



Options for Fire Protection

August 2023



A 10,000 gallon vertical bottom drain fire protection system.

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FIRE PROTECTION TANKS

In emergency fire fighting situations, the demand for water can exceed the supply available from the domestic water delivery system. This is especially true for suburban or rural areas served by a well with limited delivery capability.

Buildings like schools, hospitals, data centers, and other institutional facilities need a reliable and redundant water supply. Water storage systems have become a vital component of any distribution system.

Tanks are becoming a critical element in providing safe, secure water during periods of drought, infrastructure failure, loss of pumping capacity and fire flow enhancement.

Highland Tank Protected steel storage tanks for fire protection (FPT) are an essential element in providing a reliable source of water at desired rates and durations under anticipated design conditions.

Fire departments around the country have requirements for the submittal and approval of the design, construction, installation, and maintenance of protected steel tanks that supply water for private fire systems which are installed in accordance with NFPA 22-2018 “Standard for Water Tanks for Private Fire Protection”. Tank designs shall include but not limited to:

- 1) Water supply to refill
- 2) Duration of use
- 3) Tank fabrication standards: AWWA D-100-21, AWWA D-102-21
- 4) Tanks capacity (Useable Volume)
- 5) Overflow/fill protection
- 6) Level monitoring

Types of Water Supply

Highland Tank manufactures many different layouts for water storage tanks for fire protection because each building application is unique. In some cases, the required fire flow may incorporate a traditional drafting design (cistern tank), while others may provide a gravity flow or pumped discharge (reservoir tank).

And in some instances, an ASME pressure vessel is utilized. Highland Tank provides engineering support for standard vertical suction, pump well, and bottom drain type fire protection tanks with interior and exterior coatings per AWWA D102-21

Cisterns

Many communities have invested in large cisterns for fire protection, some of which can hold ten times as much as a fire tanker. NFPA 22 has published guidelines regarding the location and volume of an appropriate fire cistern based on the structure it is designed to protect.

Cisterns are atmospheric water tanks vented to the atmosphere to allow the free flow of air during filling and draining cycles. The vent is critical in maintaining atmospheric pressure, especially in above ground applications.



A 20,000 gallon HighGuard bottom Drain Fire Protection System.

Reservoir Tanks

Fire Protection reservoirs are protected steel water storage tanks designed to provide sufficient water supply for fire suppression beyond daily consumption. In other words, the fire suppression delivery system needs an auxiliary and/or secondary means of water to satisfy fire flow. This type of water storage tank can be either atmospheric or an ASME pressure vessel. Atmospheric water storage tanks require a fire pump to deliver water to the building.

Tanks can be installed underground or aboveground. Underground installation may require a vertical turbine fire pump be installed directly through a manway along with a jockey pump and fill and level controls. The pump can be completely enclosed in the manway or housed in a prefabricated pump house located at finished grade.



Aboveground installations can be either horizontal and/or vertical configurations depending on site conditions.

Things to consider in an aboveground application are, temperature, pump suction location, overflow, and venting.

Tanks underground can also be designed to penetrate a foundation wall, with integral water stop and link seal, to eliminate the need for a pump house while still providing access to the tank controls.

ASME Fire Protection Tanks

Highland Tank ASME Fire Protection Tanks are manufactured for use with fire suppression sprinkler systems. During normal operation, the ASME fire protection vessel is filled with 2/3 water and 1/3 air to provide the velocity factor needed for the sprinkler piping system.

Tank construction complies with ASME Section VIII Division I and welded in accordance with ASME Section IX. The ASME pressure vessel's material of construction consists of SA516 GR70 carbon steel and type 304 and 316 stainless (includes "L" grades). Most ASME vessels utilize flanged tank fittings (raised or flat face, slip-on weld neck, lap joint). Manways are limited to 24" diameter cylindrical or elliptical.



A 20,000 gallon HighGuard fire protection tank with pump well.

Break Tanks

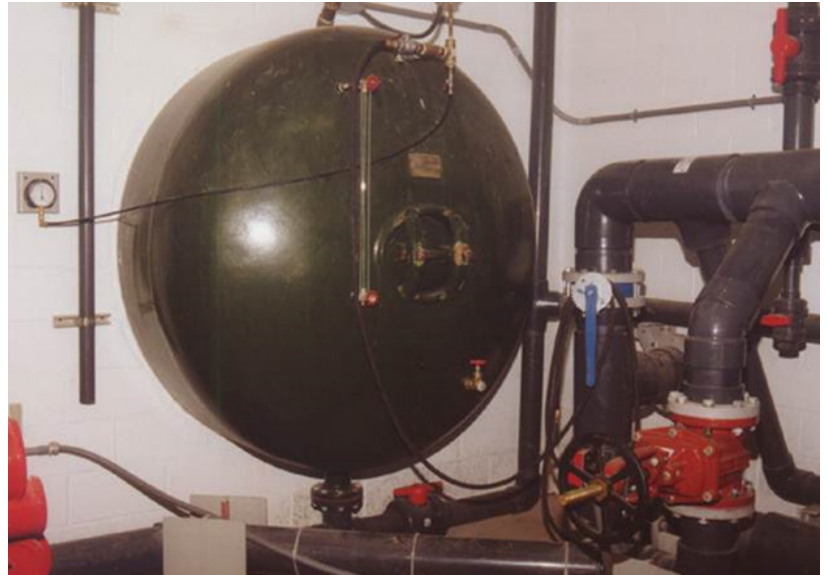
HT Break Tanks are an automatically filled reservoir that maintains a sustained water supply in a pump(s) application. Break Tanks are used for one or more of the following reasons:

- 1) As a backflow prevention device between the city water supply and fire pump suction.
- 2) To eliminate pressure fluctuations in the city water supply and provide a net positive suction to the fire pump.
- 3) To supplement the city water supply when the volume of water available from the city is deemed inadequate for the fire flow demand.

It is important to size the Break Tank correctly as well as provide means for primary and secondary auto fill capabilities.

Coatings: Interior & Exterior Linings

NFPA 22 states all coatings/paint shall be in accordance with the requirements of AWWA D102. Also, all coatings/paint shall be based on the appropriate requirements of SSPC Systems and Specifications Steel Structures Painting Manual, Chapter 5.



A 30,000 gallon ASME fire protection tank installed in foundation wall.



A 15,000 gallon aboveground break tank with external bracing.

Highland Tank HighGuard external corrosion protection systems for belowground applications use high grade, self-reinforcing, 1:1 format polyurethane that can be applied in one coat to a minimum of 75mils to meet AWWA D102. All exterior surfaces are cleaned by commercial grit blast in accordance with SSPC SP 6. The HighGuard coatings provides a limited 10-year warranty for corrosion using this type of protective coating system. For aboveground weather exposed surfaces AWWA D102 describes several types of coating systems that meet the minimum standards for corrosion protection.

Highland Tank follows the Outside Coating System No. 4 (OCS-4) which consists of a three-coat system of zinc-rich primer and polyurethane. The system is proven in all types of environments and weather conditions per ASTM D4141 and ASTM G90 for exposure coating retention. Inside a fire/ water storage tank, the approach to corrosion control is different. Internal polyurethanes are highly resistant to corrosion, abrasion, immersion, waterborne chemicals and cathodic disbandment.

It is a two component, NSF compliant, quick setting, 100% solids coating designed to protect potable water storage tanks. It cures to form a tough, durable, non- toxic solid that will not impart any taste to the contents of the tank.



Underground fire protection tanks with HighGuard coating system.

All interior surfaces are cleaned by commercial grit blast in accordance with SSPC SP 10 to near white finish.

Highland Tank follows the Inside Coating System No. 4 (ICS-4) which includes a 100% percent solids polyurethane technology. Like the HighGuard, the High-DRO liner plus is a 2-component fast setting coating with a minimum build thickness to 25 mils.

Factory applied poured foam insulation is also an option for fire/water protected steel storage systems.

The availability of an adequate and reliable water supply is paramount to effective fire suppression operations. Highland Tank Protected steel water storage tanks have become a vital element within the municipal and rural delivery system to sustain long duration fire suppression operations.

Call 814-893-5701 today or visit us at www.highlandtank.com for more information.

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