



# **Installation, Operation and Maintenance Manual**

**For**

**Executive Order**

**VR-402-B**

**Morrison Phase 1 Enhanced Vapor Recovery System**

**For**

**Aboveground Storage Tanks**

**NOTICE:**

The ARB Approved Installation, Operation and Maintenance Manual (IOM) for the VR-402 describes the tools, methods and skill levels required to install the Morrison Bros. Co. Phase I Enhanced Vapor Recovery (EVR) System for Aboveground Storage Tanks (AST).

As specified in the individual IOM's, only skilled technicians that are trained, certified and licensed by Morrison Bros. Co. (i.e. Morrison Certified Technicians) are able to perform installation, maintenance or repairs of components manufactured by Morrison Bros. Co.

It is the responsibility of each Morrison Certified Technician to be familiar with the current requirements of state, federal, local codes and air district rules and regulations of installation and repair of gasoline dispensing equipment.

It is also the responsibility of each Morrison Certified Technician to be aware of all the manuals, necessary safety precautions, and site requirements to assure a safe and trouble-free installation.

To take online training or to confirm the status of a Morrison Certified Technician, please visit the Morrison Bros. Co's website at [www.morbros.com](http://www.morbros.com) or contact:

Morrison Customer Service Dept.

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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. Torque threaded joints as follows: 2" size 75-85 ft-lbs, 3"-4" size to 75-100 ft-lbs. 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. Torque bolts to 50-55 ft-lbs. Avoid over-torque, which may damage the vent.

**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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



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## **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. Torque threaded joints as follows: 2" size 75-85 ft-lbs, 3"-4" size to 75-100 ft-lbs. 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. Torque threaded joint to 75-100 ft-lbs. 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.



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**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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



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## **Section 3**

# **9095A Series Overfill Prevention Valves**

## 9095A 2" Overfill Prevention Valve Installation & Maintenance 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 helps prevent tank overfills by closing when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed through a 4" threaded opening and has a built-in bleed hole that allows the fill hose pressure to be relieved after the valve closes. This bleed hole also provides anti-siphon protection for the valve. When installed to manufacturer requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.



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

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#### 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 suspended in the liquid 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 flow of less than 2% of max flow 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.
- 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.
- Fill points should be labeled to identify product being transferred according to all applicable codes.

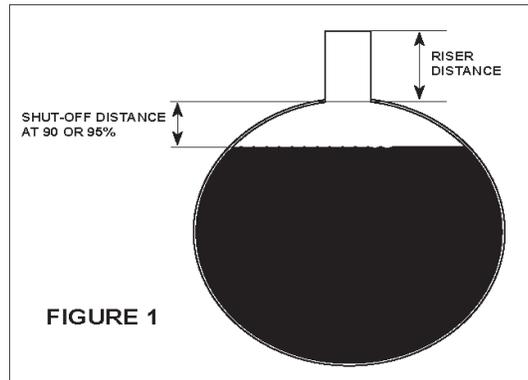
### Steps

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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 SHUT-OFF DISTANCE at 90 or 95% full. (See Fig. 1 & Mfg. tank ullage chart). Record this distance as you will need it later when installing the valve.
3. Refer to Fig. 2. Select the measurement for the fuel you will be storing. Using a ruler, measure up from the bottom of the float and mark a line on your float at that measurement. Use a wax pen or chalk to mark the line.

**Note:** If you are storing a liquid, other than those noted in Fig. 2, and the specific gravity of your liquid is not the same as one of the liquids shown, you can use the calculation, shown at the end of this document, to determine the measurement to mark your float.



4. Measure from the top of the tank up to the point where the valve is to be attached. This is your Riser Distance shown in Fig. 1. Record this length. **Note:** this distance needs to include all pipe fittings, spill containers, etc. all the way up to the point where the valve is to be attached.
5. Move your float into the up position. Now the line that you marked on the float (Step 2) is at the point where the valve will shut off during the filling process. Measure from the line on the float all the way up to the point where the valve will thread onto the piping. We will call this Length X (See Fig. 3). Record this length.
6. Now you can make piping adjustments to insure that the line on the float will be in the tank at your desired shut off point when the unit is installed into the tank. To make these adjustments you can lengthen or shorten the Nipple shown in Fig. 3. You can also change the Riser Distance shown in Fig. 1. Lastly, you can make minor adjustments by moving the floats up or down. To do this loosen the allen screws on the float adjustment collars, shown in Fig. 3, move the floats up or down, and then tighten the allen screws.

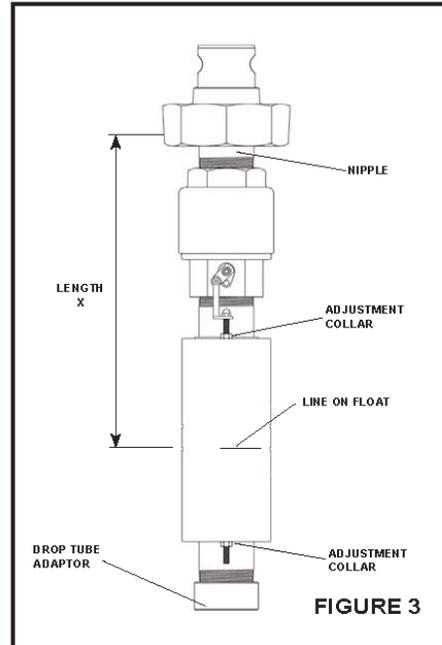
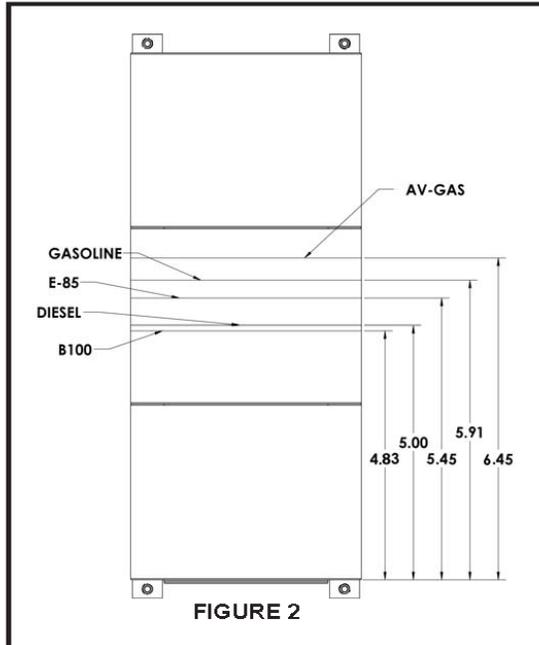
**Important:** After making your adjustments in Step 6, the Riser Distance (Step 4) **plus** your Shut-off Distance (Step 2) should be **equal to** Length X (Step 5).

**Important:** If adjustments are made to the float adjustment collars, you must set the valve in the upright position and move the float up and down to insure there is no binding.

7. 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 the 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).

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



### Filling Procedure

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. Gradually 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.



**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

If required, this valve should be maintained 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 maintain 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 maintenance. 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.



**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.**

### Calculation for shut-off point for liquids with specific gravities different than those shown in Fig. 2.

$$\text{Shut-off point distance} = ((1 - \text{Specific Gravity}) \times 6) + 4.25$$

Measure this distance up from the bottom of the float and mark as indicated in Steps 3 & 4 of the Installation Steps and then follow the rest of the Installation Steps.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

## 9095A 3" Overfill Prevention Valve Installation & Maintenance 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 helps prevent tank overfills by closing when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed through a 6" threaded opening and has a built-in bleed hole that allows the fill hose pressure to be relieved after the valve closes. This bleed hole also provides anti-siphon protection for the valve. When installed to manufacturer requirements, the Morrison Fig. 9095A Overfill Prevention Valve can eliminate hazardous liquid spills.



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.

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### Installation



#### 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 suspended in the liquid 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 flow of less than 2% of max flow 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.
- 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.
- Fill points should be labeled to identify product being transferred according to all applicable codes.

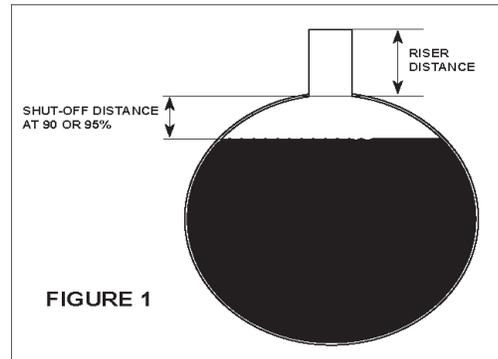
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### Steps

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 SHUT-OFF DISTANCE at 90 or 95% full. (See Fig. 1 & Mfg. tank ullage chart). Record this distance as you will need it later when installing the valve.
3. Refer to Fig. 2. Select the measurement for the fuel you will be storing. Using a ruler, measure up from the bottom of the float and mark a line on your float at that measurement. Use a wax pen or chalk to mark the line.

**Note:** If you are storing a liquid, other than those noted in Fig. 2, and the specific gravity of your liquid is not the same as one of the liquids shown, you can use the calculation, shown at the end of this document, to determine the measurement to mark your float.



4. Measure from the top of the tank up to the point where the valve is to be attached. This is your Riser Distance shown in Fig. 1. Record this length. **Note:** this distance needs to include all pipe fittings, spill containers, etc. all the way up to the point where the valve is to be attached.
5. Move your float into the up position. Now the line that you marked on the float (Step 2) is at the point where the valve will shut off during the filling process. Measure from the line on the float all the way up to the point where the valve will thread onto the piping. We will call this Length X (See Fig. 3). Record this length.
6. Now you can make piping adjustments to insure that the line on the float will be in the tank at your desired shut off point when the unit is installed into the tank. To make these adjustments you can lengthen or shorten the Nipple shown in Fig. 3. You can also change the Riser Distance shown in Fig. 1. Lastly, you can make minor adjustments by moving the floats up or down. To do this loosen the allen screws on the float adjustment collars, shown in Fig. 3, move the floats up or down, and then tighten the allen screws.

**Important:** After making your adjustments in Step 6, the Riser Distance (Step 4) **plus** your Shut-off Distance (Step 2) should be **equal to** Length X (Step 5).

**Important:** If adjustments are made to the float adjustment collars, you must set the valve in the upright position and move the float up and down to insure there is no binding.

7. 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 the 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).

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

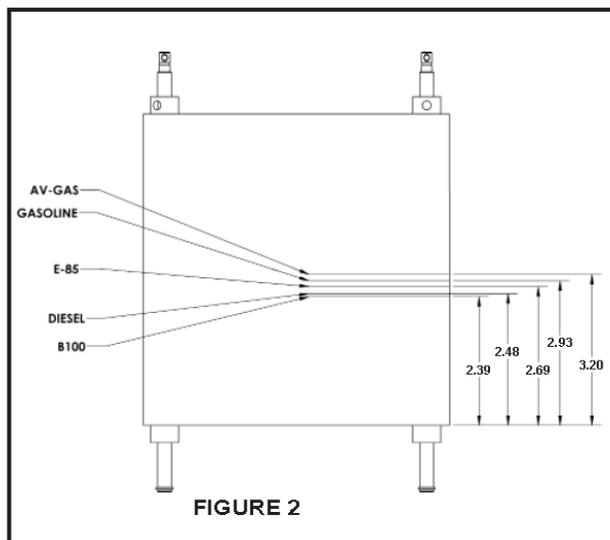


FIGURE 2

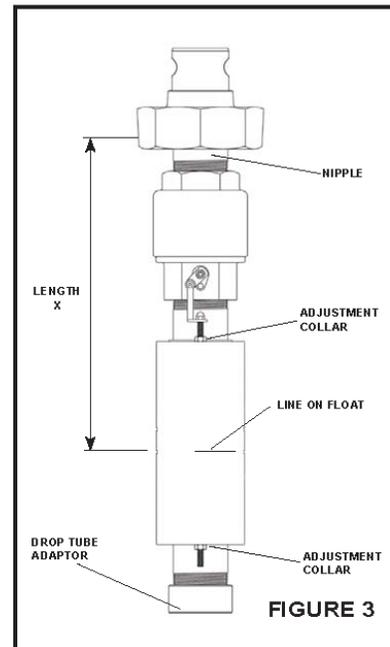


FIGURE 3

### Filling Procedure

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. Gradually 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.



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

If required, this valve should be maintained 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 maintain 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 maintenance. 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.



**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.**

### Calculation for shut-off point for liquids with specific gravities different than those shown in Fig. 2.

$$\text{Shut-off point distance} = ((1 - \text{Specific Gravity}) \times 2.43) + 2.1$$

Measure this distance up from the bottom of the float and mark as indicated in Steps 3 & 4 of the Installation Steps and then follow the rest of the Installation Steps.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

## 9095C Overfill Prevention Valve Installation & Maintenance Instructions

The 9095C Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve helps prevent tank overfills by closing when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed through a 4" threaded opening and has a built-in bleed hole that allows the fill hose pressure to be relieved after the valve closes. This bleed hole also provides anti-siphon protection for the valve. When installed to manufacturer requirements, the Morrison Fig. 9095C Overfill Prevention Valve can eliminate hazardous liquid spills.



**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.**

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### Installation



#### 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 suspended in the liquid 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 300 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 flow of less than 2% of max flow 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.
- 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.
- Fill points should be labeled to identify product being transferred according to all applicable codes.

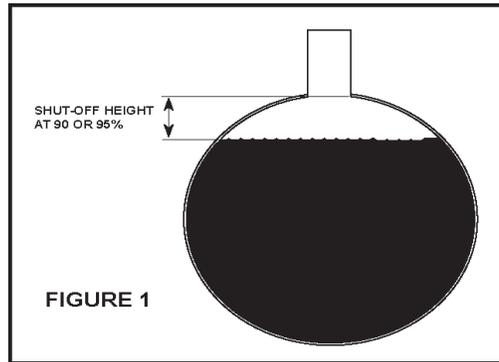
---

### Steps

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 SHUT-OFF DISTANCE at 90 or 95% full. (See Fig. 1 & Mfg. tank ullage chart). Record this distance as you will need it later when installing the valve.
3. Refer to Fig. 2. Select the measurement for the fuel you will be storing. Using a ruler, measure up from the bottom of the float and mark a line on your float at that measurement. Use a wax pen or chalk to mark the line.

**Note:** If you are storing a liquid, other than those noted in Fig. 2, and the specific gravity of your liquid is not the same as one of the liquids shown, you can use the calculation, shown at the end of this document, to determine the measurement to mark your float.



4. Measure from the top of the tank up to the point where the valve is to be attached. This is your Riser Distance shown in Fig. 1. Record this length. **Note:** this distance needs to include all pipe fittings, spill containers, etc. all the way up to the point where the valve is to be attached.
5. Move your float into the up position. Now the line that you marked on the float (Step 2) is at the point where the valve will shut off during the filling process. Measure from the line on the float all the way up to the point where the valve will thread onto the piping. We will call this Length X (See Fig. 3). Record this length.
6. Now you can make piping adjustments to insure that the line on the float will be in the tank at your desired shut off point when the unit is installed into the tank. To make these adjustments you can lengthen or shorten the Nipple shown in Fig. 3. You can also change the Riser Distance shown in Fig. 1. Lastly, you can make minor adjustments by moving the floats up or down. To do this loosen the allen screws on the float adjustment collars, shown in Fig. 3, move the floats up or down, and then tighten the allen screws.

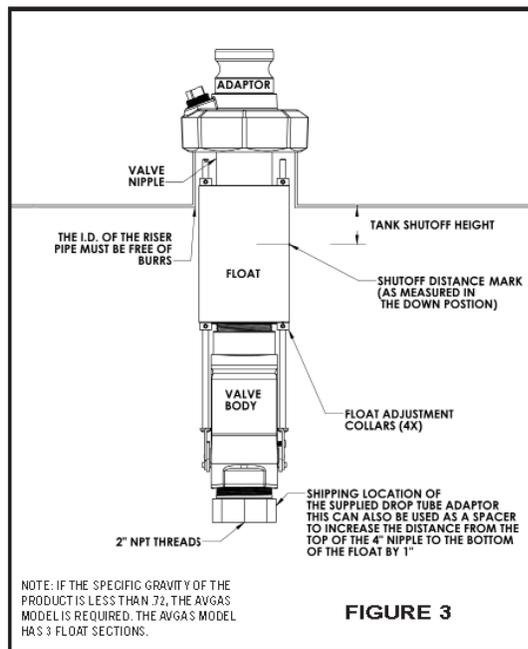
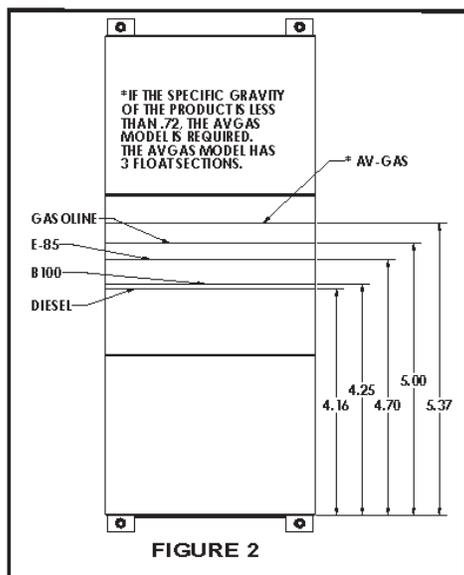
**Important:** After making your adjustments in Step 6, the Riser Distance (Step 4) **plus** your Shut-off Distance (Step 2) should be **equal to** Length X (Step 5).

**Important:** If adjustments are made to the float adjustment collars, you must set the valve in the upright position and move the float up and down to insure there is no binding.

7. 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 the 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).

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



### Filling Procedure

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. Gradually 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 9095C 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 9095C shuts off during the tank fill, perform the overfill disconnect procedure.

### Overfill Disconnect Procedure

1. If 9095C 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.



**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

If required, this valve should be maintained 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 maintain 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 maintenance. 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.



**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.**

### Calculation for shut-off point for liquids with specific gravities different than those shown in Fig. 2.

$$\text{Shut-off point distance} = ((1 - \text{Specific Gravity}) \times 5.5) + 3.5$$

Measure this distance up from the bottom of the float and mark as indicated in Steps 3 & 4 of the Installation Steps and then follow the rest of the Installation Steps.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

## 9095AA 3" Overfill Prevention Valve With 6" Tank Adaptor Installation & Maintenance Instructions

The 9095AA Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve helps prevent tank overfills by closing when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed on a standard 6" NPT male connection and has a built-in bleed hole that allows the fill hose pressure to be relieved after the valve closes. This bleed hole also provides anti-siphon protection for the valve. When installed to manufacturer requirements, the Morrison Fig. 9095AA Overfill Prevention Valve can eliminate hazardous liquid spills.

This valve 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

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#### 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 monitor operations to 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 flow of less than 2% of max flow 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.
- 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.
- Fill points should be labeled to identify product being transferred, according to all applicable codes.

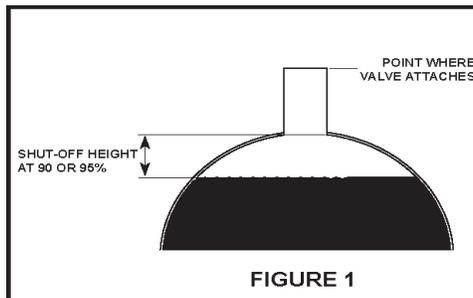
### Steps

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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 SHUT-OFF DISTANCE at 90 or 95% full. (See Fig. 1 below & Mfg. tank ullage chart). Record this distance as you will need it later when installing the valve.
3. Refer to Fig. 2. Select the measurement for the fuel you will be storing. Using a ruler, measure up from the bottom of the float and mark a line on your float at that measurement. Use a wax pen or chalk to mark the line.

**Note:** If you are storing a liquid, other than those noted in Fig. 2, and the specific gravity of your liquid is not the same as one of the liquids shown, you can use the calculation, shown at the end of this document, to determine the measurement to mark your float.



4. Measure from the top of the tank up to the point where the valve is to be attached. This is your Riser Distance shown in Fig. 1. Record this length. **Note:** this distance needs to include all pipe fittings, spill containers, etc. all the way up to the point where the valve is to be attached.
5. Move your float into the up position. Now the line that you marked on the float (Step 2) is at the point where the valve will shut off during the filling process. Measure from the line on the float all the way up to the point where the valve will thread onto the piping. We will call this Length X (See Fig. 3). Record this length.
6. Now you can make piping adjustments to insure that the line on the float will be in the tank at your desired shut off point when the unit is installed into the tank. To make these adjustments you can lengthen or shorten the Nipple shown in Fig. 3. You can also change the Riser Distance shown in Fig. 1. Lastly, you can make minor adjustments by moving the floats up or down. To do this loosen the allen screws on the float adjustment collars, shown in Fig. 3, move the floats up or down, and then tighten the allen screws.

**Important:** After making your adjustments in Step 6, the Riser Distance (Step 4) **plus** your Shut-off Distance (Step 2) should be **equal to** Length X (Step 5).

**Important:** If adjustments are made to the float adjustment collars, you must set the valve in the upright position and move the float up and down to insure there is no binding.

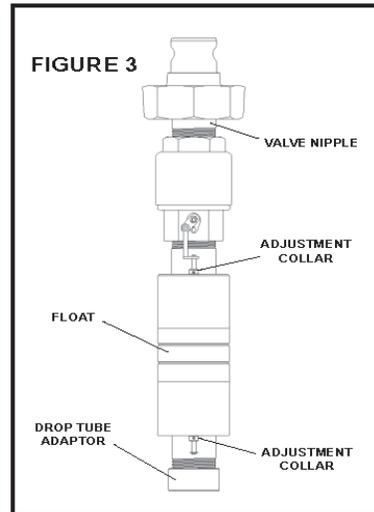
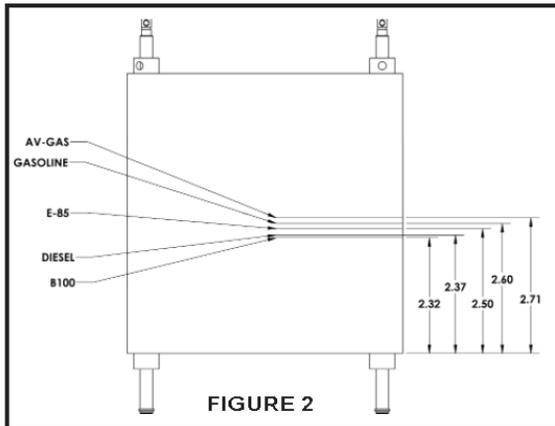
7. Use care with floats and linkage during installation. Apply a non-hardening gasoline resistant sealant sparingly to all male threads. Attach the drop tube to the bottom of the valve. Assemble piping and install valve in the tank to distance determined in the steps above.

**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).

**Important:** 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.**




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### Filling Procedure

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. Gradually 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 9095AA 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 9095AA shuts off during the tank fill, perform the overfill disconnect procedure.

---

### Overfill Disconnect Procedure

1. If 9095AA 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.

## Maintenance

If required, this valve should be maintained 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 maintain 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 maintenance. 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.



**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.**

#### Calculation for shut-off point for liquids with specific gravities different than those shown in Fig. 2.

$$\text{Shut-off point distance} = ((1 - \text{specific gravity}) \times 1.8) + 2.1$$

Measure this distance up from the bottom of the float and mark as indicated in Steps 3 & 4 of the Installation Steps and then follow the rest of the Installation Steps.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **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 one of the following specifications.

#### Wrench Makeup 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.

#### Torque Specifications

SIZE	Torque
2" NPT Threads	75-85 ft-lb
3" NPT Threads	75-100 ft-lb
4" NPT Threads	23-26 ft-lb

\* - No special tools required. Torque value could be verified by offset chain wrench and torque wrench. The Torque Specification method is required rather than Wrench Makeup Specification method for components installed in California.

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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **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 on of the following specifications.

#### Wrench Makeup 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.

#### Torque Specifications

SIZE	Torque
3" NPT Threads	75-100 ft-lb
4" NPT Threads	23-26 ft-lb

\* - No special tools required. Torque value could be verified by offset chain wrench and torque wrench. The Torque Specification method is required rather than Wrench Makeup Specification method for components installed in California..

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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **Section 8**

# **818/918 Series Tank Gauge**

## 818 Clock Gauge

### Installation, Operation, and Maintenance 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.**

**NOTE:** The most accurate method to calibrate the tank is with fluid in it. This will take into account variables associated with the float position, the mechanism, and the fluid density.

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### Installation



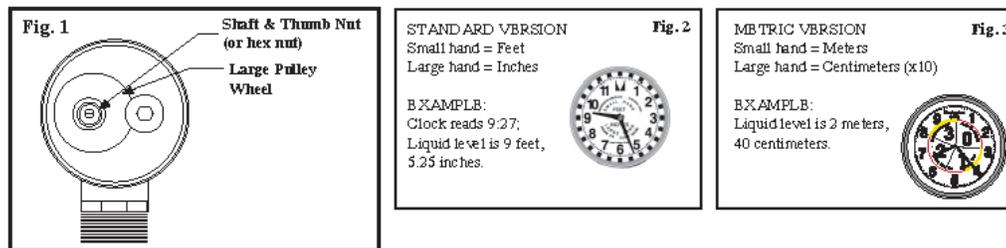
#### Warnings

- **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 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.
- Use a dampened cloth when cleaning the clear front cover of the gauge to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

#### Steps

1. Verify contents of box. You should have received the gauge, float, installation instructions, and re-order/overfill stickers. Inspect the items for shipping damage. **DO NOT** use if damage is found. **DO NOT** pull and release the cable uncontrollably. This can cause damage to the internal mechanism and render the gauge inoperable. **ALWAYS** hold onto cable and allow it to move 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 that could affect 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, measure to the bottom to determine the current liquid level height in the tank. Record this height in feet and inches (or meters and cm) 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. Open the float clip and attach the float clip to the swivel end of the cable. Latch the float clip making sure the float 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. Torque threads to 75-85 ft-lbs.

8. Remove the back plate retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the thumb nut or hex nut (Figure 1). Insert a small flat blade screwdriver into the slot on the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hand, until the gauge hands indicate the level recorded in Step 3. Note: Short hand indicates feet (or meters) and long hand indicates inches (or cm).



9. Once you have the hands in the correct position, hold the screwdriver firmly in position and tighten the thumb nut on the shaft.
10. Reinstall the metal back plate so that the side with the date label is positioned to the inside. Replace the back plate retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.
11. Swivel the body of the gauge so the face can be read by the operator on the ground.
12. OPTIONAL: If you desire additional indications for the overfill and reorder points, follow the optional Overfill and Reorder Label Installation instructions below.



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.

## Operation

### Steps

1. To determine the height of fluid in the tank, read the position of the gauge hands. Note: Short hand indicates feet (or meters) and long hand indicates inches (or cm). See Figures 2 and 3 above.
2. The tank manufacturers chart will be required to translate fluid height into fluid volume.

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## Maintenance

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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.
- Use a dampened cloth when cleaning the clear front cover to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

### 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. Measure the fluid height and verify the gauge reading. 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.**

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## Optional Overfill and Reorder Label Installation

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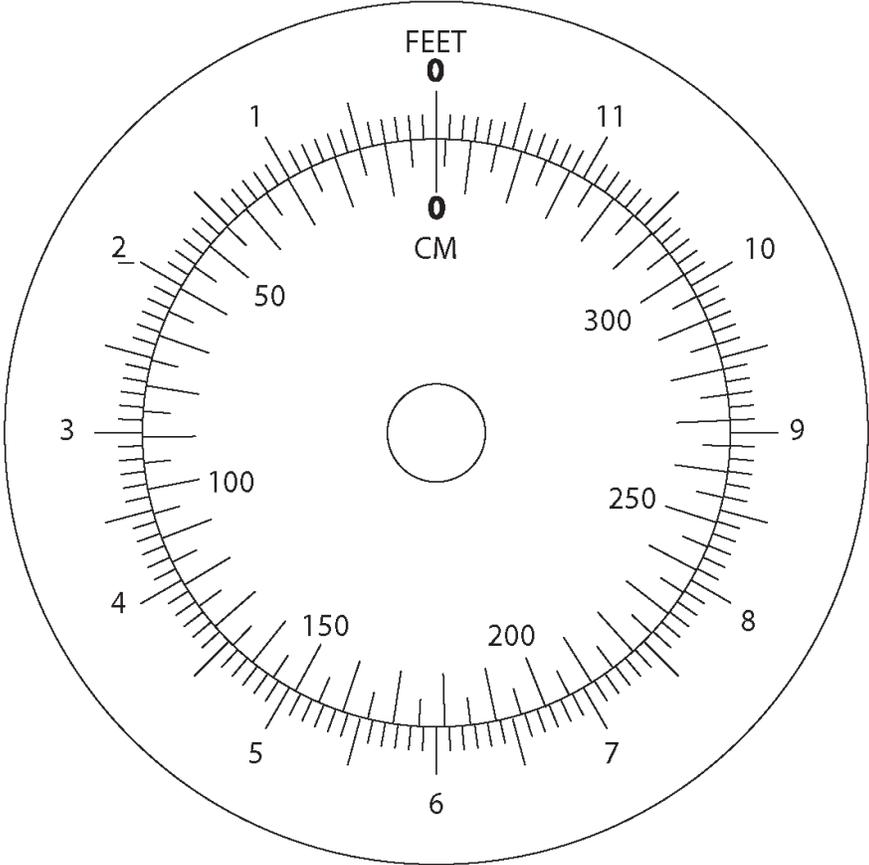
**NOTE:** The template (see Figure 4) is intentionally reversed (mirror image) so the labels may be placed on the inside surface of the clear front cover. Therefore the lettering of the labels is on the adhesive side and will read correctly once placed.

### Steps

1. Template units are shown in feet (or cm). It will be necessary to determine the desired overfill and reorder points and convert those into feet (or cm) in order to use this template.
2. Remove the front face retaining ring and remove the clear front cover.
3. Place the clear cover onto the template aligning the outside edge to the outside circle.
4. Remove indicator label backing and place label on the clear cover as shown on template. Align wider end against inside circle and narrower end pointing toward the level you want to indicate.
5. If both overfill and reorder labels are used, make sure each is pointing to the correct foot (or cm) reading that provides the volumes you desire.
6. Reinstall the clear front cover with the labels on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service. Replace the front face retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

Fig. 4: Overfill and Reorder Label Template



## 818 Gallon Gauge or Liter Gauge

### Installation, Operation, and Maintenance Instructions

The 818 Clock Gauge is designed to be used to measure liquid volume 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.**

**NOTE:** The most accurate method to calibrate the tank is with fluid in it. This will take into account variables associated with the float position, the mechanism, and the fluid density.

### Installation



#### Warnings

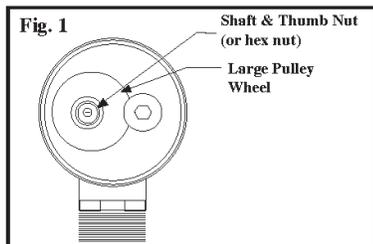
- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- Any modification to this gauge other than those stated in these installation instructions will void the product warranty.
- This device is intended to be used as a liquid level indicator to the operator and should not be the only system in place to prevent a tank from 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.
- Use a dampened cloth when cleaning the clear front cover of the gauge to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

#### Steps

1. Verify contents of box. You should have received the gauge, float, installation instructions, and re-order/overfill stickers. Inspect the items for shipping damage. **DO NOT** use if damage is found. **DO NOT** pull and release the cable uncontrollably. This can cause damage to the internal mechanism and render the gauge inoperable. **ALWAYS** hold onto cable and allow it to move 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 that could affect 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, measure to the bottom to determine the current liquid level height in the tank. Use the tank manufacturer's cross reference chart to correlate the fluid height to gallons (or Liters). Record this volume 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. Open the float clip and attach the float clip to the swivel end of the cable. Latch the float clip making sure the float 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. Torque threads to 75-85 ft-lbs.

8. Remove the back plate retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the thumb nut or hex nut (Figure 1). Insert a small flat blade screwdriver into the slot on the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hand, until the gauge hand indicates the volume that you recorded in Step 3.



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

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

11. Swivel the body of the gauge so the face can be read by the operator on the ground.

12. OPTIONAL: If you desire additional indications for the overfill and reorder points, follow the optional Overfill and Reorder Label Installation instructions below.



**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.**

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## Operation

### Steps

1. To determine the volume of fluid in the tank, read the position of the gauge hand. Interpolate if necessary.
2. Multiply the reading made in the previous step by the multiplier shown on the gauge face. Example: If 12.6 is read and the multiplier is 100, so the reading is 1260.
3. The red area indicates the 90 – 100% volume band. If the hand extends into this area, then the tank has 10% or less ullage.

## 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.
- Use a dampened cloth when cleaning the clear front cover to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

### 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. Measure the fluid height and correlate it to the tank manufacturer's volume chart to verify the gauge volume reading. 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.**

## Optional Overfill and Reorder Label Installation

**NOTE:** If an overfill volume other than 90% is desired, the overfill label can be used. Otherwise it is not needed since the 90% volume is indicated by the start of the red area.

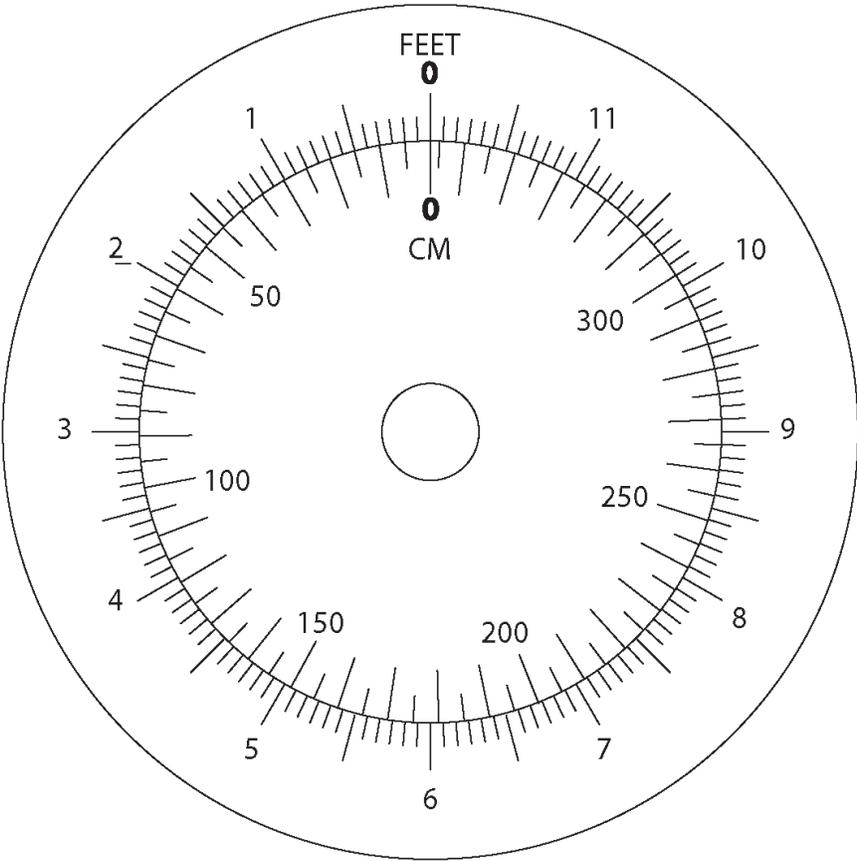
**NOTE:** The template (see Figure 2) is intentionally reversed (mirror image) so the labels may be placed on the inside surface of the clear front cover. Therefore the lettering of the labels is on the adhesive side and will read correctly once placed.

### Steps

1. Template units are shown in feet (or cm). It will be necessary to determine the desired overfill and reorder points and convert those into feet (or cm) in order to use this template.
2. Remove the front face retaining ring and remove the clear front cover.
3. Place the clear cover onto the template aligning the outside edge to the outside circle.
4. Remove indicator label backing and place label on the clear cover as shown on template. Align wider end against inside circle and narrower end pointing toward the level you want to indicate.
5. If both overfill and reorder labels are used, make sure each is pointing to the correct foot (or cm) reading that provides the volumes you desire.
6. Reinstall the clear front cover with the labels on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service. Replace the front face retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

**Fig. 2: Overfill and Reorder Label Template**



## 918 Clock Gauge

### Installation, Operation, and Maintenance Instructions

The 918 Clock Gauge is designed 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 is designed to connect to an alarm box that can provide a high level audible alarm at a desired volume 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.**

**NOTE:** The most accurate method to calibrate the tank is with fluid in it. This will take into account variables associated with the float position, the mechanism, and the fluid density.

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### Gauge Installation & Calibration

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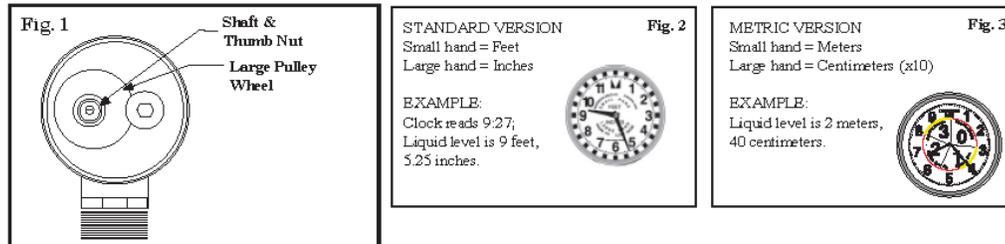
#### Warnings

- 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.
- Use a dampened cloth when cleaning the clear front cover of the gauge or 918 alarm box to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

#### Steps

1. Verify contents of box. You should have received the gauge, float, installation instructions, re-order/overflow labels, warning tag, cable tie, and optionally the alarm box. Inspect the items for shipping damage. **DO NOT** use if damage is found. **DO NOT** pull and release the cable uncontrollably. This can cause damage to the internal mechanism and render the gauge inoperable. **ALWAYS** hold onto cable and allow it to move 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 that could affect 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, measure to the bottom to determine the current liquid level height in the tank. Record this height in feet and inches (or meters and cm) 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. Open the float clip and attach the float clip to the swivel end of the cable. Latch the float clip making sure the float 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. Torque threads to 75-85 ft-lbs.
8. Remove the back plate retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the thumb nut (Figure 1). Insert a small flat blade screwdriver into the slot on the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hand, until the gauge hands indicate the level that you recorded in Step 3. Note: Short hand indicates feet (or meters) and long hand indicates inches (or cm).



9. Once you have the hands in the correct position, hold the screwdriver firmly in position and tighten the thumb nut on the shaft.
10. Remove the front face retaining ring and remove the clear front cover.
11. To calibrate the alarm setting, rotate the thumb nut counterclockwise (when facing rear of gauge, see Figure 4) to the desired alarm set point (see Figure 5). This will raise the float assembly out of the liquid. Be careful to maintain a firm grasp of the thumb nut to prevent free fall of the float. While holding the thumb nut steady, adjust the Alarm hand by pulling the alarm pointer out and rotating it to the point of the triangle (see Figure 6). Once set, carefully allow the float to drop by turning the thumb nut clockwise (when facing the rear of the gauge).



Figure 4: Raising the float with thumb nut to desired alarm trip point.



Figure 5: Hold thumb nut at desired trip point. Example - Alarm set point at 9 feet-0 inches.



Figure 6: Setting Alarm pointer. Example - Alarm will now sound when level reaches 9 feet - 0 inches.

12. If installing the alarm box, leave the gauge front and rear covers removed. If the alarm box will not be installed, or will be installed at a later date, replace the front and rear covers of the gauge.

## Alarm Installation and Testing

**Note:** As defined in Article 501 – Class 1 Locations of NFPA 70, 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.

### Steps

1. 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 of the gauge yet, this will be done later. 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. It may be necessary to remove the junction box cover of the gauge.
2. Separate the two halves of the Alarm Unit box. Attach the rear half of the box to a suitable fixture. Be sure to seal any penetrations made into the interior of the box to prevent moisture ingress.
3. 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.
4. Install the two supplied 9V batteries into the battery terminals on the circuit board.
5. Test the alarm by pressing the Test/Cancel button on the front of the alarm box.
6. Test the connection at the alarm and wiring 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.
7. Connect the wires from the alarm box to the wires of the gauge in the junction box. Replace the junction box cover.
8. Reassemble the front cover of the alarm enclosure to the stationary rear half.
9. It is recommended to simulate a tank fill and trigger the alarm using the thumb nut at the rear of the gauge. If not already done, remove the back plate retaining ring and back metal cover from the gauge. Rotate the thumb nut counterclockwise (when facing rear of gauge, see Figure 2) to the desired alarm set point (see Figure 3). This will raise the float assembly out of the liquid. Be careful to maintain a firm grasp of the thumb nut to prevent free fall of the float. Using the thumb nut, adjust the hand position beyond the desired set point to verify that the alarm activates. If it does not, check wiring at junction box and verify step 10 in the Gauge Installation procedure was performed correctly. The alarm can be silenced once activated by pressing the Test/Cancel button.
10. Reinstall the metal back plate so that the side with the date label is positioned to the inside. Replace the back plate retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.
11. Swivel the body of the gauge so the face can be read by the operator on the ground.
12. OPTIONAL: If you desire additional indications for the overfill and reorder points, follow the optional Overfill and Reorder Label Installation instructions below. If not, replace the front clear cover with the retaining ring as described in step 10 above.
13. 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.**

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## Operation

### Steps

1. To determine the height of fluid in the tank, read the position of the gauge hands. Interpolate if necessary. Note: Short hand indicates feet (or meters) and long hand indicates inches (or cm). See Figures 2 and 3 above.
2. The tank manufacturers chart will be required to translate fluid height into fluid volume.
3. Before a tank fill is initiated, the alarm should be checked for proper operation and sufficient loudness by pressing the Test/Cancel button. When the button is released, the alarm should cease.

4. If the alarm sounds while the tank is being filled, immediately halt filling operations. The alarm can be temporarily silenced by pressing the Test/Cancel button. Once the fluid level drops below the alarm set point, the alarm will be re-armed for next overflow detection.

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## Maintenance

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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.
- Use a dampened cloth when cleaning the clear front cover or alarm enclosure to prevent static buildup and discharge.
- No user serviceable parts inside. In the event of malfunction, contact Morrison Bros. Customer Service.
- The only batteries approved for use with the alarm are listed on the spec plate.

### 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 of the gauge or alarm box with a damp cloth.
3. Measure the fluid height and correlate it to the tank manufacturer's volume chart to verify the gauge volume reading. 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. If the alarm still does not sound replace the alarm box or call Morrison Bros. for repair.
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. 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.**

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## Optional Overflow and Reorder Label Installation

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**NOTE:** The template (see Figure 7) is intentionally reversed (mirror image) so the labels may be placed on the inside surface of the clear front cover. Therefore, the lettering of the labels is on the adhesive side and will read correctly once placed.

### Steps

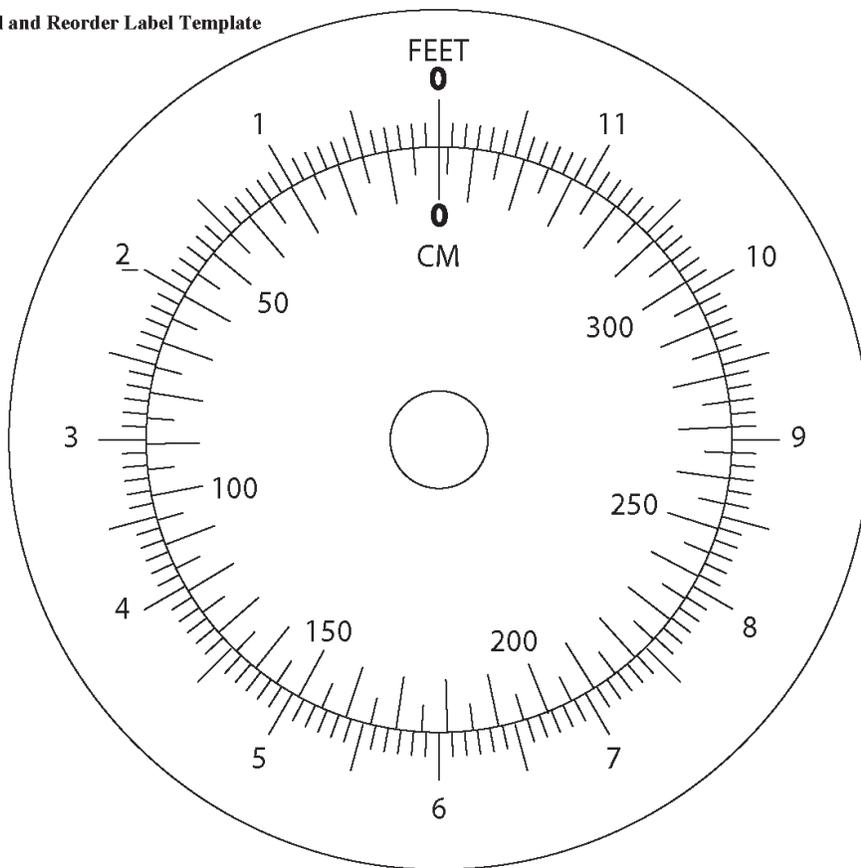
1. Template units are shown in feet (or cm). It will be necessary to determine the desired overflow and reorder points and convert those into feet (or cm) in order to use this template.
2. Remove the front face retaining ring and remove the clear front cover.
3. Place the clear cover onto the template aligning the outside edge to the outside circle.
4. Remove indicator label backing and place label on the clear cover as shown on template. Align wider end against inside circle and narrower end pointing toward the level you want to indicate.

5. If both overflow and reorder labels are used, make sure each is pointing to the correct foot (or cm) reading that provides the volumes you desire.

6. Reinstall the clear front cover with the labels on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service. Replace the front face retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

Fig. 7: Overflow and Reorder Label Template



## 918 Gallon Gauge or Liter Gauge

### Installation, Operation, and Maintenance Instructions

The 918 Clock Gauge is designed to measure liquid volume 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 is designed to connect to an alarm box that can provide a high level audible alarm at a desired volume 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.**

**NOTE:** The most accurate method to calibrate the tank is with fluid in it. This will take into account variables associated with the float position, the mechanism, and the fluid density.

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### Gauge Installation & Calibration

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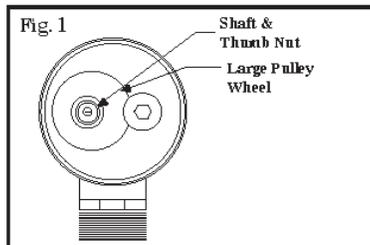
#### Warnings

- 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, federal and/or OSHA rules.
- 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.
- Use a dampened cloth when cleaning the clear front cover of the gauge or 918 alarm box to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

#### Steps

1. Verify contents of box. You should have received the gauge, float, installation instructions, re-order/overfill labels, warning tag, cable tie, and optionally the alarm box. Inspect the items for shipping damage. **DO NOT** use if damage is found. **DO NOT** pull and release the cable uncontrollably. This can cause damage to the internal mechanism and render the gauge inoperable. **ALWAYS** hold onto cable and allow it to move 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 that could affect 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, measure to the bottom to determine the current liquid level height in the tank. Use the tank manufacturer's cross reference chart to correlate the fluid height to gallons (or Liters). Record this volume 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. Open the float clip and attach the float clip to the swivel end of the cable. Latch the float clip making sure the float 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. Torque threads to 75-85 ft-lbs.
8. Remove the back plate retaining ring and back metal cover from the gauge. Hold the large pulley wheel in place and loosen the thumb nut (Figure 1). Insert a small flat blade screwdriver into the slot on the end of the shaft. Rotate the shaft with the screwdriver, which will move the gauge hand, until the gauge hand indicates the volume that you recorded in Step 3.



9. Once you have the hand in the correct position, hold the screwdriver firmly in position and tighten the thumb nut on the shaft.
10. Remove the front face retaining ring and remove the clear front cover.
11. To calibrate the alarm setting, rotate the thumb nut counterclockwise (when facing rear of gauge, see Figure 2) to the desired alarm set point (see Figure 3). This will raise the float assembly out of the liquid. Be careful to maintain a firm grasp of the thumb nut to prevent free fall of the float. While holding the thumb nut steady, adjust the Alarm hand by pulling the alarm pointer out and rotating it to the point of the triangle (see Figure 4). Once set, carefully allow the float to drop by turning the thumb nut clockwise (when facing the rear of the gauge).



Figure 2: Raising the float with thumb nut.



Figure 3: Alarm set point.



Figure 4: Setting Alarm pointer.

12. If installing the alarm box, leave the gauge front and rear covers removed. If the alarm box will not be installed, or will be installed at a later date, replace the front and rear covers of the gauge.

## Alarm Installation and Testing

**Note:** As defined in Article 501 – Class 1 Locations of NFPA 70, 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.

### Steps

1. 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 of the gauge yet, this will be done later. 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. It may be necessary to remove the junction box cover of the gauge.
2. Separate the two halves of the Alarm Unit box. Attach the rear half of the box to a suitable fixture. Be sure to seal any penetrations made into the interior of the box to prevent moisture ingress.
3. 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.
4. Install the two supplied 9V batteries into the battery terminals on the circuit board.
5. Test the alarm by pressing the Test/Cancel button on the front of the alarm box.
6. Test the connection at the alarm and wiring 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.
7. Connect the wires from the alarm box to the wires of the gauge in the junction box. Replace the junction box cover.
8. Reassemble the front cover of the alarm enclosure to the stationary rear half.
9. It is recommended to simulate a tank fill and trigger the alarm using the thumb nut at the rear of the gauge. If not already done, remove the back plate retaining ring and back metal cover from the gauge. Rotate the thumb nut counterclockwise (when facing rear of gauge, see Figure 2) to the desired alarm set point (see Figure 3). This will raise the float assembly out of the liquid. Be careful to maintain a firm grasp of the thumb nut to prevent free fall of the float. Using the thumb nut, adjust the hand position beyond the desired set point to verify that the alarm activates. If it does not, check wiring at junction box and verify step 10 in the Gauge Installation procedure was performed correctly. The alarm can be silenced once activated by pressing the Test/Cancel button.
10. Reinstall the metal back plate so that the side with the date label is positioned to the inside. Replace the back plate retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.
11. Swivel the body of the gauge so the face can be read by the operator on the ground.
12. OPTIONAL: If you desire additional indications for the overfill and reorder points, follow the optional Overfill and Reorder Label Installation instructions below. If not, replace the front clear cover with the retaining ring as described in step 10 above.
13. 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.**

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## Operation

### Steps

1. To determine the volume of fluid in the tank, read the position of the gauge hand. Interpolate if necessary.
2. Multiply the reading made in the previous step by the multiplier shown on the gauge face. Example: If 12.6 is read and the multiplier is 100, so the reading is 1260.
3. The red area indicates the 90 – 100% volume band. If the hand extends into this area, then the tank has 10% or less ullage.
4. Before a tank fill is initiated, the alarm should be checked for proper operation and sufficient loudness by pressing the Test/Cancel button. When the button is released, the alarm should cease.

5. If the alarm sounds while the tank is being filled, immediately halt filling operations. The alarm can be temporarily silenced by pressing the Test/Cancel button. Once the fluid level drops below the alarm set point, the alarm will be re-armed for next overflow detection.

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## Maintenance

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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.
- Use a dampened cloth when cleaning the clear front cover or alarm enclosure to prevent static buildup and discharge.
- No user serviceable parts inside. In the event of malfunction, contact Morrison Bros. Customer Service.
- The only batteries approved for use with the alarm are listed on the spec plate.

### 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 of the gauge or alarm box with a damp cloth.
3. Measure the fluid height and correlate it to the tank manufacturer's volume chart to verify the gauge volume reading. 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. If the alarm still does not sound replace the alarm box or call Morrison Bros. Co. for repair.
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.**

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## Optional Overflow and Reorder Label Installation

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**NOTE:** If an overflow volume other than 90% is desired, the overflow label can be used. Otherwise, it is not needed since the 90% volume is indicated by the start of the red area on the gauge face.

**NOTE:** The template (see Figure 5) is intentionally reversed (mirror image) so the labels may be placed on the inside surface of the clear front cover. Therefore, the lettering of the labels is on the adhesive side and will read correctly once placed.

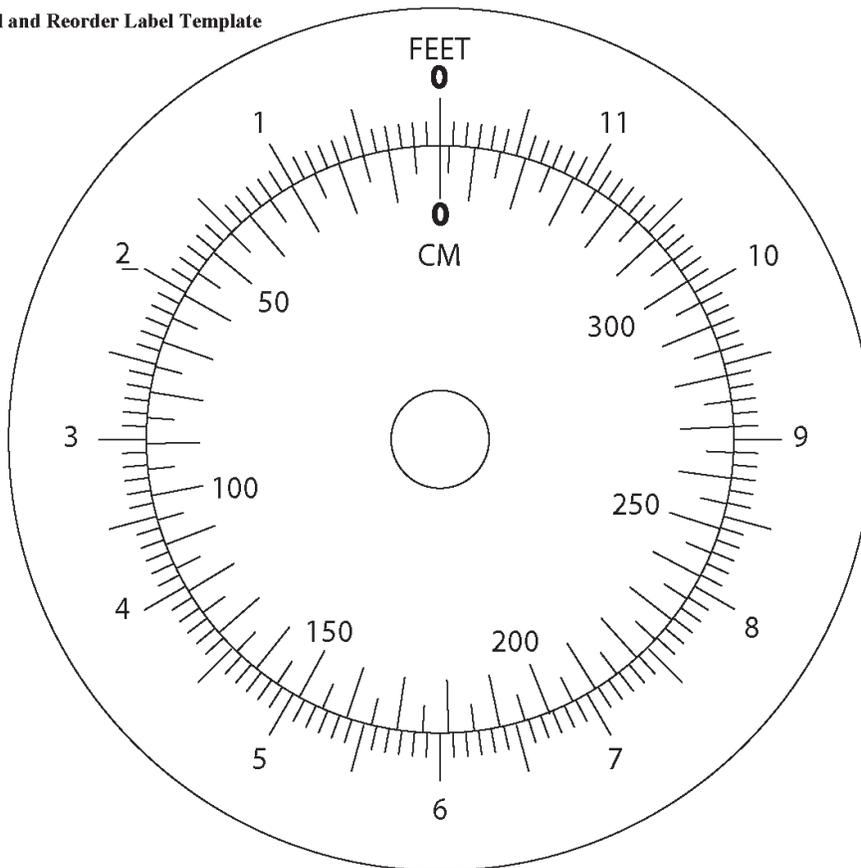
### Steps

1. Template units are shown in feet (or cm). It will be necessary to determine the desired overflow and reorder points and convert those into feet (or cm) in order to use this template.
2. Remove the front face retaining ring and remove the clear front cover.

3. Place the clear cover onto the template aligning the outside edge to the outside circle.
4. Remove indicator label backing and place label on the clear cover as shown on template. Align wider end against inside circle and narrower end pointing toward the level you want to indicate.
5. If both overfill and reorder labels are used, make sure each is pointing to the correct foot (or cm) reading that provides the volumes you desire.
6. Reinstall the clear front cover with the labels on the inside. Make sure indicators are in correct location and wording is readable before putting gauge in service. Replace the front face retaining ring making certain the ring snaps all the way down into the groove. You will need to use pliers to squeeze the ring into the groove. The retaining ring is correctly squeezed into place if the ends of the retaining ring do not overlap.

**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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

**Fig. 5: Overfill and Reorder Label Template**





## **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 one of the following specifications.

#### Wrench Makeup 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.

#### Torque Specifications

SIZE	Torque
2” NPT Threads	23-26 ft-lb

\* - No special tools required. Torque value could be verified by offset chain wrench and torque wrench. The Torque Specification method is required rather than Wrench Makeup Specification method for components installed in California,.

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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

## 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 one of the following specifications.

##### Wrench Makeup Specifications

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

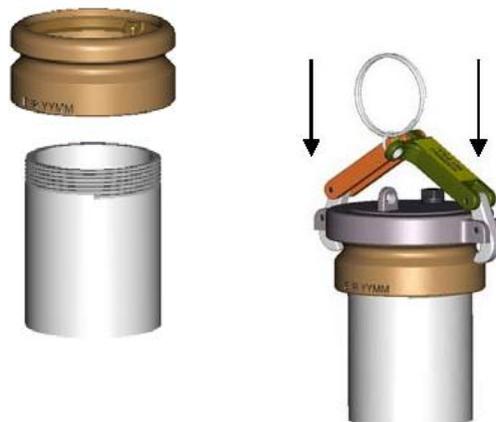
\* - All sizes should have handtight engagement before Wrench Makeup is applied.

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.

##### Torque Specifications

SIZE	Torque
4" NPT Threads	23-26 ft-lb

\* - No special tools required. Torque value could be verified by offset chain wrench and torque wrench. The Torque Specification method is required rather than Wrench Makeup Specification method for components installed in California..



- 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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **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.

**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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

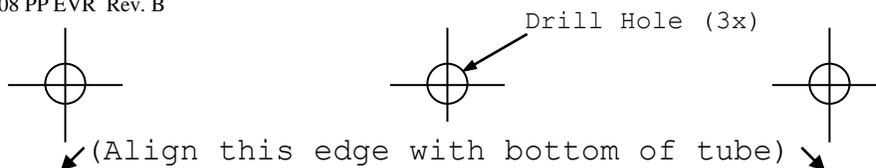


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[www.morbros.com](http://www.morbros.com)

539AS-0208 PP EVR Rev. C

### 2" Hole Location Template

539AS-0208 PPEVR 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.

<u>Drop Tube Length Calculator</u>	
_____	= Measured distance from top of riser pipe to bottom of tank.
- 6 inches	=
_____	
= <span style="border: 1px solid black; display: inline-block; width: 60px; height: 20px; vertical-align: middle;"></span>	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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.

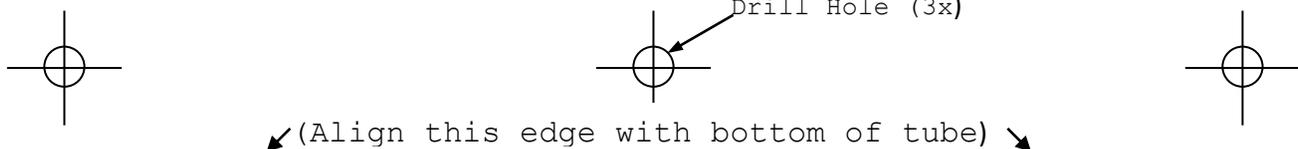


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[www.morbros.com](http://www.morbros.com)

539AS-0309 PP EVR Rev. C

#### 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](http://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 and meet all applicable performance standards and specifications. 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, and Morrison Bros. Co. will not allow claims for labor or consequential damage resulting from purchase, installation or misapplication of the product. The warranty registration information must be provided to the end user.



## **Appendix**

EVR Product Warranty Registration  
Morrison Standard Product Warranty  
Morrison Vent Guide For ASTs  
Tank Configuration Examples  
Installation Specifications  
Summary of Guidelines for Maintenance  
EVR Installation Check List

## MORRISON BROS. CO. WARRANTY REGISTRATION

All Morrison products are thoroughly tested before shipment and meet all applicable performance standards and specifications of related ARB executive orders and vapor recovery procedures of CP-206 (Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks) or CP-201 (Certification Procedure for Vapor Recovery Systems at Dispensing Facilities). This warranty shall include the ongoing compliance with all applicable performance standards and specifications for the duration of the warranty. 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. This warranty will include the initial purchaser and any subsequent purchasers of the initial equipment within the warranty period.

Installation Date: \_\_\_\_\_

Name Of Installer/Contractor \_\_\_\_\_

Installation Company: Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Business At Installation Site: Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Morrison Product(s) I.D Numbers With Date Of Manufacture \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date of manufacture can be found on the product identification label applied to the finished product. This warranty registration must remain with the equipment and be provided to the end user. If a warranty claim needs to be pursued, a copy of this information and the invoice of these products to the purchaser must be supplied to Morrison for verification.

# Product Warranty

## Morrison Bros. Co.

**WARRANTY**— All Morrison products are thoroughly tested before shipment and meet all applicable performance standards and specifications of related ARB executive orders and vapor recovery procedures of CP-206 (Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks) or CP-201 (Certification Procedure for Vapor Recovery Systems at Dispensing Facilities). This warranty shall include the ongoing compliance with all applicable performance standards and specifications for the duration of the warranty. 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. This warranty will include the initial purchaser and any subsequent purchasers of the initial equipment within the warranty period. This warranty registration must remain with the equipment and be provided to the end user. If a warranty claim needs to be pursued, a copy of this information and the invoice of these products to the purchaser must be supplied to Morrison for verification.



# **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.

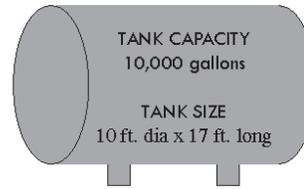
**Wetted Area** — Exposed surface or shell area of a tank used in determining the venting requirements needed for that size tank in event of an exposure fire. In a horizontal tank, the wetted area is calculated as 75% of the exposed surface area. In a vertical tank, the wetted area is calculated as the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

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

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

#### STEP 5 Vent Selection

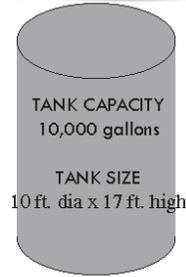
Options based on size of piping, type of product, flow requirements, required venting capacity and mounting. For the sake of this example, use 2" piping, Class 1B liquid. The normal vent size should be no smaller than the system piping, so a Morrison 2" Fig. 548 (20,200 CFH) is selected.

Total required venting capacity for this tank example was determined to be 360,840 CFH. Normal venting and emergency venting may be combined to reach this total. Morrison Vent Capacities are listed on Table H, page 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:

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

$$144$$

L = length, W = width, H = height

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

Wetted Area = 612 Sq. ft.

#### STEP 3 Determine CFH Requirement

Use Table F: Venting Capacity Chart on page 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.	<del>392,000</del>	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)	<del>504,818</del>	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	1399	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

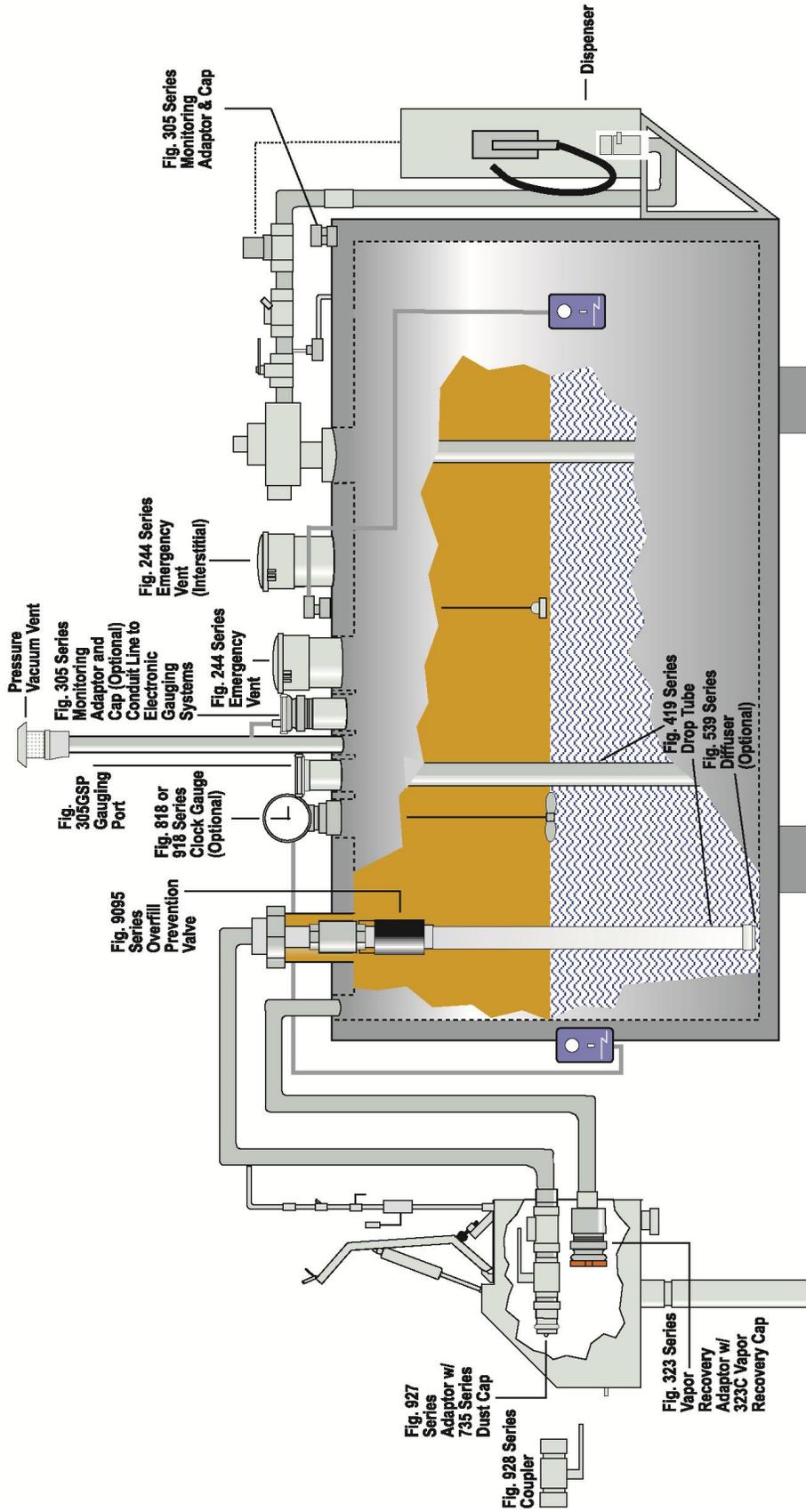
4.2.5.1.2 Normal vents shall be sized to be at least as large as the filling or withdrawal connection, whichever is larger, but in no case less than 1-1/4 in. (3 cm) nominal inside diameter.

**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

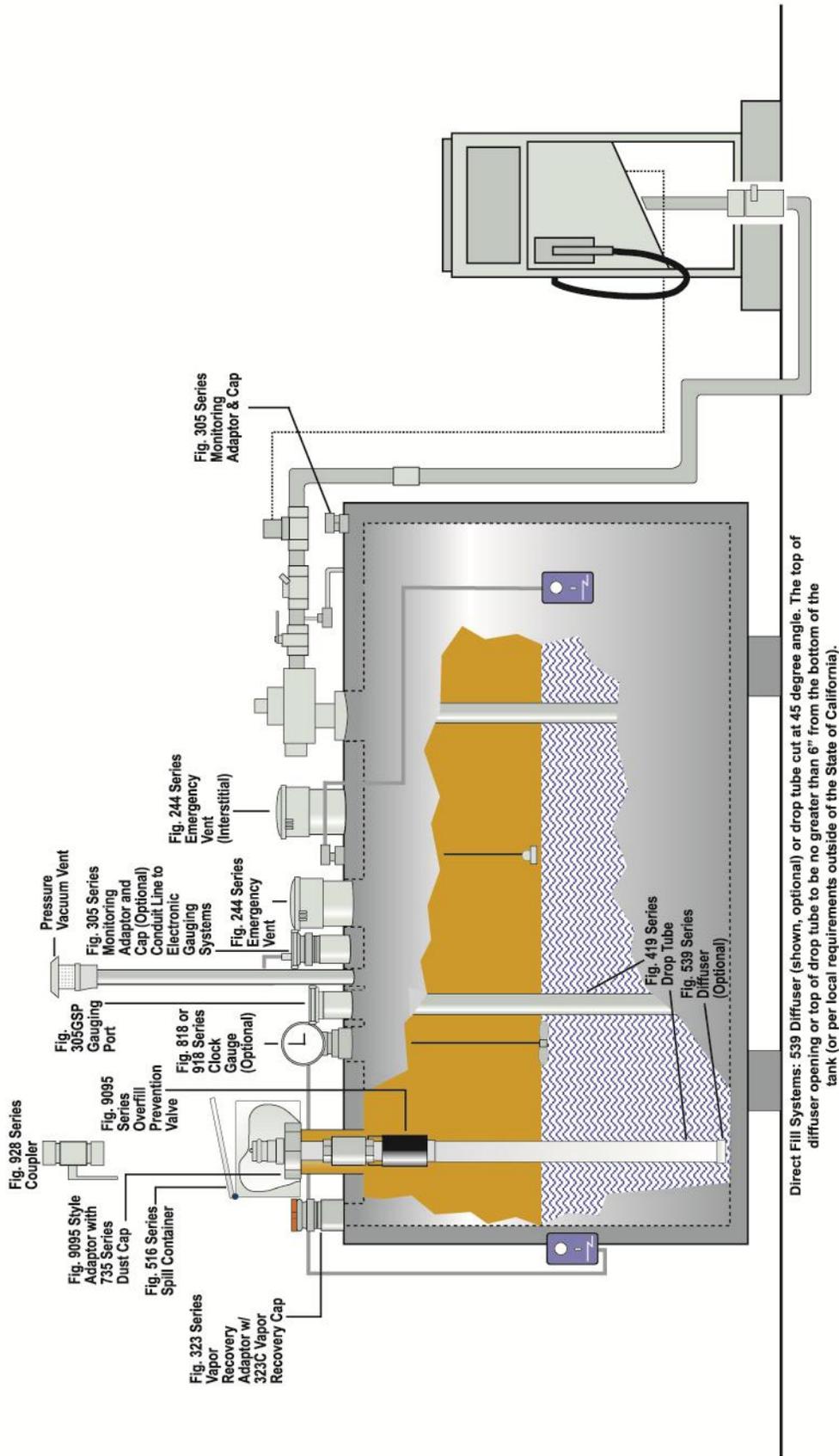
#### Protected Double-Wall Tank With Remote Fill



Remote Fill Systems: 539 Diffuser (shown, optional) or drop tube cut at 45 degree angle. The top of diffuser opening or top of drop tube to be no greater than 12" from the bottom of the tank (or per local requirements outside of the State of California).

The fill pipe may have to be removed upon District request to verify that the bottom of the fill pipe is no greater than 6 inches from the bottom of the tank.

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

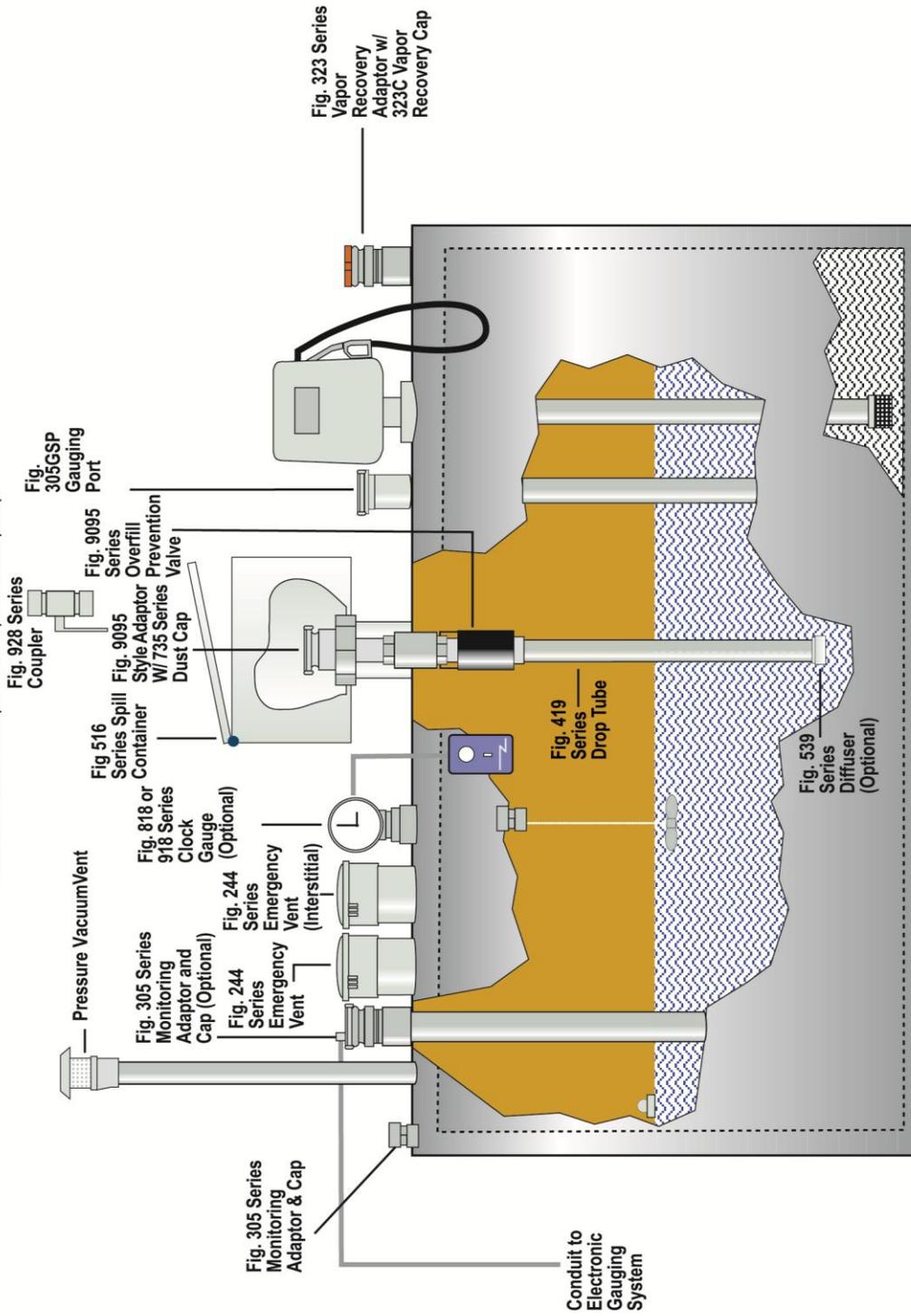


Direct Fill Systems: 539 Diffuser (shown, optional) or drop tube cut at 45 degree angle. The top of diffuser opening or top of drop tube to be no greater than 6" from the bottom of the tank (or per local requirements outside of the State of California).

The fill pipe may have to be removed upon District request to verify that the bottom of the fill pipe is no greater than 6 inches from the bottom of the tank.

### Aboveground Fuel Storage - Suction System

Protected tank with top fill and top mounted pump

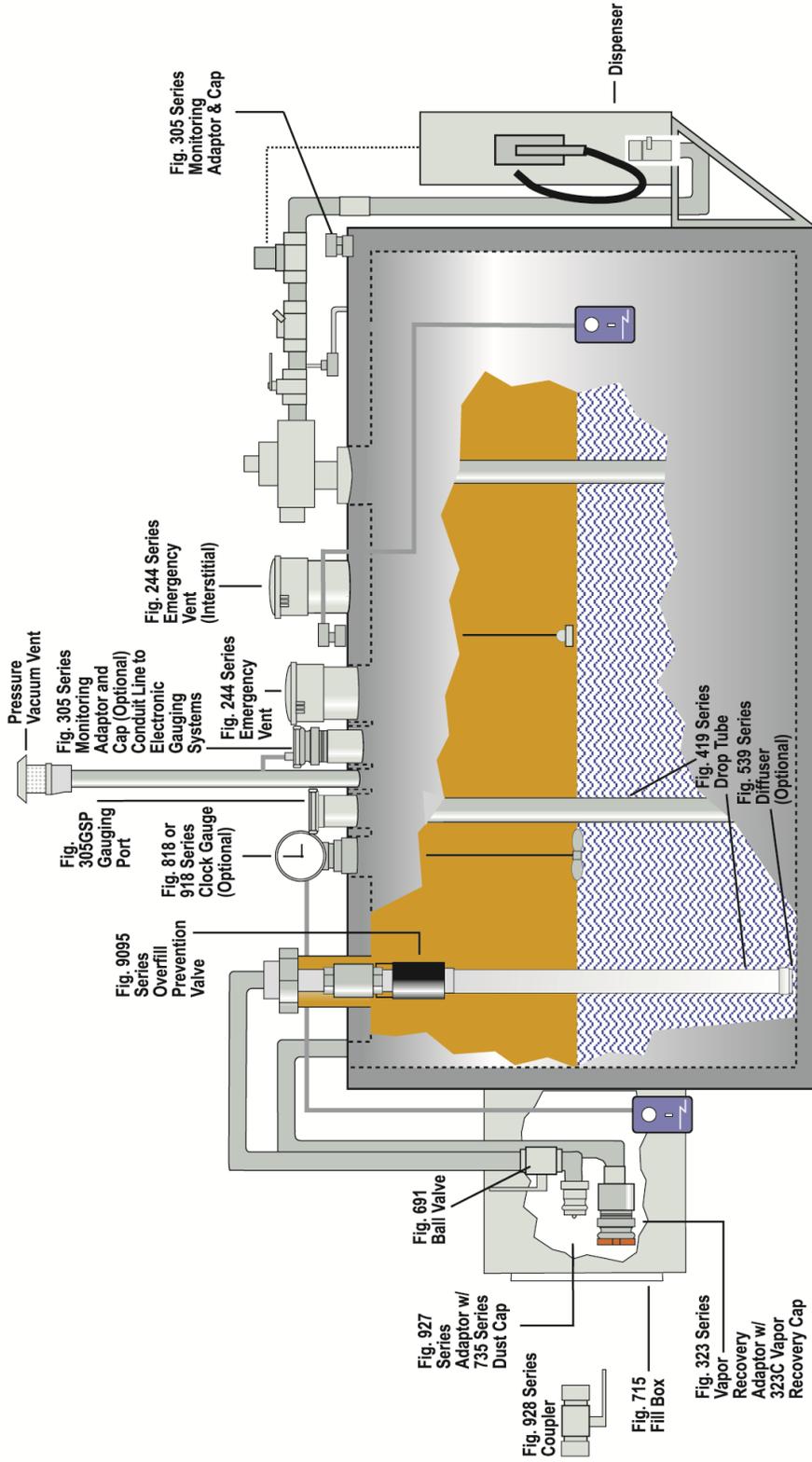


Remote Fill Systems: 539 Diffuser (shown, optional) or drop tube cut at 45 degree angle. The top of diffuser opening top of drop tube cut to be no greater than 6" from the bottom of the tank (or per local requirements outside of the State of California).

The fill pipe may have to be removed upon District request to verify that the bottom of the fill pipe is no greater than 6 inches from the bottom of the tank.

### Aboveground Fuel Storage System With Vapor Recovery Components

Protected Double-Wall Tank With Tank Mounted Remote Fill



Remote Fill Systems: 539 Diffuser (shown, optional) or drop tube cut at 45 degree angle. The top of diffuser opening or top of drop tube to be no greater than 12" from the bottom of the tank (or per local requirements outside of the State of California).

The fill pipe may have to be removed upon District request to verify that the bottom of the fill pipe is no greater than 6 inches from the bottom of the tank.

## EVR Aboveground Storage Tank Components Installation Specifications

(May 23, 2012)

### A. Wrench Makeup Method

	<b>Wrench Makeup*</b>
<b>Size</b>	<b>(Number of Turns)</b>
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. This method is allowed for states outside of California.

### B. Torque Method

<b>Component</b>	<b>Size</b>	<b>Torque Specification*</b>
Vapor Adaptor	3"	75-100 ft-lb
	4"	23-26 ft-lb
Product Adaptor	2"	75-85 ft-lb
	3"	75-100 ft-lb
	4"	23-26 ft-lb
Monitoring Adaptor	2", 4"	23-26 ft-lb
Dedicated Gauging Port Adaptor	2"	23-26 ft-lb
Spill Container	4"	75-100 ft-lb
Tank Gauge	2"	75-85 ft-lb
Emergency Vent	2"	75-85 ft-lb
	3"-4"	75-100 ft-lb

- \* - No special tools required. Torque value could be verified by offset chain wrench and torque wrench. The Torque method is required rather than Wrench Makeup method for components installed in California,.

## 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"><li>1. Remove screws that hold top cover on. Do not remove the screens.</li><li>2. Remove any debris that might be sitting inside the lower cover.</li><li>3. Check the drain holes in the lower cover to ensure they are not plugged.</li><li>4. Reinstall the top cover.</li><li>5. Tighten the screws firmly.</li></ol>

**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 \_\_\_\_\_