Fuel Storage Tanks for Emergency and Standby Power Systems

Electrical power failures can range in time from seconds to weeks. These potential failures necessitate the need for a reliable, alternate supply of electric power at facilities and systems where the potential loss of life, information or significant financial loss may result.

These facilities include hospitals, data centers, regional emergency coordination centers, strategic military facilities and other life safety and mission critical facilities. Typically, emergency back-up power is provided using a Genset (a stand-alone diesel generator), a combination of diesel engine and electric generator or some other machine to generate electricity.

Although other fuels such as gasoline, natural gas and liquid petroleum (propane) gas are available, diesel-fueled systems are by far the most prevalent systems used to generate electrical energy for emergency and standby applications. Diesel Gensets are available from 100 kW to 10,000 kW. They are rugged, dependable and suitable for continuous duty.

A typical emergency or standby power system may include these components: engine - generator set, transfer switch, battery system, engine/generator control, fuel supply system and air handling system.

Hospitals, data centers, strategic military installations and air traffic control and emergency response facilities all need emergency and/or standby power systems to provide sustained services.
Fueling systems for emergency or standby power system are regulated by federal, state, local, county, township and/or city authorities. Nationally recognized compliance codes and standards are:

**Fire Codes**
- NFPA 30 - Flammable and Combustible Liquids Code
- IFC 34 - International Fire Code - Chapter 34 Flammable & Combustible Liquids

**Emergency and Standby Power**
- NFPA 31 - Code for the Installation of Oil-Burning Equipment
- NFPA 110 - Standard for Emergency and Standby Power Systems - Fuel Quality
- NFPA 37 - Stationary Combustion Engines and Gas Turbines
- IFC 6 - Building Services & Systems

**Environmental/Spill Prevention**

A typical Genset fueling system includes:
- Bulk Fuel Storage Tanks (AST or UST)
- Integrated Day Tanks
- Duplex Pump Sets, Controls & Alarms
- Tank Filling/Monitoring Systems
- Control Panel
- Filtration Sets/Controls

The capacity of a bulk storage tank is contingent upon factors such as the nature of business operations, consumption rate, running hours required and the availability of fuel. The amount of product that will be stored is dependent on the expected length of a power outage, the duration of fuel delivery disruption and the intervals between fuel deliveries after a power outage (reliable fuel delivery or availability might be interrupted after a natural disaster).

Based on the required or desired run time and estimated load, the main tank capacity can be calculated and specified. Accurate tank capacity calculations are important as excessive tank capacity can be just as problematic as insufficient tank capacity.

Diesel fuel can degrade if it is stored too long and should be turned over or replaced on an annual basis. The degradation process is accelerated by the following factors:
- Water
- Temperature extremes
- Oxygen
- Microbes

Water has the most adverse effect on the quality of diesel fuel. As water accumulates at the bottom of the storage tank, microbial growth (bacteria, fungus, algae, etc.) begins to occur at the fuel/water interface. If taken up the suction pipe, this contamination will clog fuel filters and injectors, resulting in a total shut-down of the generator.

In order to ensure high-quality fuel and the proper operation of the fuel storage systems, you must monitor for water in the systems and remove water whenever it is detected. This must be a routine part of your operations and maintenance procedures.

There are two basic ways to store the diesel fuel required by diesel combustion engine generators. The large tank can be mounted remotely from the generator and installed either underground (UST) or aboveground (AST). In either case, the tanks must be secondarily contained and meet appropriate NFPA and EPA requirements.
**Underground Storage Tanks (USTs)**

USTs regulated under 40 CFR 280 and other state and federal standards must meet minimum requirements, including double-wall construction, corrosion-resistance, spill containment, overfill prevention and leak detection. Tanks used to store fuel underground must also be listed compatible with the product stored.

Highland Tank HighGuard fuel storage tanks are commonly used for the belowground installations. With sizes up to 50,000 gallons, these large-volume, double-wall tanks combine the structural strength of steel tank construction and the lasting protection of a polyurethane coating to produce a high-quality storage tank second to none.

HighGuard’s heavy-duty protective coating is a two-component polyurethane coating system that provides permanent and effective corrosion protection for the life of the tank. HighGuard’s 75-mil coating is UL-1746 compliant and extremely resistant to surface damage due to impact or abrasion that may occur during transportation and installation.

**Aboveground Storage Tanks (ASTs)**

ASTs can be supplied in sizes up to 75,000 gallons. They are available as single-wall, secondarily contained, double-wall or protected tanks.

Single-wall ASTs should be installed with some form of secondary containment. Additional containment requirements and capacity restrictions may be imposed by fire codes, state regulations or federal regulations (SPCC Plans). As a result, free oil in storm water should be directed to a properly sized oil/water separator for treatment prior to discharge.

For the majority of aboveground installations, Highland Tank’s UL 2085 Fireguard® storage tanks are used to provide fuel oil for emergency and standby power systems, such as the systems at mission critical facilities.
Mission critical facilities are designed for reliability and availability. They need to withstand utility outages, weather events and even sabotage. Although mission critical facilities are secure in design, every precaution must be taken, and the facility’s equipment must meet these stringent security standards.

Fireguard® tanks are tough, thermally protected, double-wall steel storage tanks. They are used where a fire-protected tank is needed because of setback limitations or regulatory requirements. Fireguards® pass Two-Hour Pool Fire, Hose Stream, Ballistics/Projectile and Vehicle Impact tests, earning them the Underwriters Laboratories, Inc. UL-2085 label. These tanks are lightweight and come with a 30-year warranty.

Each tank is constructed with a minimum three-inch interstice around the inner tank which is completely filled with a lightweight, monolithic material. This high efficiency insulation protects the inner tank in the event of a fire or extreme heat. It is porous to allow fluid migration through the interstice to the monitoring point.

The Day Tank
The bulk storage tank(s) typically require a smaller receiving tank called the day tank. Usually a day tank is specified to hold at least the amount of fuel that would be consumed in two hours of operation for the rated load.

A day tank mounted on or near the engine provides a small supply of fuel at a relatively constant level, regardless of the level of the bulk storage tank.

When the bulk storage tank is positioned at an elevation or height sufficiently above the day tank to cause adequate gravity flow, a float operated valve or float switch and fuel shutoff solenoid can be used to fill the day tank. Otherwise a fuel transfer pump is required if gravity flow cannot occur between the tanks.