A Code Review for Emergency Generators and Indoor Use of Portable Generators

By: the Fire and Life-Safety Group (FLS)

Fire Code requires that emergency generators be stationary generators. Therefore, a portable generator would not be allowed to be used as an emergency generator. The following code review lists the requirements for indoor use of both portable and stationary generators. Both require a minimum of 1 hour fire rated construction and an exhaust system. Specific requirements and their code sections are listed below.

I. INTRODUCTION

This document was prepared to list the requirements for the installation of a portable fuel generator for the purpose of emergency power. These requirements are based on the 2009 edition of the *International Fire Code* (IFC), the 2009 edition of the *International Building Code* (IBC), the 2009 edition of the *International Mechanical Code* (IMC), the 2006 edition of the Use of Stationary Combustion Engines and Gas Turbines Code (NFPA-37), and the 2005 edition of the Emergency and Standby Power Code (NFPA-110).

II. INDOOR USE OF PORTABLE GENERATORS

A. Location Requirements

1. Section 313.1 of the IFC states fueled equipment, including but not limited to motorcycles, mopeds, lawn-care equipment and portable cooking equipment, should not be stored, operated or repaired within a building.

Exceptions:

i. Buildings or rooms constructed for such use in accordance with the IBC.
ii. Storage of equipment utilized for maintenance purposes is allowed in approved locations when the aggregate fuel capacity of the stored equipment does not exceed 10 gallons and the building is equipped throughout with an automatic sprinkler system. (Please note that "approved locations" need to comply with the IBC and be approved in writing by Fire and Life-Safety (FLS) and Environmental Health and Safety (EHS)).

2. Section 414.2.4 of the IBC states that the fire resistance-rating for a control area containing hazardous materials is one hour for floor levels 1-3 and 2 hours for floor levels above 3.

B. Exhaust System Requirements

Section 502.1 of the IMC states that an exhaust system should be provided for all occupied areas where fumes are emitted in such quantities so as to be injurious to health or safety.

C. Allowable Quantities of Fuel

Section 2702.1 of the IFC defines a control area as a space within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used, or handled. The control area is separated from other parts of the building by fire-rated assemblies.

IFC Table 2703.8.3.2: Design and Number of Control Areas

Floor Level		Percentage of the Maximum Allowable Quantity per Control Area	Number of Control Areas per Floor	Fire-Resistance Rating for Control Areas (Hours)
Above Grade Plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below Grade Plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

III. EMERGENCY GENERATOR REQUIREMENTS

A. Location Requirements

1. Section 7.2.3 of NFPA-110 states that rooms, shelters, or separate buildings housing emergency power supply systems should be designed and located to minimize the damage from flooding.

2. Section 7.2.5 of NFPA-110 states that the emergency power supply should be installed in a location that permits ready accessibility.

3. Section 7.3.1 of NFPA-110 states that emergency power supply locations should be provided with battery-powered emergency lighting except if the unit is located outdoors in an enclosure that does not include walk-in access.

4. Section 7.4.1 of NFPA-110 states that rotating energy converters should be installed on solid foundations to prohibit sagging of fuel, exhaust, or lubrication oil piping and damage to parts resulting in leakage at joints.

5. Section 7.4.1.1 of NFPA-110 states that such foundations or structural bases should raise the engine at least 150 mm above the floor or grade level and be of sufficient elevation to facilitate lubricating-oil drainage and ease of maintenance.

6. Section 7.4.3 of NFPA-110 states that where required to prevent transmission of vibration during operation, the foundation should be isolated from the surrounding floor or other foundations, or both, in accordance with the manufacturer's recommendations and accepted structural engineering practices.

7. Section 7.11.1 of NFPA-110 states that the room in which the emergency power supply equipment is located should not be used for other purposes that are not directly related to the emergency power supply system.

8. Section 4.1.2.1.1 of NFPA-37 states that engine rooms located within structures should have interior walls, floors, and ceilings of at least 1- hour fire resistance rating.

Exception: The ceiling of rooms located on the top floor of a structure should be permitted to be noncombustible or protected with an automatic fire suppression system.

B. Exhaust System Requirements

1. Section 7.7.1 of NFPA-110 states that with the emergency power supply running at the rated load, ventilation air flow should be provided to limit the maximum air temperature in the emergency power supply room to the maximum ambient air temperature required by the emergency power supply manufacturer.

2. Section 7.7.2 of NFPA-110 states that air should be supplied to the emergency power supply equipment for combustion.

3. Section 7.7.3 of NFPA-110 states that ventilation air supply should be from outdoors by a 2-hour fire rated air transfer system.

4. Section 7.7.4.2 of NFPA-110 states that radiator air discharge should be ducted outdoors or to an exterior opening by a 2-hour rated air transfer system.

5. Section 7.10.2 of NFPA-110 states that exhaust system installation should be gastight to prevent exhaust gas fumes from entering inhabited room or buildings and terminate in such a manner that toxic fumes cannot reenter a building or structure, particularly through windows, air ventilation inlets, or the engine air-intake system.

6. Section 4.1.3.1 of NFPA-37 states that engines and their weatherproof housings that are installed on roofs of structures should be located at least 5ft from openings in walls and at least 5 ft from structures having combustible walls. A minimum separation should not be required where the following conditions exist:

i. The adjacent wall of the structure has a fire resistance rating of at least 1 hour.

ii. The weatherproof enclosure is constructed of noncombustible materials and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure.

7. Section 8.3.2 of NFPA-37 states that exhaust pipes and ducts passing directly through combustible roofs should be guarded at the point of passage by ventilated metal thimbles that extend not less than 9 in. on each side of roof construction and are at least 6 in. in diameter larger than the exhaust pipe or duct.

8. Section 8.3.3 of NFPA-37 states that exhaust pipes and ducts passing directly through combustible walls or partitions should be guarded at the point of passage by one of the following methods:

i. Metal ventilated thimbles not less than 12 in. larger in diameter than the exhaust pipe or ducts.

ii. Metal or burned fire clay thimbles built in brickwork or other approved fireproofing materials providing not less than 8 in. of insulation between the thimble and combustible material.

C. Equipment Requirements

1. Section 4.4.3 of NFPA-110 states that all emergency power supply systems should be permanently installed.

2. Section 5.2.1 of NFPA-110 states that energy converters should consist only of the following rotating equipment:

1. Otto cycle (spark ignited)
2. Diesel cycle
3. Gas turbine cycle

3. Section 5.1.1 of NFPA-110 states that liquid petroleum products at atmospheric pressure, liquefied petroleum gas, and natural or synthetic gas can be used for emergency power supply.