



## Town of Hampstead Fire/Rescue

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Fire Prevention Bureau

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The following information is made available by the Hampstead Fire Department in order to prevent death and injury thru the improper use of generators. If you have any questions please contact Hampstead Fire Department. **In an Emergency Dial 911.**

### **N.H. State Fire Marshal's INFORMATIONAL BULLETIN ON RESIDENTIAL GENERATOR SAFETY (REVISED) JUNE 22, 2009**

The State Fire Marshal has developed this informational document to provide homeowners and other residents of New Hampshire with valuable information about generator safety during periods of power outages. Accidental fires from improper refueling methods, improper wiring methods, and carbon monoxide poisoning from exhaust can cause severe injuries or death to citizens. In addition, linemen attempting to restore power to the area can be injured or killed if the generator is not installed properly. For additional safety inspections and tips please contact your local Fire Department or this office at (603) 223-4289 or [fmo@dos.nh.gov](mailto:fmo@dos.nh.gov).

#### **Portable Generators**

Portable generators should be placed 10 feet from any structure, with the exhaust facing away from the building openings. Deadly exhaust fumes can enter the building through any opening resulting in severe injury or death to unsuspecting occupants. **Never** place portable generators on or near combustible surfaces such as decks, porches, or tool sheds. Heat generated by the motor, or improper refueling methods can start a fire.

**Never** run portable generators inside any building, including basement areas and garages. Deadly levels of carbon monoxide can build up in minutes injuring occupants with little to no warning.

**Allow** plenty of time to cool the generator before refueling. Gasoline vapors can easily ignite from hot surfaces causing a flash fire and severe injuries.

**Always** store approved gasoline containers a safe distance from generators while in use. Always store gasoline in an approved container placed in a well ventilated storage area. Never store gasoline products in basements or enclosed areas of your dwelling.

**Never** modify or construct any power cord so a generator can be connected to a receptacle, dryer or range outlet.

**Never** connect a generator directly to panelboard without a means to prevent inadvertent connection to the normal supply system wiring. Connecting a generator directly to an electrical outlet or to a panelboard without a transfer switch or an

interlocking device could result in a situation where power from the generator could energize the utility's wiring (back feeds into the utility system). Electrical power from a generator back fed through your meter into the utility system can cause fires, serious injury or death to utility workers trying to repair the lines in the street, or electricians working on nearby property's electrical systems.

**Unless** you are the owner of, and are occupying, a single family residence or meet one of the exceptions in RSA 319-C, a license is required to perform the electrical installation for connection of a generator to premises wiring. Therefore, a properly licensed master electrician must perform the electrical installation. In all cases the electrical installation must meet the minimum requirements of the National Electrical Code (NFPA 70-2008).

**Although** the generator is portable, an electrical permit and inspection may be required by the local jurisdiction for the installation of electrical wiring and equipment for connecting the generator to the premises wiring. Therefore it would be prudent to contact the local jurisdiction to ascertain whether an electrical permit is required.

### **Stationary Generator Installations**

In many cases property owners have chosen to install a stationary generator. In addition to the above mentioned items, stationary generators used for an alternate source of power require additional considerations. Along with the National Electrical Code (NFPA 70-2008) the requirements of other documents, that are either adopted directly or by reference by the State of New Hampshire, must be adhered to. Examples of these documents and the types of requirements they contain are:

NFPA 37, Standard for the Installation and Use of Stationary Combustion

Engines and Gas Turbines (2002 Edition)

NFPA 54, National Fuel Gas Code (2003 Edition)

The Manufacturers Instructions

NFPA 37 requires stationary generator engines and their weatherproof housings if provided, that are installed outdoors to be located at least 5' from openings in walls.

This standard recognizes the potential danger of deadly carbon monoxide gas entering the structure and injuring the occupants. Building openings could be, but are not limited to, the following:

Basement doors & bulkhead openings

Basement windows

Exit doors or sliding glass openings

Windows

Dryer vents

Kitchen appliance vents

Mechanical exhaust vents for heating or hot water appliances

Air intake openings or screens

NFPA 37 also requires stationary generator engines and their weatherproof housings, if provided, that are installed outdoors to be placed a minimum of five feet (5') from structures having combustible walls. The minimum separation is not required where:

(1) The adjacent wall of the structure has a fire resistance rating of at least 1 hour **or**

(2) The weatherproof enclosure is constructed of noncombustible materials, which has been listed and approved in accordance with NFPA 555, verifying that a fire within the enclosure will not ignite combustible materials outside the enclosure.

These allowances apply directly to the separation from the combustible wall surface and in no case shall reduce the minimum distance to a building opening.

The fuel gas piping must be installed in accordance with both NFPA 37 and NFPA 54 (National Fuel Gas Code). These documents require that the second stage system regulator be placed a minimum of five feet (5') from any building opening and ignition source. Care must be given in placement of both the generator engine and delivery system piping to address the minimum separation distances.

**Unless** you are the owner of, and are occupying, a single family residence or meet one of the exceptions in RSA 319-C, a license is required to perform the electrical installation for connection of a stationary generator to premises wiring. Therefore, a properly licensed master electrician must perform the electrical installation. In all cases the electrical installation must meet the minimum requirements of the National Electrical Code (NFPA 70-2008).

**Unless** you are the owner of an existing single family stand-alone structure that is used as your primary residence, Saf-C 8003.01 requires a license to perform the installation of the fuel gas supply system. In all cases the installation of the fuel gas supply system must meet all the applicable standards and codes.

Installation permits and inspection may be required by the local jurisdiction for the installation of electrical wiring and equipment for connecting the generator to the premises wiring and for the fuel gas fitting portion of the installation. Therefore it would be prudent to contact the local jurisdiction to ascertain whether a permit(s) is required.

### **Additional Information on the Dangers of Carbon Monoxide Exposure.**

What is Carbon Monoxide (CO)?

Carbon Monoxide is a toxic gas that can occur in homes and buildings. It is colorless, odorless, tasteless

and non-irritating. CO is a poison and can be deadly at high levels. At low concentrations, CO can go undetected and contribute to nagging illnesses. It can compound pre-existing health problems and often times goes unblamed in premature deaths.

Carbon monoxide is produced by the incomplete combustion of fuels. This occurs when there is not

enough oxygen mixed with fuel. This is commonly referred to as a "rich mixture". All fuel burning appliances have the potential to produce CO in varying concentrations. CO can result from improperly vented or malfunctioning combustion appliances such as furnaces, stoves and hot water heaters.

How CO Affects the Human Body

CO is inhaled into the lungs and bonds with hemoglobin in the blood to form carboxyhemoglobin (COHb).

This condition limits the ability of the blood to carry oxygen and effects all major organs and muscles.

Extended exposure or brief high level exposure to CO can lead to unconsciousness, brain damage or death. Early warning signs of CO poisoning are headaches, nausea, dizziness, shortness of breath and confusion.

## **Carbon Monoxide Exposure Levels:**

### **High risk groups for CO poisoning include:**

- infants/children
- pregnant women
- elderly people
- heart patients
- anyone who has trouble breathing
- those with anemic conditions

## **Carbon Monoxide Levels of Concern in buildings:**

### **CO Levels: Effects**

**12,800 PPM** Death within 1 to 3 minutes.\*

**1,600 PPM** Nausea within 20 minutes; death within 1 hour.\*

**800 PPM** Nausea and convulsions, death within 2 hours.\*

**400 PPM** Frontal headaches 1 to 2 hours: life threatening after 3 hours.\*

**50 PPM** Maximum concentration for continuous exposure in any 8 hour period.

**9 PPM** Maximum acceptable level of CO in a living space.

\*Effects can vary significantly based on age, sex, weight and overall state of health.

## **Levels of Concern in the Humans:**

Body

### **% COHb Levels:**

(Carboxy-hemoglobin

Saturation)

**0-10%** None

**10-20%** Tension in forehead, dilation of skin vessels

**20-30%** Headache and pulsating temples

**30-40%** Severe headache, weariness, dizziness, weakened sight, nausea, vomiting, prostration

**40-50%** Same as above, plus increased breathing and pulse rates, asphyxiation and prostration

**50-60%** Same as above, plus coma, convulsions, Cheyne-Stokes respiration

**60-70%** Coma, convulsions, weak respiration and pulse, possible death

**70-80%** Slowing and stopping of breathing, death within hours

**80-90%** Death in less than one hour

**90-100%** Death within a few minutes

Reference the conversation chart on the unit for PPM CO conversion to %COHb.

\*Symptoms may vary slightly depending upon individual and amount of time exposed. Smokers may display reading of up to 8% COHb without additional CO exposure.

Any levels reading above 9ppm require immediately action to eliminate the cause of the elevated levels and to prevent human exposure.