



Tank Buying Guide for Storage of Flammable and Combustible Liquids

Many customers are unsure of what type of tank they need for their application. There are many options available it can often be confusing. The purpose of this article is to provide the end user the information they need to select the best tank and equipment for their application to save you not only time but also money.

Here are the main points to consider when purchasing a tank:

Tank Buying Checklist

1. Determine local code requirements and restrictions.
2. Determine type of liquid to be stored and tank material compatibility.
3. Determine tank capacity requirement.
4. Determine space limitations to determine tank style.
5. Identify operating environment to determine exterior coating requirement.
6. Determine method, frequency and rate of tank fill.
7. Determine method, frequency and rate of pump out.

Regulations

If storing flammable or combustible liquids, it is necessary to contact your local fire marshal and any regulating agencies to determine the tank construction standard required. If the tank is not storing flammable or combustible liquids, check your local building code for any restrictions. Additionally, you need to identify any permitting requirements. The two most common construction standards to become familiar with are UL-142 and UL-2085.

Underwriters Laboratories Inc. (UL) UL-142 standard is a nationally recognized standard for construction of Steel Aboveground Tanks for Flammable and Combustible Liquids. This standard covers steel primary, secondary and diked type atmospheric storage tanks intended for noncorrosive, stable flammable and combustible liquids in aboveground applications. A double-walled tank built to this standard meets the requirement for 110% containment. The requirement for 110% containment is one that is mandated by most fire marshals or the applicable regulating agency. Containment requirements are determined by the tank capacity, location, landing zoning and use.

Underwriters Laboratories Inc. (UL) standard UL-2085 is a nationally recognized standard for Protected Aboveground Tanks for Flammable and Combustible Liquids. UL-2085 tanks use the UL-142 standard as the basis for construction, but add additional materials to classify it as a protected tank. This tank construction is intended to limit the heat transferred to the primary tank when the tank is exposed to a 2-hour hydrocarbon pool fire and are provided with protection from physical damage. The requirement to use a UL-2085 tank is stipulated by local fire marshals or the applicable regulating agency where the tank is to be used.

Aside from the construction standard, there are specific codes that must be adopted for tanks storing flammable and combustible liquids. Consult the Uniform Fire Code, International Fire Code and NFPA 30A for restrictions.

Material

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Once the requirements and restrictions are identified, the next step is to determine the type of liquid to be stored and tank material compatibility. For most applications, carbon structural steel per American Society for Testing and Materials (ASTM) A36M is adequate without coating the tank interior. Some applications may require stainless steel (e.g. type 304 or 316) ASTM A167 for a specific desired purpose such as to prevent corrosion.

Some applications may require a coating of the tank interior. For example, storage of some aviation fuels per Federal Aviation Administration (FAA) regulations require epoxy coating of the interior tank. If storing water or a water based liquid, it is recommended to coat the tank interior of carbon steel tanks to prevent corrosion. There is a large selection of tank coatings available. It is critical to identify the properties of the liquid to be stored to determine compatibility of the tank interior coating.

Capacity

After determining the tank material requirement, the next step is to settle on the tank capacity for your application. Two key elements to remember is whether the tank can be shop fabricated or field erected. Tanks having more than >35,000 gallons must be field fabricated since they are unable to be transported over the road. Additional local codes will most likely require unique secondary containment provisions. Tanks having less than 35,000 gallons can be shop fabricated and transported over the road.

If the tank is storing fuel, there are several factors to consider in finding the best tank capacity for your application. First, compare the fuel usage by type and grade for the application and the desired goal for the tank. Most end users seek to increase fuel capacity and this can be done by increasing the number of tanks, increasing the tank volume, or by increasing the frequency of fill of existing tanks.

Second, find out the capacity of the local fuel distributor's truck and trailer and volume price discount. Typical truck and trailer capacity is 7,500 to 10,000 gallons. Purchase of a truck and trailer load of fuel offers the most price per gallon discount as opposed to purchasing less volume. An important thing to remember is that a fuel storage tank can only be filled to a maximum of 90% of the tank capacity per most local codes. For example, a 12,000 gallon tank is required to receive 10,000 gallons truck and trailer load of fuel. This will play a large factor in matching up the distributor's capability, your requirements and the best value.

If secondary containment is required, choose the most economical or ease of use solution based on your needs. There a couple of routes to take: either a double wall tank with integral secondary containment versus a single wall tank with an external secondary containment. It may be more cost effective to purchase a tank that has its own secondary containment than it is to build the secondary containment. The convenience of the portability of a double-wall tank may outweigh the cost of a single wall tank with an external secondary containment. This decision is primarily based on the size of the tank, local requirements and restrictions and the budget for the project.

A final consideration with tank capacity is to figure out the most economical tank configuration for the types of fuel used. Purchase of a two product tank having a compartment for each type of fuel versus the cost of two tanks for each product is dependent on your application, tank volume requirements and budget. Typically, it is more cost effective to purchase a two compartment tank in



tank volume greater than 500 gallons. While it is often more cost effective to purchase two tanks below 500 gallons. This leads to the next point: space versus capacity.

Style

The next decision is to select a tank shape that has the capacity for your application while at the same time meeting your space limitations. The most common shapes of steel tanks are cylindrical horizontal, cylindrical vertical and rectangular. Cylindrical horizontal tanks lay on their side in steel or concrete saddles. Cylindrical horizontal tanks offer portability, significant capacity and with a double-walled tank meet secondary containment requirement.

Another tank style to consider is a vertical tank. Vertical tanks have the largest capacity for the required footprint, but they may require extensive external secondary containment site preparation. Usually, vertical tanks are the best value in terms of the lowest cost per gallon compared to other tank styles.

Finally, rectangular style tanks have the most efficient use of space and capacity for space restrictive applications, but they are limited in capacity. Typical applications for this style of tank are in vehicle service or industrial type applications where space is most often the issue.

Coating

The next significant step is to identify the operating environment the tank will be in to determine the exterior coating requirement. It is important to select the correct coating to protect steel tanks from corrosion, chemicals, and other natural weather and jobsite elements. With proper surface preparation, substrate condition, formulation choice, primers, and application, a tank with good coating can extend the life of a tank. The most common exterior coating is acrylic enamel due to its low cost and reasonable protective qualities. Another common exterior coating is epoxy based for superior ability in extreme environments and greatly extends the life of the tank.

Fill

There are multiple options for filling fuel storage tanks. One must determine method, frequency and rate of tank fill. The most common method of fill is by nozzle in a port located on the top of the tank. This is a typical method of fill for 4000 gallon or less tanks. The fill port is simply a hinged flip top style or a threaded cap. The next most common method of fill is through a cam lock adapter located on the top of the tank for 5000 gallon or greater tanks. This is a good option for quickly connecting to a tanker truck and transferring the load. An alternative to climbing up the tank to connect to the cam lock adapter is to use a cam lock adapter located about 36" above grade that is plumbed to the top of the tank. This is a common method of fill for tanks that are greater than 7 feet in height. These are only a few basic and more common methods of filling tanks.

Pumps

The final decision is to select the method, frequency use and pump rate required to meet your application. The methods range from a point of sale type system to a simple hand operated pump and everything in between. Once you identify how many pieces of equipment that need to be filled, how



many gallons each equipment will accept and how fast they need to be filled will reflect how many nozzles and pump size expressed in gallons per minute (GPM) is required.

Conclusion

This article is only a basic guide to get you started in selecting the right tank for your application. It is best to determine what you need and what your restrictions are first before buying equipment and finding out later that you bought the wrong equipment. Spending a little time now will save you time and money later.

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Here's a few links you may want to check out for more information:

Eagle Tanks, Inc. manufacturer of above ground steel tanks www.eagletanks.com

Underwriters Laboratories www.ul.com

Petroleum Equipment Institute www.pei.org

Steel Tank Institute www.steeltank.com

Fillrite Fuel Transfer Pumps <http://transfer.tuthill.com/Products/FuelTransferPumps/index.asp>

Morrison Brothers Company www.morbros.com

Veeder-Root www.veeder.com/page/submersible_pumps