



# Water Storage Tank Installation and Maintenance

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*Part of a series of documents created by Tim Guishard Enterprises discussing relevant subjects in the groundwater industry.*

This document details factors that should be observed during the installation and maintenance of private water storage tanks used for Potable, irrigation, and Fire applications on Private Property.



## INTRODUCTION:

Every water storage tank either: manufactured, or erected, by Tim Guishard Enterprises is designed to provide many years of service when properly installed and maintained. The following are guidelines to protect your investment and comply with tank warranty requirements. Please perform the following: maintenance, observations and corrections as periodically recommended or as required below.

Most owners or their agents can inspect the tanks and perform some maintenance tasks with little or no extra cost. However, some tasks should be handled by properly trained specialists.

## INSTALLATION REQUIREMENTS:

Tank installation shall be in accordance with Uniform Building Code, American Water Works Association Standard D-103, NFPA-22 (as applicable), California Building and Plumbing Codes, and Per Tim Guishard Enterprises or the specific tank manufacturer's; Specifications and Warranty Requirements.

### Some do's and don'ts during installation:

- When materials of different metals must be connected to the tank, the use of di-electric fittings is highly recommended.
- Never use electrode type liquid level controls (I.E.: B&W) in a coated steel tank. We have observed excessive concentrated corrosion on the insides of tanks with the use of these controls.
- Never site your tank under or within 10' of overhead power lines. Never place your tank over underground power or water lines. Not only is this an OSHA violation, we have observed accelerated corrosion inside tanks.
- When a tank is placed in a windy location, like the side or top of a hill with no trees, we have observed excessive corrosion on both the interior and exterior of the tanks. There is no science to prove why this happens, but we suspect static electricity may be the culprit. In these locations, we recommend that the tank be grounded in accordance with NEC requirements.
- When float switches are used to control pumps, always use low voltage (as defined by NEC as <50 Volts to ground) control power. We have observed excessive corrosion and electrocution issues when high voltage controls are used. Additionally, never use mercury type float switches in a potable water tank.
- **Do not use 1.5" crushed rock!**  $\frac{3}{4}$ " or smaller, rounded rock reduces damage to the coatings on the underside of water tanks. Concrete foundations are best, provided that an asphalt impregnated fiberboard is installed between the tank bottom and the concrete.



- Use Chlorine, ozone, and other oxidizing chemicals sparingly. Excessive use of these products can deteriorate the tank coatings and sealants in a relatively short time.
- Have your water analyzed. Certain contaminants can accelerate corrosion in water tanks. Nitrates, IRB, SRB, MRB, low pH, high TDS, among others can all be detrimental to a tank's life.

Contact Tim Guishard Enterprises for further Recommendations.

## **MAINTENANCE REQUIRMENTS:**

### **Site Inspection**

Vegetation and soil, which can trap moisture against concrete and steel, should be cleared from the base of the tank. Similarly, tree limbs and bushes should be trimmed from the tank shell to prevent scratches in the steel coating. (Scratches are not only unsightly but precursors to premature coating failure and corrosion.)

In addition to examining the surrounding area, the site should be surveyed for signs of unauthorized access or vandalism. Unauthorized access is a potential liability for the tank owner, and a possible threat to water system security and the tank itself. Manholes and access doors to the tank interior should be checked frequently to ensure that they are secure.

### **Foundation Inspection**

Tank foundations should be evaluated on a regular basis, as deterioration of the foundation can lead to major problems elsewhere. Careful visual observation is key to inspecting a foundation.

The presence of any of the following factors signals the need for immediate repairs: signs of leakage, abnormal vegetation growth, ponding, settlement, cracking, gravel spillage or exposed reinforcing steel. Some foundation repairs can be accomplished without special skills or training, while other more severe deterioration may require professional assistance.

Soil erosion can either wash soils, or debris, against the tank shell, or wash away soils from the foundation. Either issue will cause tank failure. Careful attention of soil conditions around your tank is paramount to proper maintenance of your water tank.



#### A. Concrete Ring Wall and Slab Foundation

1. Annually examine foundation to make sure that no fractures have developed. Fractures or other distortions can cause eccentric loading on the steel tank and could lead to structural damage or failure.
2. Make thorough check at base of tank to ensure:
  - a) That there are no voids or gaps between tank bottom and foundation due to foundation settlement.
  - b) That anchor bolts (if used) are tight.

#### B. Foundations on Granular Berm

1. Annually examine foundation to make sure that no wash outs have developed. Sufficient water drainage away from the tank should be maintained.
2. Keep site clear of vegetation growth within five feet of tank.
3. Keep site clear of tree growth within thirty feet of tank.

#### **TANK INSPECTION:**

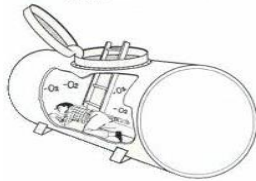
Assessment of the foundation and tank site should be followed by examination of the tank itself. Inspect for signs of corrosion and leaking, and assess the condition of connections and screens.

Leaks may not be readily visible but instead may be detected through the presence of rust or mineral streaks, ponding, or soil saturation. If a leak is discovered, contact Tim Guishard Enterprises or the tank manufacturer. Photographs can be of great assistance in describing the problem. Examine the condition of sanitary items such as the overflow discharge screening and vent screening. Be sure that the screens are clear of debris and free of holes or gaps. Vent screens also are present on the tank roof. If the inspection person is trained in accessing heights and equipped with the proper safety gear, the vent screen condition may be monitored. Extreme care and caution should be taken when accessing tank roofs. If the tank is equipped with rafters, walk on or near the vertical overlaps, avoid walking in the center of the tank roof panels. For shop fabricated tanks, use a ladder to visually inspect vent screens; do not attempt to walk on the steep, slippery conical covers.



**WARNING: ENTERING A WATER STORAGE TANK SHOULD BE PERFORMED ONLY BY PROPERLY EQUIPPED AND TRAINED PERSONNEL. EXTREME CAUTION SHOULD BE USED IF ENTERING TANK FROM THE DECK MANWAY. TIM GUSHARD ENTERPRISES RECOMMENDS ACCESS BY GROUND LEVEL SHELL MAN-WAYS WHENEVER POSSIBLE. IF YOUR TANK IS NOT EQUIPPED WITH A SHELL MAN-WAY, CONTACT TIM GUSHARD ENTERPRISES FOR RECOMMENDATIONS OR ACCESS INSTRUCTIONS.**

Figure 10. In certain working environments such as confined spaces, an inadequate amount of oxygen can lead to simple asphyxiation and death.



**HAZARDUS GASSES ARE FREQUENTLY FOUND IN DEBRIS AT THE BOTTOM OF WATER TANKS. DISTRUBING THIS DEBRIS CAN RELEASE THESE GASSES, RESULTING IN THE EXHAUSTION OF ALL OXYGEN IN THE TANK INTERIOR, AND COLLAPSE OR POSSIBLE DEATH OF A PERSON INSIDE.**

**NEVER ATTEMPT RO RESCUE A PERSON THAT HAS COLLAPSED INSIDE A TANK, UNLESS YOU HAVE THE PROPER TRAINING AND EQUIPMENT. CONTACT EMERGENCEY PERSONELL THAT HAVE BEEN TRAINED IN THESE RESCUE SITUATIONS.**

*(Worker training—whether for accessing heights or for confined-space entry—is available from a variety of sources, including the Occupational Safety and Health Administration, [www.osha.gov](http://www.osha.gov).)*

1. Visually inspect tank interior through the deck (roof) man-way annually. If excess mineral build-up, rust or coating degradation is noted, drain tank and inspect for the following:
2. Prior to draining tank, contact tank distributor or tank manufacturer for coating touch- up procedures. Most repairs can be performed by untrained personnel with some instructions.
3. Carefully remove the side-shell man-way to prevent damage to the neoprene rubber gasket.
4. Remove sediment that has collected on tank bottom using a soft bristle broom, squeegee or vacuum. Rinse with clean water and flush out tank if possible.
5. Visually inspect submerged surfaces, including deck and support structure, for signs of corrosion or coating damage. Use a battery powered flashlight.



**WARNING: DO NOT USE ELECTRIC POWERED LIGHTS OR TOOLS INSIDE A TANK THAT HAS ANY STANDING WATER. WHEN POWER TOOLS ARE NEEDED, ONLY USE TOOLS THAT ARE PROPERLY GROUNDED, AND TOOLS THAT RECEIVE POWER FROM PROPERLY WORKING GFCI PROTECTED OUTLETS.**

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6. Check paint coating for wear caused by access or turbulence of liquid stored in tank. If coating shows excessive wear – re-coating may be required.
7. Inspect interior sealant for general condition and edge adhesion. Do not pull or remove loose sealant. Make a note of location and monitor exterior for signs of leakage.
8. If painting is required, contact tank, or coating, manufacturer for painting recommendations.
9. Check all interior appurtenances for wear or damage and repair as required.
10. Inspect deck support structure for any distortion that may have occurred from undue structural stress.
11. If inside repairs have been made, be sure all materials, equipment and tools have been removed before replacing man-way cover and putting tank back in operation.
12. For potable water tanks it is necessary to disinfect tank before putting tank back in operation. **DO NOT EXCEED MORE THAN FIVE (5) PARTS PER MILLION OF CHLORINE FOR “SHOCK” DISINFECTING.** Long term exposure to Chlorine residuals greater than 2-PPM will damage: coatings, sealants, and/or gaskets used in the construction of your tank. Contact Tim Guishard Enterprises for recommendations for correct disinfection procedures of your water storage tank. In general, a maximum of 1-2-ppm residual should be sufficient for disinfection purposes. (1 gallon of 5% household bleach in a 10,000 gallon tank will yield approximately 5-PPM chlorine residual.)

## **SERVICING OF TANK APPURTENANCES:**

### **Vent:**

Clean screen of all debris that may have collected in or on top of it. Check screen wire for deterioration and replace if required. In extreme cold climates; check for screen icing or snow blockage.

### **Nozzles and Connecting Pipes:**

Check for distortion of tank wall at location of attachment of pipe nozzles. This distortion could be caused by difference in foundation settlement between tank and attaching piping. This distortion must be corrected by adjusting pipe supports as required. The use of fittings like “flexible metal hose”, or “Flextend” products, will allow for some pipe or tank movement.



### **Liquid Level Indicator (Targeting Reading Type):**

Annually inspect the following:

1. Check if indicator rides smoothly up and down gage board.
2. Clean gage board of any foreign material that may inhibit operation.
3. Use a dry lubricant on pulley shafts if required.
4. In extreme cold climates keep gage board clear of ice buildup.

### **OEM Level Indicators of other types:**

Follow manufacturers' recommendations for inspection and maintenance.

### **Valves, Sample Boxes, Sight Glass, Pressure Gage, Etc.:**

Annually inspect for smooth and proper operation. Exercise valves, by fully closing and then opening fully, at least annually. Clean and repair as required.

### **Outside Ladder, Cage, and Perimeter Handrails:**

Annually inspect and tighten bolts as required.

### **Interior ladders:**

Tim Guishard Enterprises does not recommend the installation, or use, of permanently installed interior ladder systems. Frequently these components are deteriorated by the water in the tank, and are unsafe.

**WARNING: IF AN INTERIOR LADDER MUST BE USED, TAKE SPECIAL CARE IN ACENDING OR DECENDING THESE LADDERS. ALWAYS US PROPER P.P.E., LIKE A HARNESS AND LANYARD ATTACHED TO A STURDY SURFACE.**

### **Cathodic Protection equipment:**

Inspect and adjust equipment per the equipment manufacturer's requirements.



## **CONCLUSION:**

Careful installation and maintenance can significantly increase the useful life of your water storage tank. Be aware that no matter how well you maintain a tank, water being the universal solvent it is will try to destroy all water tanks. The first annual inspection is probably the most important, and rarely performed, inspection during a tank's life.

An overall interior and exterior inspection of water tanks should be performed annually to evaluate damage or problems that may have occurred. The inspection should include any signs of: rust, product leakage, algae, biofilm growths, coating damage, equipment functions, and any other item related directly or indirectly with the performance of the tanks and the safe operation of the entire water system. All corrective action should be completed immediately after a problem is identified to assure irreversible damage does not occur.

Monthly inspections of level controls, overflow and venting systems should be made to assure damage does not occur to the tank from plugged or inoperative equipment.

### **FAILURE TO INSPECT OR MAINTAIN YOUR WATER STORAGE TANK IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS MAY RESULT IN VOIDANCE OF WARRANTY.**

Most inspections can utilize the owner's own personnel. If this is not feasible, or the severity of the problem warrants the need, an experienced tank inspector or repairman can be hired through Tim Guishard Enterprises, at 619-589-9433.