



# FLORIDA RURAL WATER ASSOCIATION

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## Hydropneumatic Tank Inspections and Replacement

*FRWA Water Writes Article Fall 2007*

By Sterling L. Carroll, P.E., State Engineer

Recently, we spoke with a water system about their hydropneumatic tank. They had just welded a plate over a pinhole leak. This type of repair can significantly compromise the tank, shorten its life, and the tank could fail. In this particular case, instead of strengthening the tank, the welds increased the metal stresses. Luckily two weeks later when the tank blew, no one was in the immediate area and no extensive damage was done to other structures.

Owners and operators of water systems should be aware of the hazards of aging hydropneumatic tanks. We recommend that you take inspections seriously. Pressure vessels are dynamic devices. When they fail, they can fail catastrophically. They can cause major damage, injury and even death.

**Catastrophic Failure.** Seven tanks failed in Florida in recent years, two resulting in fatalities. Persons making repairs, grinding, sandblasting or welding hydropneumatic tanks should be properly trained or certified to work on ASME (American Society Of Mechanical Engineers) Coded Pressure Vessels. Alterations to hydropneumatic tanks can reduce structural integrity and compromise pressure rating. Any tank repairs, grinding, sandblasting or welding should be performed under the direction of a professional engineer that has expertise with ASME pressure vessel codes, and the tank should be inspected before the tank is re-pressurized and placed back into service.

The metal skin of pressure vessels is under continual tension. When a crack is formed it can rip through the metal skin at very high

velocities -- speeds in the range of hundreds to thousands of miles per hour. In other words, you can't see it happening. You will hear it -- probably after it occurred. And if you are standing next to it you will most likely not have a chance to react.

**Hydropneumatic Tank Automatic Pressure Relief Valves.** All pressure tanks must be safeguarded with an Automatic Pressure Relief Valve (PRV) to protect against over-pressurization. The Pressure Relief Valve must be installed on top of the tank or on outlet piping in such a location that will not allow the possibility of over pressurizing the pressure tank. The "set" pressure of the Pressure Relief Valve shall not exceed the design pressure of the vessel.

We recommend checking the Automatic Pressure Relief Valves at least annually and replaced them at least once every five (5) years. This one small item probably is the cause for more catastrophic tank failures than anything else! The cost for a replacement valve is \$75 to \$125 dollars -- this is a minimal outlay to safeguard life and your capital investment in the tank, equating to only \$15 - \$25 per year.

**Periodic Tank Inspections and Cleaning.** The Florida Department of Environmental Protection Rule 62-555.350(2) FAC. requires that all finished drinking water storage tanks, including conventional hydropneumatic tanks with an access manhole shall be cleaned at least once every five (5) years and inspected under the responsible charge of a professional engineer that has expertise with ASME

Coded Pressure Vessels. Tanks excluded by the rule are HPDE and bladder tanks.

Prior to and in conjunction with the inspection water systems should thoroughly clean the interior of the hydropneumatic tank.

Hydropneumatic Tanks Inspection Reports are to be prepared under the responsible charge of a professional engineer and must be signed and sealed by the engineer per FS 471.025 and FAC 61G15-23.002. In general the inspection will assess structural and coating integrity, pit-depth, and wall thickness. The engineer may make a professional determination regarding the structural and coating integrity of a finished-water storage tank.

Water systems are required by rule 62-555.350(12)(c) to keep acceptable records documenting these inspections.

**Internal Hydropneumatic Tanks Inspections is Required by FDEP.** Mr. John R. Sowerby, P.E. of the Florida Department of Environmental Protection recently addressed the intent of the rules, on FRWA request, with regard to whether an engineering inspection of hydropneumatic tanks without examination of internal coatings or conditions conforms to 62-555.350(2) FAC (assuming all have access manholes). Mr. John R. Sowerby responded,

*"No, such an inspection by itself would not meet the intent of FAC 62-555.350(2). We expect inspections to also include an examination of interior coatings. Per FAC 62-555.350(2), systems also must clean the inside of their tanks at least once every five years. (Note: FAC 62-555.350(2) was written with steel or concrete tanks in mind. The required inspection for structural and coating integrity by personnel under the responsible charge of a PE may be waived for finished-water storage tanks that are constructed of HDPE or fiberglass. However, such tanks still must be cleaned*

*at least once every five years to remove sludge from inside the tanks.)"*

**Annual Cleaning and Repair of All Other Treatment Tanks and Facilities.** The rule also requires the routine (i.e., at least annually) cleaning of any tank, device or facility that comes in contact with raw, partially treated, or finished drinking water. The cleaning shall include the removal of any *"accumulated sludge and biogrowths"*.

Once cleaned the interior of the tanks are to be inspected by staff for blistering, chipped, or cracked coatings and linings on treatment or storage facilities in contact with raw, partially treated, or finished drinking water; and the tank and interior coatings *"shall be rehabilitated or repaired"*.

**Hydropneumatic Tanks Are NOT Intended for Fire Protection Purposes.**

Ten States Standards also states clearly that, *"hydropneumatic tank storage is not to be permitted for fire protection purposes."* (paragraph 7.2) [emphasis added], but the Insurance Services Office (ISO) allows fire protection rating to be evaluated if the water system can meet the demand for the duration of the fire. Further bladder tanks are not specifically excluded by FAC 62-555.520(20)(c). Generally speaking the Florida Department of Environmental Protection does NOT mandate systems to provide fire protection, as this issue is not a water quality issue, but it gets involved with the system components as they are related to water quality, capacity and supply.

**Hydropneumatic Tank Operational Checklist.** All tanks and treatment facilities shall be cleaned annually per rule 62-555.350(2). The owner is responsible that the following Preventive Maintenance on the Hydropneumatic Tank is performed:

- ✓ Annually Flush, Super-chlorinate, and Clean Hydropneumatic Tanks removing all accumulated sludge and biogrowths in the tank, as piping allows. This is very important to preserve good water quality!

- ✓ Annual Inspection and Testing of Air / Pressure Relief Valves on Hydropneumatic Tanks
- ✓ Annual Inspection and Testing Air Compressor for Hydropneumatic Tanks
- ✓ Annual Visual Inspection (by the operator) the interior of the Hydropneumatic Tanks with an access manhole. Bladder- or diaphragm-type hydropneumatic tanks without access manholes are excluded.
- ✓ Any blistering, chipped, or cracked coatings and linings on treatment or storage facilities in contact with raw, partially treated, or finished drinking water shall be rehabilitated or repaired.
- ✓ Maintain all components in good operating condition so the components function as intended.
- ✓ Annually ensure that all hatches are closed and screens are in place.
- ✓ At least once every five (5) years Overhaul or Replace Pressure Relief Valves on Hydropneumatic Tanks.
- ✓ At least once every five (5) years and before August 28, 2008, the tank shall be inspected for structural and coating integrity by personnel under the responsible charge of a professional engineer licensed in Florida, rule 62-555.320(2), FAC.

Your FRWA Water Circuit Rider or the FRWA Engineer can provide a list of associate members that can provide tank inspection services and engineering reports.



**Hydropneumatic Tank Rupture**



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