

Information Sheet # 23
Above-Ground Sub-Base Fuel Tanks for Generator Sets

*Your Reliable Guide for
Generator Maintenance*

1.0 Introduction

Frequently a generator set system is supplied with a fuel tank built into the package. The arrangement most often supplied from the manufacturer is with the generator set mounted above the fuel tank. (See illustration below)

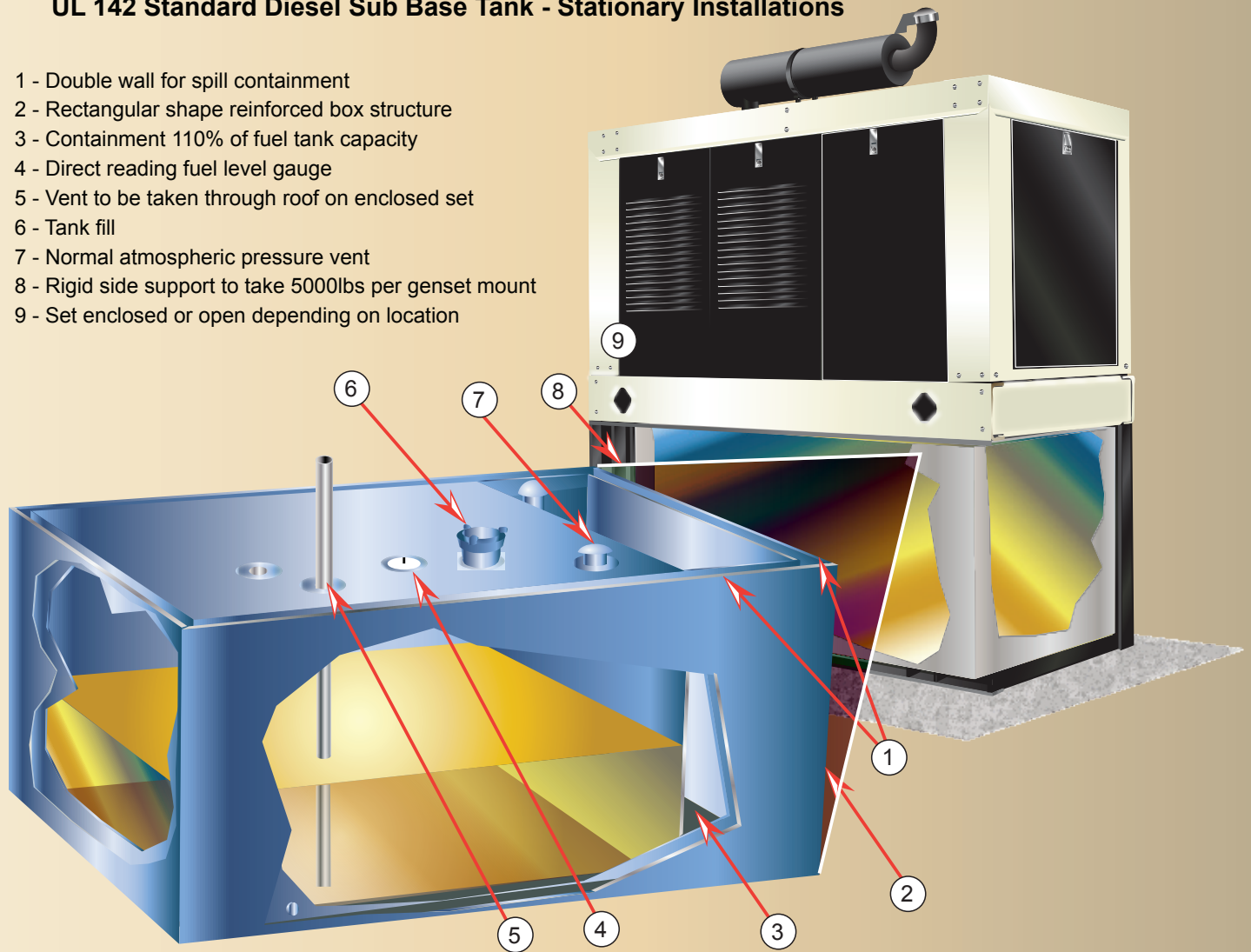
This Information Sheet discusses the variety of codes and regulations pertaining to sub-base fuel tanks for standby generators. Fuel tanks come in all shapes and sizes, but often need to comply with certain standards.

2.0 NFPA Codes Applying to Fuel Tanks:

The National Fire Protection Agency (NFPA) is the principal body referenced when applying codes for generator set systems. The following clauses taken from NFPA 37 6.3.2 applies to fuel tanks for inside structures. *(Continued over)*

UL 142 Standard Diesel Sub Base Tank - Stationary Installations

- 1 - Double wall for spill containment
- 2 - Rectangular shape reinforced box structure
- 3 - Containment 110% of fuel tank capacity
- 4 - Direct reading fuel level gauge
- 5 - Vent to be taken through roof on enclosed set
- 6 - Tank fill
- 7 - Normal atmospheric pressure vent
- 8 - Rigid side support to take 5000lbs per genset mount
- 9 - Set enclosed or open depending on location



To fulfill our commitment to be the leading supplier in the power generation industry, the Loftin Equipment and Bay City Electric Works teams ensure they are always up-to-date with the current power industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power industry.

6.3.2.1 Fuel tanks inside structures shall be securely mounted on non-combustible supports.

6.3.2.2 Fuel tanks not in a room by themselves shall not exceed 660 gallons. Fuel tanks larger than 660 gallons capacity shall be enclosed in a room in accordance with 6.3.5 or 6.3.6. Not more than one such 660 gallon capacity tank, or two or more of these tanks with an aggregate capacity of 660 gallons, shall be connected to one engine.

Exception. Fuel tanks of any size shall be **permitted** within engine rooms or mechanical spaces, provided the engine or mechanical room is designed using recognized engineering practices with suitable fire detection, fire suppression, and containment means to prevent the spread of fire beyond the room of origin.

6.3.2.3 The aggregate capacity of all fuel tanks in a structure shall not exceed 1,320 gallons, unless that portion exceeding 1,320 gallons is enclosed in a room in accordance with 6.3.5 or 6.3.6.

Exception. Fuel tanks of any size shall be **permitted** within engine rooms or mechanical spaces provided the engine or mechanical room is designed using recognized engineering practices with suitable fire detection, fire suppression, and containment means to prevent the spread of fire beyond the room of origin.

6.3.5 Rooms housing only fuel tanks with an aggregate capacity of 1,320 gallons or less.

6.3.5.1 Rooms containing only fuel tanks with an aggregate capacity of 1,320 gallons or less shall be constructed of walls, floor, and ceiling having a fire resistance of not less than one hour with the walls bonded to the floor.

6.3.6 Rooms housing only fuel tanks with an aggregate capacity of more than 1,320 gallons.

6.3.6.1 Rooms housing only fuel tanks shall be constructed of walls, floor, and ceiling having a fire resistance of not less than three hours with the walls bonded to the floor.

3.0 UL 142 standard for Diesel Fuel Sub Base Tank (stationary installations):

This calls for the construction be in accordance with NFPA 30 –Flammable and Combustible Liquids; NFPA 37 – Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines; NFPA – the Standard for Emergency and Standby Power Systems.

Details to be noted are:

- This must be rectangular in shape and include a reinforced steel box channel, with load rating of 5,000 lbs. per genset mounting hole location. Full height gussets shall be provided at genset mounting holes.
- The tank must be pressure washed with an iron phosphate solution and the interior coated with a solvent-based film rust preventative, providing inter-operational protection.
- The primary and secondary containment basin shall be pressurized at 3 to 5 psi to ensure leak integrity of the weld seams.
- Closed top dike primary tank sections to be pressure tested at 3 to 5 psi and leak checked to ensure integrity of weld seams. Containment basin to be leak checked by means of weld penetrant and ultraviolet light.
- **Sub Base Tank Fittings to include:** appropriately sized NPT fuel supply, fuel return fitting, 2-inch NPT for normal vent, NPT for emergency vent sized as appropriate, 2-inch NPT for manual fill, NPT for level gauge sized as appropriate, 3/8 inch NPT basin drain (tank drain if single wall), 2-inch NPT for level alarm and NPT fitting for leak detection alarm.
- **Fuel Level Gauge:** Sub-base tank shall include a direct-reading fuel level gauge.
- **Fuel Containment Basin:** Welded steel containment basin sized a minimum of 110% of the tank capacity to prevent escape of fuel in the event of a tank rupture.
- **Leak Detection System:** A fuel containment basin leak detector switch will be provided.
- **Sub Base Tank Venting:**
 1. Normal venting shall be sized at 2-inch NPT through 10,000 gallons in accordance with American Petroleum Institute Standard No. 2000, for venting atmospheric and low pressure storage tanks. Tank shall be provided with atmospheric (normal) vent cap and screen.
 2. Emergency venting. Emergency vent to be sized to accommodate total capacity of both normal and emergency vents and is not less than derived from NFPA 30, table 2-8, based on wetted surface area of tank. A zinc-plated emergency pressure relief vent cap shall be furnished. This vent to be spring-pressure operated. Opening pressure shall be 0.5 psi; full opening pressure shall be 2.5 psi. A secondary emergency vent shall be provided for the secondary containment portion of the tank, if applicable.

4.0 Summary of Applicable Standards and What is Covered:

To summarize, this standard covers the ability of the tank to withstand: fire (section 17); vehicle impact resistance (section 20) and projectile resistance (section 21).

- **Withstand fire:** With a two-hour liquid pool and furnace fire tests, the primary internal tanks sees an average rise of no more than 260 degrees F.
- **Resist vehicle impact:** Maintain fuel containment after an impact of 12,000 lbs. force at 10 mph.
- **Resist projectiles:** One manufacturer quotes a test with a 150-grain, 30-caliber bullet having a muzzle velocity of 2,700 feet per second, from a distance of 100 feet.

In addition to the above, some states, cities and fire departments have their own standards and regulations that cover aspects of fuel storage tanks. We suggest that you always investigate with the relevant authorities.



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