# PHOENIX FIRE CODE SUMMARY

## Generator Sub-Base Aboveground Storage Tanks

**REFERENCE FIRE CODE SECTION** 2006 edition of the Phoenix Fire Code as adopted and amended by the City of Phoenix, Chapter 27, 34 and 2003 NFPA 30, LP-Gas Code,

**SCOPE OF THIS FIRE CODE SUMMARY** An explanation of the hazards of combustible liquid storage and the City of Phoenix requirements for constructing, installing and operating a generator sub-base tank installed at grade outside of a building. THIS SUMMARY DOES NOT ADDRESS THE INSTALLATION OF TANKS ON THE ROOF OF BUILDINGS.

## HAZARDS OF FUEL STORAGE

The primary hazards of any aboveground fuel storage are ensuring that the system is liquid tight and that the storage tank is properly constructed. The violations most commonly identified are aboveground fuel storage tanks (ASTs) that are not equipped with the proper emergency venting or the AST is not listed. An AST without an emergency vent represents a serious risk to firefighters because if the tank is subjected to the energy of a pool or exposure fire, a pressure explosion could result.

## COMMONLY USED HAZARDOUS MATERIALS AND THEIR CLASSIFICATION

Diesel fuel is the fuel used to power the engine. Diesel fuel is assigned Chemical Abstract Service (CAS) Number 62435-54-2 and is classified as a Class II Combustible Liquid. Diesel fuel has the following NFPA 704 hazard ratings: Health: 2, Flammability: 2, Reactivity: 0, Special Hazards: Blank.

## SUMMARY OF FIRE CODE REQUIREMENTS

1. **Phoenix Fire Code Requirements.** Chapter 34 of the Phoenix Fire Code and NFPA 30 has requirements for the storage and handling of Class II Combustible Liquids. The following summarizes the requirements for the construction and installation of the fuel tank and piping system.

   1.1. **Fuel Storage Tank - Construction**

      1.1.1. The tank shall be bear a permanent nameplate or marking indicating the standard used as a basis for design. At a minimum, atmospheric storage tanks including those incorporating secondary containment, shall be labeled as being constructed using Underwriters Laboratories 142, Standard for the Construction for Steel Flammable & Combustible Liquid Storage Tanks (PFC 3404.2.7).

      1.1.2. Tanks constructed with integral secondary containment shall be listed as meeting UL 142 (NFPA 30 4.2.3.1.1 (1)).

      1.1.3. The tank nameplate shall state the required flow rate for the emergency vent. If a tank is constructed with integral secondary containment, the nameplate shall indicate the required flow rate for the primary and secondary containment tank. (UL 142, Section 48.1).

**1.2. Fuel Storage Tank – Secondary Containment**

1.2.1. Secondary containment is required when a stationary AST is installed outside of a building (PFC 2704.2.2.4).

1.2.2. The permit applicant shall submit plans for the secondary containment system to PFD that demonstrate the design meets PFC 2701.5.

1.2.3. Tanks labeled as either "Single Wall" or "Generator Sub-Base Tank" are single-wall tanks and require secondary containment. Provide secondary containment for the generator sub-base tank (PFC 2704.2.2.4).

*(NOTE: Tanks labeled as Open-Top Diked Tanks, Closed Top Diked Tanks or Secondary Containment Tanks shall comply with NFPA 30 4.3.2.3.3).*

**1.3. Fuel Storage Tank – Normal Vent**

1.3.1. The tank normal vent shall be terminated outside of the building. The vent shall be terminated at least 12 feet above grade, 5 feet from property lines and 5 feet from building openings. (PFC 3404.2.7.3.3).

1.3.2. Normal vents shall be installed so they will drain toward the tank without traps in which liquids can collect. The normal vent shall not be subject to physical damage or vibration (PFC 3404.2.7.3.4).

1.3.3. The minimum required diameter of a normal vent is 1 ¼ -inch (NFPA 30 4.2.5.1.2).

**1.4. Fuel Storage Tank – Emergency Vent**

1.4.1. An emergency vent shall be provided for the primary tank and when provided, the secondary containment tank. (PFC 3404.2.7.4).

1.4.2. The flow rate of the emergency vent shall equal or exceed the flow rate calculated in NFPA 30 Table 4.2.5.2.3.

1.4.3. Emergency vents shall not be modified, obstructed or otherwise altered which would reduce its flow. (PFC 3404.2.7.4)

**1.5. Fuel Storage Tank – Tank Openings Other Than Vents**

1.5.1. For top-loaded tanks, a metallic fill pipe fill pipe shall be installed to minimize the generation of static electricity by terminating the pipe within 6-inches of the bottom of the tank, and shall be installed in such a manner that avoids excessive vibration (PFC 3404.2.7.5.5).

1.5.2. Tanks installed outside of buildings that have a volume of more than 1320 gallons shall be equipped with an approved means of overfill protection. (PFC 3404.2.7.5.8 and 3404.2.9.6.6).

1.5.3. All tanks installed inside buildings shall be equipped with an approved means of overfill protection. (PFC 3404.2.7.5.8 and 3404.2.9.6.6).

1.5.4. All tanks inside buildings shall have a remote fill that is located outside the building at a location free from sources of ignition, and not less than 5 feet from building openings and property lines. (PFC 3404.2.7.5.2)

**1.6. Fuel Storage Tank – Location**

1.6.1. The location of generator sub-base fuel storage tanks located outside buildings that are listed as meeting UL 142 shall meet the distance requirements in NFPA 30 4.3.2.1.1 & Table 4.3.2.1 (b).and PFC 3404.2.9.5.1.

| **Tank Volume (Gallons)** | **Minimum Distance from Property Line of Property Which Is or Can Be Built Upon, Including the Opposite Side of a Public Way (Feet)** | **Minimum Distance From Nearest Side of Any Public Way or From the Nearest Important Building On the Same Property (Feet)** |
|---|---|---|
| 275 gallons or less | 5 | 5 |
| 276 to 750 | 10 | 5 |
| 751 to 12,000 | 15 | 5 |

1.6.2. If these separation distances cannot be satisfied, the Phoenix Fire Department permits the use of Protected ASTs that are listed as meeting UL 2085, Protected Aboveground Storage Tanks for Flammable and Combustible Liquids. ASTs that are listed as meeting UL 2085 and installed in accordance with PFC 3404.2.9.6 can have separation distances reduced by 50 percent but not less than 5-feet (PFC 3404.2.9.5.1.1).

**1.7. Fuel Storage Tank – Support Columns**

1.7.1. Tank supports, foundations, and anchors shall be designed and installed in accordance with Phoenix Building Code, NFPA 30 and PFC 3404.2.9.2.

1.7.2. If the fuel tank is located outside the building and is elevated more than 12 inches above grade, the supports or pilings shall have a fire-resistance rating of not less than 2 hours. When fire resistive assemblies are used, they shall meet ASTM E-1529, Standard Test Method for Determining Effects of Large Hydrocarbon Pool Fire on Structural Members and Assemblies (PFC 3404.2.9.1.3).

1.7.3. The design of the supporting structure for tanks such as spheres is outside the scope of the PFC and NFPA 30 and requires special engineering considerations. Consult the design requirements in Appendix N of API 620 *Recommended Rules for the Design and Construction of Large, Welded, Low Pressure Storage Tanks* (NFPA 30 Appendix 4.2.4.1).

**1.8. Other PFC Requirements**

1.8.1. The tank cannot be filled or placed in service until it is inspected and approved by the Phoenix Fire Department **AND** the owner has obtained a Flammable/Combustible Liquids Storage, Handling and Use permit.

1.8.2. Provide Phoenix Fire Department approved signs that indicate the contents of generator sub-base fuel storage tank (PFC 3403.5).

1.8.3. Provide impact protection if the above ground storage tank is located in an area subject to vehicle traffic (PFC 3403.6.4 and 312).

## REQUIRED FIRE CODE PERMITS

The following permits are required for fuel storage tanks that supply diesel generators:

- A PFD construction permit is required when installing an any size aboveground storage tank inside a building or aboveground storage tanks installed outside a building with a nominal capacity of 125 gallons or more (PFC 105.7.11). Before this permit can be issued, a minimum of two sets of plans shall be submitted to the Fire Department for review and approval. The plans shall include but not be limited to a detailed site plan, tank shop drawings, piping drawings and details on the generator itself and shall be submitted to 200 W Washington, 10th Floor in the Fire Plans Review Office. The plan review fee is $540.00 for each tank and the inspection fee for each tank is $270.00 (PFC Chapter 46).
- The building owner or tenant is required to obtain a Flammable/Combustible Liquids Storage, Handling and Use permit. The permit application and Hazardous Materials Inventory Statement is available at Fire Department Headquarters, Fire Prevention Division located at 150 S. 12th Street. The permit application and fee schedule is available on-line at www.phoenix.gov/fire/shu.html and click on “Hazardous Materials Application.”
- The following is the annual assessment fee for Flammable/Combustible Liquids Aboveground Storage Tanks:

| Number of Tanks | Annual Assessment Fee |
|---|---|
| 1 | $550.00 |
| 2 or more | $550.00 + $125.00 for each additional tank |

## OTHER REQUIRED CITY OF PHOENIX PERMITS

A generator set that is connected to a building’s electrical system requires a plan review and construction permit issued by the Development Services Department.

The fee for the construction permit is calculated using the value of the project, building, or area. To obtain an accurate fee calculation, contact the Development Services Department Business Customer Service Center at 602-534-2000.

## HOW CAN I OBTAIN MORE INFORMATION?

If this fire code summary does not answer your questions, please feel free to contact one of the Phoenix Fire Department’s fire protection engineers or fire plan examiners at 602-256-3434. E-mail inquires can be sent to phoenix.fire.prevention@phoenix.gov

Requests for information about Building, Plumbing, Mechanical and Electrical Code requirements should be directed to the Development Services Department at 602-534-2000.

Telephony or e-mail messages regarding particular code requirements to the Phoenix Fire Department are not official interpretations. An official interpretation requires a plan review or written correspondence that requests an official interpretation, the referenced code section(s) **AND** includes sufficient information to interpret if the applicable code section(s) applies.

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Revision 1: April 15, 2004 based on new assessment fees.

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