



Generator Tank Installation Reference Sheet

CITY OF
PORTLAND, OREGON
 BUREAU OF FIRE & RESCUE
 1300 SE Gideon St
 Portland, Oregon 97202



Notes: This document has been provided to you for informational purposes. Please review all applicable aspects of this document prior to requesting inspection. This document is not all-inclusive of all requirements for fuel installations, and it is the responsibility of the designer to research the applicable codes. Code references shall be from: The Portland Fire Code (PFD) 2016 ed., the Oregon Fire Code (OFC) 2014 ed. or NFPA 30 2011ed, unless otherwise noted. You may also be required to complete a **FIRE SAFETY PLAN REVIEW CHECK SHEET** for plan review corrections. **More than one check sheet (revision) will be \$50 per hour. On site corrections will be \$150.**

Tank Permits & Documentation		Code(s)	Y	N	N/A
1	Permits / Information: visit http://www.portlandoregon.gov/fire/58368 Permit #300.15-application to remove or install tanks, cylinders and equipment. Portland Title 31.	Portland Title 31 31.30.040 (E) # 2 & # 3			
2	Two sets of Plans: Plans should include distances from property lines, buildings, walls, other tank/gas lines and include vehicle impact protection (see PFC/OFC Chapter 312 for vehicle impact protection). Will need to include piping lines for fueling and venting with calculations for normal over 12' and an emergency 12''.	Portland Title 31.30.040 (F) 1 (a) OFC 105.4.2.			
3	Construction of Tank: Shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design. Provide serial number of tank. Per PFC/OFC 5704.2.7.	PFC/OFC 5704.2.7.			
4	Applicable Codes: Put on application form and plan submittals all applicable codes and standards used for the system design.				
5	Cut Sheets: Include all cut sheets for tank, spill container, fuel shut off and anti-siphon device with submittal documents. <i>Also see Cut Sheets under Tank Design.</i>				
6	Drain Locations: Plans must show drain locations in the filling area. State if oil separator in drains or not.				
7	Label or Placard on Tanks: Required for tanks over 100 gallons, include on tank as well as door to tank room; show on plans. PFC/OFC 5704.2.3.2.	PFC/OFC 5704.2.3.2			
8	Calibration Chart: Chart for filling of tank (5704.2.9.7.6.1). Will need to be in the fill area so the driver can see it. <i>Also see Filling Rates later in this document.</i>	PFC/OFC 5704.2.9.7.6.1			
9	Provide documentation of 2hr fuel supply: For life safety systems see PFC/OFC section 604.2.14.1.1 requires 2 hours at full demand. Fire pumps will require 8 hours of fuel supply for electric generator running a fire pump. Diesel motor running fire pump is 1 gal per hour for each HP. plus 10%-2010 NFPA 20 11.4.2. NFPA requires 133% of class or low-fuel sensor – see NFPA 110 Section 5.5.3.	PFC/OFC 604.2.14.1.1 NFPA 110(2013) section 5.5.3 & NFPA 20 section 11.4.2.			
10	For generator Prime Mover: Will need E-stop located outside the room housing the prime mover. This is for Emergency Power Supply Systems (EPSS) levels 1 and 2. Electrical permit required through BDS. Show on plans. NFPA 110 5.6.5.6.	NFPA 110 (2013) 5.6.5.6			
11	Valuations: Please provide a breakdown of valuations. BDS has defined fair market value in their fee schedule to read as follows: The Fair Market Value to be used in computing the permit fee for alterations and repair shall be the total value of all construction work for which the permit is issued as well as all finish work, painting, roofing, electrical, plumbing, heating, air conditioning, elevators, fire extinguishing systems and other permanent work or equipment, and contractors' profit. The Oregon Structural Specialty Code, Section 109.3, also notes that permit valuations shall include total value of work, including materials and labor.				

12	Existing Noncompliant Installations: Must be maintained in accordance with the code requirements that were applicable at the time of installation. If installed in violation of code, it shall be made code compliant to the code applicable to the time of installation or it shall be removed regardless if such tank has been previously inspected. 5704.2.9.1	PFC/OFC 5704.2.9.1			
13	Unpermitted Installations: Tanks found to have been installed without permits must go through the permitting process, providing the same documentation and submittals as a new installation, or it shall be removed regardless if such tank has been previously inspected.	PFC/OFC 105.7.8			
Tank Location		Code(s)	Y	N	N/A
14	Clearance: Tanks inside of buildings require 36" clearance on all sides of tank. <u>NFPA 110 – 7.9.12.1 applies to EPS for Life Safety Systems.</u> Generators for back-up power / optional systems, see NFPA 37 6.3.5.1.2 & 6.3.6.1.2 - states there must be minimum of 15" of clearance around tank. Since NFPA 37 is not adopted in the PFC/OFC an appeal is required with reasoning. For Fire Code Appeals go to: www.portlandoregon.gov/fire/article/76862	NFPA 110 (2013) section 7.9.12.1 NFPA 37 6.3.5.1.2 & 6.3.6.1.2			
15	Setbacks: For exterior tank installations, not less than 5 feet – this includes a 2085 tank. NFPA 30 table 22.4.1.1 (size and protection) note "a".	NFPA 30 table 22.4.1.1			
16	Rated Room: Go to the Bureau of Development Services (BDS) to review for use and occupancy of space for EPS (generator & tank). Per NFPA 110 7.2.1.1, EPS room must be a two (2) hour rated room. Must show documentation.	NFPA 110 7.2.1.1			
Tank Design		Code(s)	Y	N	N/A
17	Cut Sheets: Add cut sheets with listing (UL) for all tanks and include serial number(s). Protected tank requirements, see 5704.2.9.7, for tanks in excess of 660 gallons as per section 603.3.2.1	PFC/OFC 5704.2.9.7 and 603.3.2.1			
18	Vents: <u>Normal Vents for Class I, II or IIIA</u> – Vapors are to be released at a safe point outside, and: <ul style="list-style-type: none"> • 12 feet off the ground • 5 feet from building openings and lot lines • 15 feet from powered intakes • Vapors shall not be trapped by eaves or other obstructions • Vapors shall be discharged upwards or horizontally away from adjacent walls • Vents with over 12 feet of vent pipe between the tank and the open air (ie., to the roof) require an engineering calculation • Vent Sizing Formulas, see NFPA 30 Appendix A.27.8.1.6 (emergency) • Smallest vent will be as large as the largest fill or withdrawal connection, but not less than 1.25 inches. • Flame arrestors required on all protected tanks, 5704.2.9.7.3 • Roof top areas where there is public/tenant access, such as a roof top patio, shall be considered ground level for vent pipe. Vent shall extend 12 feet. • Roof top areas where there is no public/tenant access, vent shall extend 3 feet (this may be in addition to the required 12 feet overall minimum) above the roof, per OSSC 501.2 • Vent lines shall not be used for other purposes other than venting 5704.2.7.3.1 <p>All items noted above must be shown on plans.</p>	PFC/OFC 5704.2.7.3 PFC/OFC 5704.2.7.3.3 NFPA 30 - 27.8.1.1, 2, & 3 NFPA 30 Appendix A.27.8.1.6 PFC/OFC 5704.2.9.7.3 OSSC 501.2			

19	<p>Vents: Emergency Vents for Class I, II & IIIA</p> <ul style="list-style-type: none"> Stationary, above-ground tanks shall be equipped with additional venting that will relieve excessive internal pressure caused by exposure to fires. Emergency vents for Class I, II and IIIA liquids shall not discharge inside buildings. The venting shall be installed and maintained in accordance with Section 22.7 of NFPA 30 and PFC/OFC 5704.2.7.4. Includes Secondary Tanks. Emergency vents shall be arranged to discharge in a manner which prevents localized overheating or flame impingement on any part of the tank in the event that vapors from such vents are ignited. The outlets of all vents and vent drains on tanks equipped with emergency relief venting that that permits pressures to exceed a gauge pressure of 2.5 psi shall be arranged to discharge so that localized overheating of or flame impingement on any part of the tank will not occur if vapors from the tank are ignited. Vents over 12 inches require an engineering calculation, see NFPA 30 – 22.7.4 and Appendix A.22.7.4. Show extension of vents & max pressure on plans. Vent lines shall not be used for other purposes other than venting 5704.2.7.3.1 <p>All items noted above must be shown on plans.</p>	NFPA 30 Section 22.7 PFC/OFC 5704.2.7.4 NFPA 30 Section 22.7.3.9 PFC/OFC 5704.2.7.3.1			
20	MAQ is 660 gallons aggregate of all tanks inside building except for protected tanks – PFC/OFC CH 603.3.2.1 (see exceptions for max capacity to 3,000 gallons). For number of control areas see PFC/OFC table 5003.8.3.2.	PFC/OFC 603.3.2.1 & 5003.8.3.2			
21	Bonding & Grounding: Piping systems shall be bonded and grounded. NFPA 30 section 27.9	NFPA 30 section 27.9			
22	Piping Labeled. Compatible building materials, required to withstand the pressure, structural and seismic stress as well as top other exposure. Readily accessible. NFPA 30 section 27.10 and 5003.2.2.1. Need to be identified with accordance to – ASME A13.1.	PFC/OFC 5003.2.2.1 & NFPA 30 27.10			
23	Secondary Piping for inside with monitoring. Possible penetrations see NFPA 30 section 27.6.3 <i>This is best practice only.</i>	NFPA 30 27.6.3 NFPA 110 5.5.3			
24	Seismic (OFC 5003.2.8) NFPA 30 sections 22.5.1.3. See building code/fire pumps looks at table 1604.5. Show documentation building permit.	PFC/OFC 5003.2.8			
Tank Fueling		Code(s)	Y	N	N/A
25	Overfill Prevention: Alarm shall sound when reaching 90% capacity and delivery shall automatically stop (shut off) when reaching 95%, per NFPA 30 – 22.11.4.5. Fuel port needs to be wired into the emergency generator so that it will work in a power outage.	NFPA 30 22.11.4.5			
26	Fueling: Fueling of engines needs to be done by pump not gravity per NFPA 37 section 6.9. NFPA 37 is not adopted but is a reference for this.	NFPA 37 section 6.9			
27	Location of Remote Fill: Fill outside, 5ft from openings per PFC/OFC 5704.2.7.5.6. An appeal <i>may be possible</i> for remote fills placed just inside a concrete room (Type I or II construction). Go to portlandoregon.gov under the PF&R menu select the permit tab; select fire code appeal, then form 300.13 – cost is \$200 nonrefundable. Show fill line and bucket on plans.	PFC/OFC 5704.2.7.5.6			
28	Location of Connections that are Made or Broken: Filling and withdrawal connections which are made and broken shall be located outside of buildings and not less than 5 feet from building openings. Per PFC/OFC 5704.2.7.5.6.	PFC/OFC 5704.2.7.5.6			
29	Diesel Generator Fill Box: Diesel Generator Fill Box with electronics must be no closer than 36 inches from a natural gas regulator vent, as per NFPA 54 5.8.5.1	NFPA 54 5.8.5.1			
30	Filling Rates: Delivery trucks pump fuel at up to 65 GPM and have a working pressure of 80 to 100 PSI. Fill lines need to be designed to this standard, meeting the GPM and Pressure requirements.				

Protection		Code(s)	Y	N	N/A
31	<p>Overfill Protection: For tanks inside of buildings see 5704.2.7.5.8 & 5704.2.9.5. For tanks outside over 1320 gallons see 5704.2.9.6. High alarm at 90% and at 95% fuel shut down. Automatic control needs to be fail-safe see 5005.1.11 design. NFPA 30 - 22.11.4.5 for secondary containment tanks 90% alarm and 95% shut off.</p> <p>Note: Initial Tank Fill <u>Shall Be Witnessed</u> by a PF&R Hazardous Materials Inspector.</p>	PFC/OFC 5704.2.7.5.8 5704.2.9.5 NFPA 30 22.11.4.5			
32	<p>Vapor Protection: shall be vapor tight/ this will be for the enclosed space having ignition sources-5704.2.7.5.6. See 2012 commentary. NFPA #37 2010 6.6.2 closed pipe system (tank mounted). Dry break and/or cam lock will work to push the vapors up and out the normal vent, away from enclosed hot motor with ignition source.</p>	PFC/OFC 5704.2.7.5.6			
33	<p>Tank Vents for Normal Venting (other uses): Vent lines from tanks shall not be used for purposes other than venting unless approved See 5704.2.7.3.1.</p>	PFC/OFC 5704.2.7.3.1			
34	<p>Manifolding: Tank Vent Piping shall not be manifolded except for vapor recovery, vapor conservation or air pollution control as per PFC/OFC 5704.2.7.3.5 and NFPA 30 - 27.8.1.4.</p>	PFC/OFC 5704.2.7.3.5 NFPA 30 - 27.8.1.4			
35	<p>Locations Subject to Flooding: As per PFA/OFC 5704.2.7.8. Where a tank is located in an area where it is subject to buoyancy because of a rise in the water table, flooding or accumulation of water from the fire suppression operations, uplift protection shall be provided in accordance with sections 22.14 and 23.14 of NFPA 30.</p>	PFC/OFC 5704.2.7.8 NFPA 30 22.14 & 23.14			
36	<p>Piping Supports: Piping systems shall be substantially supported and protected against physical damage and excessive stresses. The supports shall be protected against exposure to fire by either draining liquid from piping system at a minimum 1% slope or providing fire-resistive rating of not less than 2 hrs or other approved method. PFC/OFC 5703.6.8</p>	PFC/OFC 5703.6.8			
37	<p>Fire Protection of Supports: For above ground tanks, per PFC/OFC section 5704.2.9.2.3, for above ground tanks storing class I, II or IIIA liquids elevated more than 12 inches above grade shall have fire resistance rating of not less than 2 hours. See exceptions for, 1.) 2085 tanks, 2.) stationary tanks located outside that have protection from approved water spray system, and 3.) stationary tanks inside protected by an approved sprinkler system per PFC/OFC – 903.3.1.1.</p>	PFC/OFC section 5704.2.9.2.3			
38	<p>Anti-Siphon Device: Required for protected above-ground tanks per PFC/OFC 5704.2.9.7.10 and section 2306.6.2.4 (fueling from). <i>Also see NFPA 30A 4.3.6.4.</i></p> <p>NFPA 30 22.11.4.2 and .3: Means shall be provided to prevent the release of liquid from the tank by siphon flow. This includes piping. <i>Also note 12 inches from fill, for piping. As per NFPA representative the tanks need excess flow, double wall, curbing or similar.</i></p>	PFC/OFC 5704.2.9.7.10 and 2306.6.2.4 NFPA 30 22.11.4.2 and .3 NFPA 30A 4.3.6.4.			
39	<p>Extinguishers: For inside installations per PFC/OFC 906 - A minimum of 1 portable fire extinguisher having a rating of not less than 20-B shall be located outside of but not more than ten feet from the door. <i>(an example would be a 3A-20B:C extinguisher)</i></p>	PFC/OFC 906			
40	<p>Secondary Containment – Protected Tanks: As per PFC/OFC 5704.2.9.7.4 Protected tanks shall be provided with secondary containment, drainage control, or diking in accordance with 5004.2. A means shall be provided to establish the integrity of the secondary containment in accordance with NFPA 30.</p>	PFC/OFC 5704.2.9.7.4			
41	<p>Impact Protection: As per PFC/OFC sections 5003.9.3 (General), 5703.6.4 (Piping) and 5704.2.9.7.5 (Protected tanks) Guard posts or other approved means shall be provided to protect tanks subject to vehicular damage in accordance with PFC/OFC section 312</p>	PFC/OFC 5003.9.3, 5703.6.4 and 5704.2.9.7.5 go to PFC/OFC sec 312			
42	<p>Spill Containers; Per PFC/IFC 5704.2.9.7.8 For protected tanks, spill containers of not <u>less than 5 gallons</u> shall be provided for each fill connection. <i>Also see 5004.2 Spill control & Secondary Containment, specifically 5004.2.1 for requirements. Also see 5005.2.1.3., this is over the MAQ of 5 gallons noted. Some tanks have 7 to 10 gallon spill containers built into top.</i></p>	PFC/IFC 5704.2.9.7.8			
43	<p>Drain Cover: Provide a cover mat for drain in close proximity to drain.</p>				

44	Seismic Protection: As per PFC/OFC 5003.2.8, Seismic protection for piping and connections shall be provided in accordance with the Oregon Structural Specialty Code.	PFC/OFC 5003.2.8			
45	Sprinkler System Design Requirements: <u>Installation and Use of Stationary Combustion Engines and Gas Turbines.</u> Per NFPA 13 (2013) 21.6.1 * Design Requirements. Automatic sprinkler systems shall be designed to provide for a density of 0.3 gpm/ft ² (12.2L/min/m ²) over the most remote 2500 ft ² (230 m ²). [NFPA 37:11.4.5.1]	NFPA 13 (2013) 21.6.1			
General		Code(s)	Y	N	N/A
46	Standby Power Systems: High rise >75ft. Standby power system shall be located in separate room enclosed with 2hr. fire barriers constructed in accordance with Section 707 of the Oregon Structural Specialty Code & PFC/OFC 604.2.14.1	OSSC Sec 707 PFC/OFC 604.2.14.1			
47	Tank Testing; Oregon Fire Code (prior to being placed in-service) sends you to NFPA #30-21.5 (Testing), this is broken down into two sections. 1—Initial testing, the label on the tank is for compliance to initial testing and 2—Tightness testing is for after installation and an addition to the initial testing after installation, all tanks and connections shall be tested before being placed in service. There is an exception; Go to NFPA #1—66.21.5.2.1 – factory applied vacuum for conditions met; AST – vacuum maintained until set in plan location. UST – vacuum maintained till, back fill top of tank. Will need documentation that states the test of the inner primary tank and the outer secondary tank	PFC/OFC 5704.2.12.1 NFPA 30 – 21.5 NFPA 1 – 66.21.5.2.1			
48	Sprinkler & Alarms: Prior to requesting tank final, ensure that sprinkler and alarm finals have been completed or provide proof that sprinkler system is working and alarms are centrally monitored.				
49	Distances from Combustion Motor Exhaust to Tank Vents: 3 Feet. Diesel, See PFC/OFC table 5703.1.1. Flammable gasses. NFPA 20/ fire pumps 11.5.3.5 and NFPA 37 install of combustion motors 8.3.2 gives an exception for spark arresting mufflers, are permitted to terminate in the class two areas. Look at the distance of class wiring, see table 5703.1.1 vents. 0 to 3 feet no combustion motor exhaust, 3 to 5 feet needs a spark arrester on the motor exhaust pipe, and no spark arresting will need to be out past five feet. <u>Tank permit does not cover exhaust installations, will need separate Mechanical permit.</u>	PFC/OFC table 5703.1.1 NFPA 20 11.5.3.5 NFPA 37 8.3.2			
50	Fire Code takes precedence PFC/OFC 102.7.1. Also See Portland GPR Memo Hazmat #01	PFC/OFC 102.7.1			

Definitions

EPSS- Emergency Power Supply System- A complete functioning EPS system coupled to a system of conductors, disconnecting means and over-current protective devices, transfer switches, and all control, supervisory, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a safe and reliable source of electric power.

Level 1- Includes the following: emergency lighting, exit signs, fire alarm, sprinkler alarm, and detection systems, fire pumps where backup power is required, controls for smoke control equipment required by the Building Code, elevator car lighting. Includes all loads classified as Emergency Systems by the NEC.

Level 2 - Includes elevators requiring emergency power, and could include heating and refrigeration systems, communications systems, ventilation and smoke removal systems (except controls), sewerage disposal, lighting, and industrial processes that, when stopped due to any interruption of the primary electrical supply, could create hazards or hamper rescue or fire-fighting operations. Includes all loads classified as Legally Required Standby by the NEC.

Per PFC/OFC 604.1.1; The Stationary Emergency and Standby Generator Systems are required to be listed in accordance with UL 2200.

Storage Tanks shall meet the requirements of NFPA 30 (2012 ed.) section 21.4.2; Design Standards for Storage Tanks.

For more information, please contact the Portland Fire Marshal's Office at: 503-823-3770 and ask to speak to the Hazardous Materials Plan Reviewer.