	6
4,000	11'-4"	6'-10"	7'-2"	338	282,480	8
4,000	18'-2"	5'-5"	5'-5"	354	289,920	8
5,000	22'-9"	5'-5"	5'-5"	428	323,760	8
6,000	13'-8"	10'-10"	5'-5"	413	317,460	8
6,000	16'-5"	6'-10"	7'-2"	445	330,900	8
6,000	27'-4"	5'-5"	5'-5"	503	355,140	8
8,000	18'-2"	10'-10"	5'-5"	511	358,180	8
8,000	21'-11"	6'-10"	7'-2"	562	377,560	8
10,000	22'-10"	10'-10"	5'-5"	612	396,320	8
10,000	27'-5"	6'-10"	7'-2"	678	420,080	8
12,000	27'-4"	10'-10"	5'-5"	710	431,400	8
12,000	32'-11"	6'-10"	7'-2"	795	460,300	8

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	Tank Diameter	3 Ft	4 Ft	5 Ft	6 Ft	7 Ft	8 Ft	9 Ft	10 Ft	11 Ft	12 Ft		
Tank Length	Approximate Wetted Area of Tanks With Flat Heads, Square Feet											Tank Length	Approximate Wetted Area of Tanks With Flat Heads, Square Feet										
3 Ft	32											38 Ft						685	791	902	1013	1129	1244
4 Ft	39	55										39 Ft						701	810	923	1036	1155	1272
5 Ft	46	65	88									40 Ft						718	828	944	1060	1181	1301
6 Ft	53	74	100	128								41 Ft						734	847	966	1083	1207	1329
7 Ft	60	84	112	142	173							42 Ft						751	866	987	1107	1233	1357
8 Ft	67	93	124	156	190	226						43 Ft						767	885	1008	1130	1259	1385
9 Ft	74	102	136	170	206	245	286					44 Ft							904	1029	1154	1284	1414
10 Ft	81	112	147	184	223	264	308	353				45 Ft							923	1051	1178	1310	1442
11 Ft	88	121	159	198	239	283	329	377	428			46 Ft							941	1072	1201	1336	1470
12 Ft	95	131	171	213	256	301	350	400	454	509		47 Ft							960	1093	1225	1362	1498
13 Ft	102	140	183	227	272	320	371	424	480	537		48 Ft							979	1114	1248	1388	1527
14 Ft	109	150	194	241	289	339	393	447	506	565		49 Ft							998	1135	1272	1414	1555
15 Ft	116	159	206	255	305	358	414	471	532	594		50 Ft								1157	1295	1440	1583
16 Ft	123	169	218	269	322	377	435	495	558	622		51 Ft								1178	1319	1466	1612
17 Ft	130	178	230	283	338	395	456	518	584	650		52 Ft								1199	1342	1492	1640
18 Ft	137	188	242	298	355	414	477	542	610	678		53 Ft								1220	1366	1518	1668
19 Ft		197	253	312	371	433	499	565	636	707		54 Ft								1246	1389	1544	1696
20 Ft		206	265	326	388	452	520	589	662	735		55 Ft								1263	1413	1570	1725
21 Ft		216	277	340	404	471	541	612	688	763		56 Ft									1437	1593	1753
22 Ft		225	289	354	421	490	562	636	714	792		57 Ft									1460	1622	1781
23 Ft		235	300	368	437	508	584	659	740	820		58 Ft									1484	1648	1809
24 Ft		244	312	383	454	527	605	683	765	848		59 Ft									1507	1674	1839
25 Ft			324	397	470	546	626	706	791	876		60 Ft									1531	1700	1866
26 Ft			336	411	487	565	647	730	817	905		61 Ft										1726	1894
27 Ft			347	425	503	584	668	754	843	933		62 Ft										1752	1923
28 Ft			359	440	520	603	690	777	869	961		63 Ft										1778	1951
29 Ft			371	454	536	621	711	801	895	989		64 Ft										1803	1979
30 Ft			383	468	553	640	732	824	921	1018		65 Ft										1829	2007
31 Ft			395	482	569	659	753	848	947	1046		66 Ft										1855	2036
32 Ft				496	586	678	775	871	973	1074		67 Ft											2064
33 Ft				510	602	697	796	895	999	1103		68 Ft											2092
34 Ft				524	619	715	817	918	1025	1131		69 Ft											2120
35 Ft				539	635	734	838	942	1051	1159		70 Ft											2149
36 Ft				553	652	753	860	966	1077	1187		71 Ft											2177
37 Ft				567	668	772	881	989	1103	1216		72 Ft											2205

SI Units: 1 Ft = 0.30 m; 1 sq ft = 0.09 sq m
 Source for Chart: NFPA 30, 2003 Edition, Table B-4

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
Tank	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
14 Ft		176	220	265	308	351	396	440	484	528
15 Ft		189	236	284	330	377	424	471	519	566
16 Ft		202	251	302	352	402	453	502	554	603
17 Ft			267	321	374	427	481	534	588	641
18 Ft			283	340	396	452	510	565	623	679
19 Ft			298	359	418	477	538	597	657	716
20 Ft			314	378	440	502	566	628	692	754
21 Ft				397	462	527	594	659	727	792
22 Ft				416	484	552	623	691	761	829
23 Ft				435	506	577	651	722	796	867
24 Ft				454	528	602	679	757	830	905
25 Ft					550	628	708	785	865	943
26 Ft					572	653	736	816	900	980
27 Ft					594	678	764	848	934	1018
28 Ft					616	703	792	879	969	1056
29 Ft						728	821	911	1003	1093
30 Ft						753	849	942	1038	1131

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

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

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, Table 4.2.5.2.3
- 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 — 2003

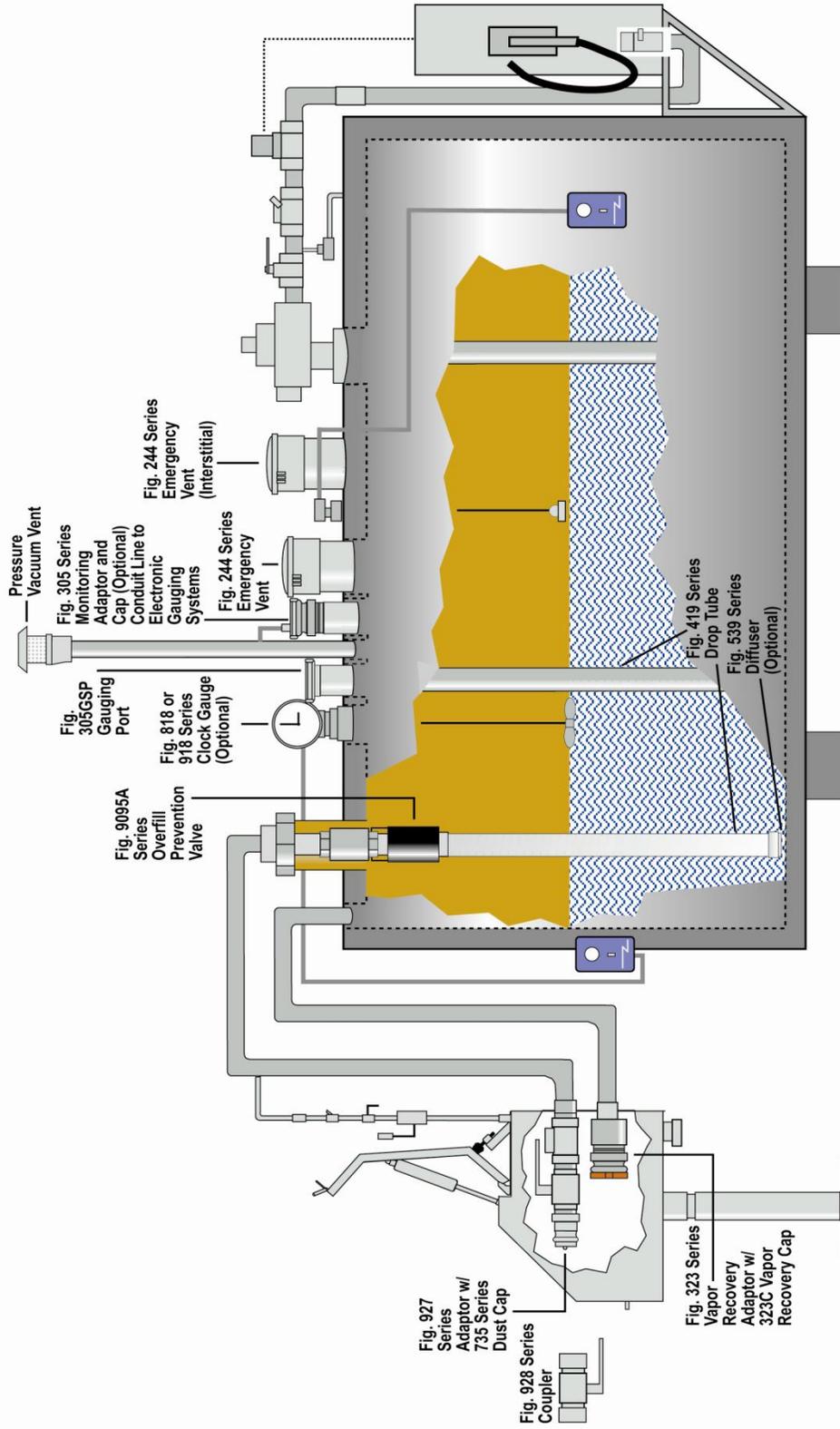
4.2.5.1.2 Normal vents shall be sized to be at least as large as the filling or withdrawal connection, whichever is larger, but in no case less than 1-1/4 in. (3 cm) nominal inside diameter.

Table G: Gallon Capacity Per Foot of Length

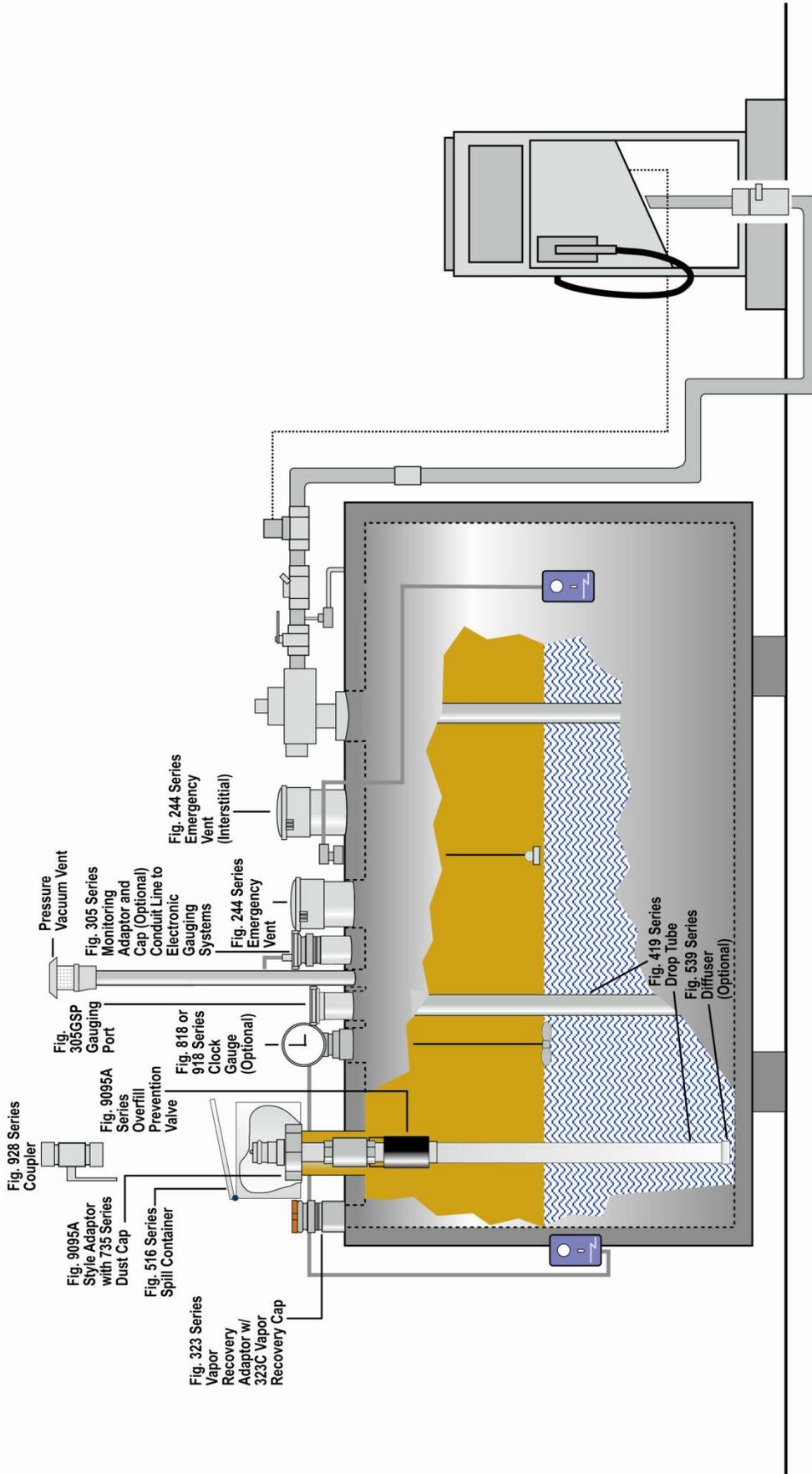
Diameter (Inches)	U.S. Gallons Per Ft Length	Diameter (Inches)	U.S. Gallons Per Ft Length	Diameter (Inches)	U.S. Gallons Per Ft Length
24	23.50	65	172.38	106	458.30
25	25.50	66	177.72	107	467.70
26	27.58	67	183.15	108	475.89
27	29.74	68	188.66	109	485.00
28	31.99	69	194.25	110	493.70
29	34.31	70	199.92	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		

Aboveground Fuel Storage System With Vapor Recovery Components

Protected Double-Wall Tank With Remote Fill

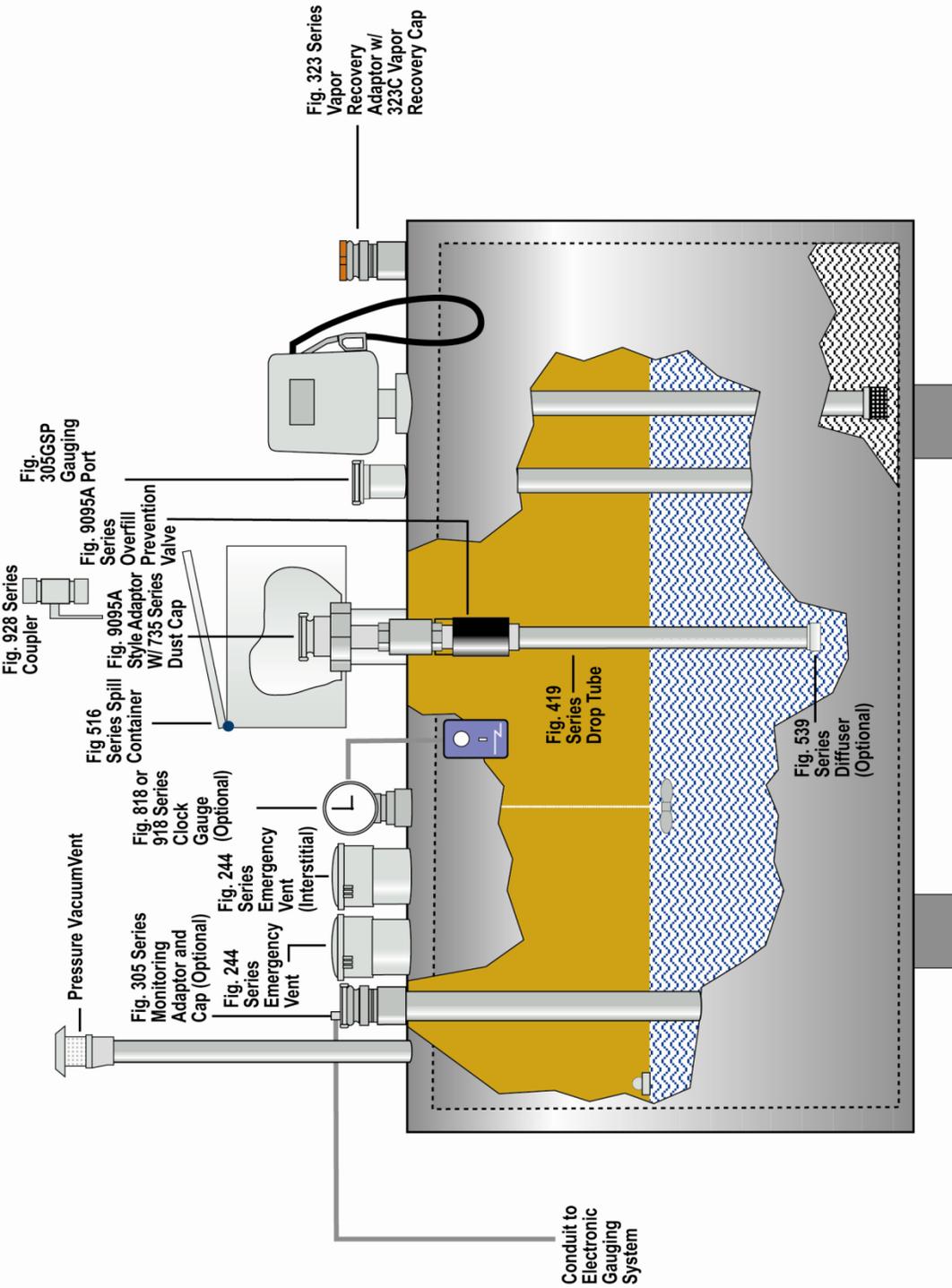


Aboveground Fuel Storage System With Vapor Recovery Components Protected Double-Wall Tank With Direct Fill



Aboveground Fuel Storage - Suction System

Protected tank with top fill and top mounted pump



EVR Aboveground Storage Tank Component Thread Tightening Specifications

(August 13, 2010)

	Wrench Makeup*
SIZE	(Number of Turns)
2" NPT Threads	3.25
3" NPT Threads	2
4" NPT Threads	2.12
5" NPT Threads	2.25
6" NPT Threads	2.50
8" NPT Threads	2.75

- * - All sizes should have handtight engagement before Wrench Makeup is applied.
All threads should be prepared with a fuel resistant, non-hardening, anti-seize sealant.
Morrison recommends thread sealant rather than Teflon® tape.
A tolerance of plus or minus one turn is allowed.
This information is to be used as guide only. The number of turns may vary depending
on the quality of thread form.

Summary of Guidelines for Maintenance Activities Required of Morrison EVR Aboveground Storage Tank Equipment

<u>Component</u>	<u>Interval</u>	<u>Maintenance To Be Performed</u>
Emergency Vents Morrison 244 Series	Annual	Annual inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of the storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank. Lift the cover of the vent all the way up and lower back down onto the body several times. The cover must move freely for the vent to work properly. Replace the unit if sticking or binding occurs. Inspect the vent, including the seal area, for dust, debris, snow or ice. Remove any that is found. Inspect all vent components and surfaces for damage, corrosion or excessive wear. If any is found replace the vent. If painting, extreme caution must be exercised to make sure that the paint does not inhibit proper vent operation.
Spill Container Morrison 516 Series & 515 Series	Annual	Clean and remove any dirt, debris or spilled product from the spill container as it accumulates. Observe the container to assure proper performance. Visually inspect exterior and interior of container on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts.
Drop Tube Overfill Prevention Device Morrison 9095A Series	None	No maintenance is required for this product, but local codes may require specific procedures.
Drop Tube Morrison 419 Series	None	No maintenance is required for this product, but local codes may require specific procedures. It should be verified during installation that the bottom of the drop tube is at the proper distance from the bottom of the tank.

Maintenance guidelines do not replace the use of the Morrison maintenance instructions. Maintenance personnel or owner/operators must refer to the complete installation, maintenance and operation instructions to ensure that all requirements are completed.

Summary of Guidelines for Maintenance Activities Required of Morrison EVR Aboveground Storage Tank Equipment

<u>Component</u>	<u>Interval</u>	<u>Maintenance To Be Performed</u>
Product Adaptor Morrison 927 Series	Annual	Visually inspect adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gasket on the adaptor is present and sealing adequately. Wipe seals clean of any dirt or particles if necessary. The adaptor will require that the poppet be manually pushed in to inspect the whole seal.
Dust Caps Morrison 323C & 735 Series	Annual	Visually inspect cap on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gasket on the cap is present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.
Product Coupler Morrison 928 Series	Annual	Visually inspect coupler on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the coupler are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.
Vapor Adaptor Morrison 323 Series	Annual	Visually inspect coupler on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the coupler are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.

Maintenance guidelines do not replace the use of the Morrison maintenance instructions. Maintenance personnel or owner/operators must refer to the complete installation, maintenance and operation instructions to ensure that all requirements are completed.

Summary of Guidelines for Maintenance Activities Required of Morrison EVR Aboveground Storage Tank Equipment

<u>Component</u>	<u>Interval</u>	<u>Maintenance To Be Performed</u>
Gauging Port Morrison 305 Series	Annual	Visually inspect cap and adaptor on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gaskets on the cap and adaptor are present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.
Tank Gauge Morrison 818 Series & 918 Series	Annual	Visually inspect gauge to ensure product is not worn or damaged by any objects that could affect the functionality of the parts. Clean clear face if necessary with a damp cloth. To minimize static build up, do not use a solvent. Manually stick tank to verify gauge read out. Repair or replace parts as needed.
Monitoring Cap Morrison 305 Series	Annual	Visually inspect cap on a regular basis, or at least once a year to ensure the product is not worn or damaged to affect the functionality of the parts. Also ensure the gasket on the cap is present and sealing adequately. Wipe seals clean of any dirt or particles if necessary.

Maintenance guidelines do not replace the use of the Morrison maintenance instructions. Maintenance personnel or owner/operators must refer to the complete installation, maintenance and operation instructions to ensure that all requirements are completed.

Summary of Guidelines for Maintenance Activities Required of Morrison EVR Aboveground Storage Tank Equipment

<u>Component</u>	<u>Interval</u>	<u>Maintenance To Be Performed</u>
Drop Tube Diffuser Morrison 539 Series	None	No maintenance is required for this product.
Pressure/Vacuum Vent Valve Husky 5885	Annual	Annually inspect the P/V vent valve for foreign objects. <ol style="list-style-type: none">1. Remove screws that hold top cover on. Do not remove the screens.2. Remove any debris that might be sitting inside the lower cover.3. Check the drain holes in the lower cover to ensure they are not plugged.4. Reinstall the top cover.5. Tighten the screws firmly.

Maintenance guidelines do not replace the use of the Morrison maintenance instructions. Maintenance personnel or owner/operators must refer to the complete installation, maintenance and operation instructions to ensure that all requirements are completed.

Morrison

Above Ground Storage Tank EVR Equipment Installation Check List

Site Identification Information

Installation Date: _____

Installation Company:

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Business At Installation Site:

Name _____

Address _____

City _____ **State** _____ **Zip** _____

Technician's Name (Print):

Technician's Signature:

Morrison

Above Ground Storage Tank EVR Equipment Installation Check List

Components Installed

Emergency Vents

Morrison 244 Series

Spill Container

Morrison 516 Series

Morrison 515 Series

Drop Tube Overfill Prevention Device

Morrison 9095A Series

Drop Tube

Morrison 419 Series

Product Adaptor

Morrison 927 Series

Dust Caps

Morrison 323C

Morrison 735 Series

Product Coupler

Morrison 928 Series

Vapor Adaptor

Morrison 323 Series

Gauging Port

Morrison 305 Series

Morrison 735 Series

Tank Gauge

Morrison 818 Series

Morrison 918 Series

Monitoring Cap & Adaptor

Morrison 305 Series

Drop Tube Diffuser

Morrison 539 Series

Morrison

Above Ground Storage Tank EVR Equipment Installation Check List

Installation Acknowledgment

Thread sealant compound used at installation _____

Emergency Vents

___ Morrison 244 Series Wrench Makeup Number of Turns _____

Spill Container

___ Morrison 516 Series Wrench Makeup Number of Turns _____

___ Morrison 515 Series Wrench Makeup Number of Turns _____

Drop Tube Overfill Prevention Device

___ Morrison 9095A Series Wrench Makeup Number of Turns _____

Product Adaptor

___ Morrison 927 Series Wrench Makeup Number of Turns _____

Product Coupler

___ Morrison 928 Series Wrench Makeup Number of Turns _____

Vapor Adaptor

___ Morrison 323 Series Wrench Makeup Number of Turns _____

Gauging Port Adaptor

___ Morrison 305 Series Wrench Makeup Number of Turns _____

Tank Gauge

___ Morrison 818 Series Wrench Makeup Number of Turns _____

___ Morrison 918 Series Wrench Makeup Number of Turns _____

Monitoring Adaptor

___ Morrison 305 Series Wrench Makeup Number of Turns _____

Drop Tube Diffuser (Thread on style)

___ Morrison 539 Series Wrench Makeup Number of Turns _____