

**CHAPTER 37  
HIGHLY TOXIC AND TOXIC MATERIALS**

**SECTION FC 3701  
GENERAL**

**3701.1 Scope.** This chapter shall govern the storage, handling and use of highly toxic and toxic materials and ozone gas generators.

**Exceptions:**

1. Storage and display in Group M and storage in Group S occupancies complying with the requirements of FC2703.11.
2. Storage, handling or use for agricultural purposes, including as a pesticide, herbicide, fertilizer or similar application, when approved for such use by the federal, state or city regulatory agency having jurisdiction and when such storage, handling or use is in accordance with the manufacturer's instructions.
3. Storage, handling or personal or domestic use as a pesticide, herbicide, fertilizer in and around a residential dwelling, when approved for such use by the federal, state or city regulatory agency having jurisdiction and when such storage, handling or use is in accordance with the manufacturer's instructions.

**3701.2 Permits.** Permits shall be required as set forth in FC105.6.

**3701.3 General.** Highly toxic and toxic materials and ozone gas generators shall be stored, handled and used in accordance with this chapter. Highly toxic and toxic materials that are compressed gases shall additionally comply with the requirements of FC Chapter 30.

**3701.4 Highly toxic and toxic material mixtures.** The level of toxicity of highly toxic and toxic materials may be reduced by diluting such materials with other materials, such as water, to a degree that the resulting mixture may no longer be highly toxic or toxic. A mixture containing any amount of highly toxic and/or toxic material is presumed to be a highly toxic or toxic material, as applicable, unless it is otherwise certified and labeled by the manufacturer.

**3701.5 Supervision.** The handling and use of highly toxic and toxic materials in quantities requiring a permit shall be under the personal supervision of a certificate of fitness holder. The storage of highly toxic and toxic materials in quantities requiring a permit shall be under the general supervision of a certificate of fitness holder.

**3701.6 Prohibition.** It shall be unlawful to compress highly toxic and toxic materials.

**SECTION FC 3702  
DEFINITIONS**

**3702.1 Definitions.** The following terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**CONTAINMENT SYSTEM.** A gas-tight recovery system comprised of devices or equipment which, when placed over or around the portion of the compressed gas container that is leaking, stops or controls the escape of gas from the container.

**CONTAINMENT VESSEL.** A gas-tight vessel which, when installed or placed over or around a leaking compressed gas container, confines the container and the gas leaking therefrom.

**EXCESS FLOW VALVE.** A valve inserted into a compressed gas container that is designed to shut off the flow of gas in the event that its predetermined flow is exceeded.

**HIGHLY TOXIC MATERIAL.** A chemical that is lethal at the following doses or concentration:

1. A chemical that has a median lethal dose ( $LD_{50}$ ) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each; or
2. A chemical that has a median lethal dose ( $LD_{50}$ ) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each; or
3. A chemical that has a median lethal concentration ( $LC_{50}$ ) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

**OZONE GAS GENERATOR.** Equipment which produces ozone.

**REDUCED FLOW VALVE.** A valve equipped with a restricted flow orifice and inserted into a compressed gas container that is designed to reduce the maximum flow from the valve under full-flow conditions. The maximum flow rate from the valve is determined with the valve allowed to flow to atmosphere with no other piping or fittings attached.

**TOXIC MATERIAL.** A chemical that is lethal at the following doses or concentration:

1. A chemical that has a median lethal dose ( $LD_{50}$ ) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each; or
2. A chemical that has a median lethal dose ( $LD_{50}$ ) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by

continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each; or

3. A chemical that has a median lethal concentration (LC<sub>50</sub>) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

**Exception:** Chlorine. Although chlorine is, by definition, a toxic material, for purposes of this code it shall be classified as a highly toxic material.

## **SECTION FC 3703 HIGHLY TOXIC AND TOXIC SOLIDS AND LIQUIDS**

**3703.1 Indoor storage, handling and use.** The indoor storage, handling and use of highly toxic and toxic materials shall comply with the requirements of FC 3703.1.1 through 3703.1.5.3.

**3703.1.1 Quantities not exceeding the maximum allowable quantity per control area.** The indoor storage, handling or use of highly toxic and toxic solids or liquids in amounts not exceeding the maximum allowable quantity per control area indicated in FC Table 2703.1.1(2) shall be in accordance with FC 2701, 2703 and 3701.

**3703.1.2 Quantities exceeding the maximum allowable quantity per control area.** The indoor storage, handling or use of highly toxic and toxic solids or liquids in amounts exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(2) shall be in accordance with FC3701, FC 3703.1.3 through 3703.1.5.3 and FC Chapter 27.

**3703.1.3 Treatment system—highly toxic liquids.** Exhaust scrubbers or other systems for processing vapors of highly toxic liquids shall be provided where a spill or accidental release of such liquids can be expected to release highly toxic vapors at normal temperature and pressure. Treatment systems and other processing systems shall be installed in accordance with the construction codes, including the Mechanical Code.

**3703.1.4 Indoor storage.** Indoor storage of highly toxic and toxic solids and liquids shall comply with the requirements of FC 3703.1.4.1 and 3703.1.4.2.

**3703.1.4.1 Floors.** In addition to the requirements set forth in FC2704.12, floors of storage areas shall be of liquid-tight construction.

**3703.1.4.2 Separation—highly toxic solids and liquids.** In addition to the requirements set forth in FC2703.9.8, highly toxic solids and liquids in storage shall be located in approved hazardous material storage cabinets or isolated from other hazardous material storage by construction in accordance with the construction codes, including the Building Code.

**3703.1.5 Indoor handling and use.** Indoor handling and use of highly toxic and toxic solids and liquids shall be in accordance with FC 3703.1.5.1 through 3703.1.5.3.

**3703.1.5.1 Liquid transfer.** Highly toxic and toxic liquids shall be transferred in accordance with FC2705.1.10.

**3703.1.5.2 Exhaust ventilation for open systems.** Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in open systems in accordance with FC2705.2.1.1.

**Exception:** Liquids or solids that do not generate highly toxic or toxic fumes, mists or vapors.

**3703.1.5.3 Exhaust ventilation for closed systems.** Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in closed systems in accordance with FC2705.2.2.2.

**Exception:** Liquids or solids that do not generate highly toxic or toxic fumes, mists or vapors.

**3703.2 Outdoor storage, handling and use.** Outdoor storage, handling and use of highly toxic and toxic materials shall be in accordance with FC 3703.2.1 through 3703.2.6.

**3703.2.1 Quantities not exceeding the maximum allowable quantity per control area.** The outdoor storage, handling or use of highly toxic and toxic solids or liquids in amounts not exceeding the maximum allowable quantity per control area indicated in FC Table 2703.1.1(4) shall be in accordance with FC 2701, 2703 and 3701.

**3703.2.2 Quantities exceeding the maximum allowable quantity per control area.** The outdoor storage, handling or use of highly toxic and toxic solids or liquids in amounts exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(4) shall be in accordance with FC 3701 and 3703.2 and FC Chapter 27.

**3703.2.3 General outdoor requirements.** The general requirements applicable to the outdoor storage of highly toxic or toxic solids and liquids shall be in accordance with FC 3703.2.3.1 and 3703.2.3.2.

**3703.2.3.1 Location.** Outdoor storage, handling or use of highly toxic or toxic solids and liquids shall not be located within 20 feet (6096 mm) of lot lines, public streets, private roads, exit discharges or exterior wall openings. A 2-hour fire barrier wall without openings or penetrations extending not less than 30 inches (762 mm) above and to the sides of the storage is allowed in lieu of such distance. The fire barrier wall shall be either an independent structure or the exterior wall of the building adjacent to the storage area.

**3703.2.3.2 Treatment system—highly toxic liquids.** Exhaust scrubbers or other systems for processing vapors of highly toxic liquid shall be installed where a spill or accidental release of such liquids can be expected to release highly toxic vapors at normal temperature and pressure (NTP). Treatment systems and other processing systems shall be installed in accordance with the construction codes, including the Mechanical Code.

**3703.2.4 Outdoor storage piles.** Outdoor storage piles of highly toxic and toxic solids and liquids shall be separated into piles not larger than 2,500 cubic feet (71 m<sup>3</sup>). Aisle widths between piles shall not be less than one-half the height of the pile or 10 feet (3048 mm), whichever is greater.

**3703.2.5 Weather protection—outdoor storage or use.** Where overhead weather protection is provided for outdoor storage or use of highly toxic and toxic liquids or solids, and the weather protection is attached to a building or structure, the storage or use area shall either be protected throughout by a sprinkler system, or storage or use vessels shall be fire-resistance rated. Weather protection shall be provided in accordance with FC2704.13 for storage and FC2705.3.9 for use.

**3703.2.6 Outdoor liquid transfer.** Highly toxic and toxic liquids shall be transferred in accordance with FC2705.1.10.

## **SECTION FC 3704 HIGHLY TOXIC AND TOXIC COMPRESSED GASES**

**3704.1 General.** The storage, handling and use of highly toxic and toxic compressed gases shall comply with the requirements of this section.

**3704.1.1 Prohibited indoor storage, handling and use by occupancy.** It shall be unlawful to store, handle or use highly toxic and toxic compressed gases in:

1. Group A, E, I, R or U occupancies.
2. Group B office occupancies, F, M or S occupancies, or any other areas of such occupancies that are accessible to the public.

**3704.1.2 Gas cabinets.** Gas cabinets containing highly toxic or toxic compressed gases shall comply with the requirements of FC2703.8.6 and shall be ventilated in accordance with the Mechanical Code.

**3704.1.2.1 Capacity limits.** The maximum number of containers located in a single gas cabinet shall not exceed three, except that cabinets containing containers not over 1 pound (0.454 kg) net contents are allowed to contain up to 100 containers.

**3704.1.2.2 Fire protection.** Gas cabinets required by FC 3704.2 or 3704.3 shall be protected by a sprinkler system. Alternative fire extinguishing systems shall not be used in lieu of a sprinkler system.

**3704.1.3 Exhausted enclosures.** Exhausted enclosures containing highly toxic or toxic compressed gases shall be ventilated in accordance with the Mechanical Code.

**3704.1.3.1 Fire protection.** Exhausted enclosures required by FC 3704.2 or 3704.3 shall be protected by a sprinkler system. Alternative fire extinguishing systems shall not be used in lieu of a sprinkler system.

**3704.2 Indoor storage, handling and use.** The indoor storage, handling and use of highly toxic or toxic compressed gases shall be in accordance with FC 3704.2.1 through 3704.2.2.10.3.

**3704.2.1 Applicability.** The applicability of regulations governing the indoor storage, handling and use of highly toxic and toxic compressed gases shall be as set forth in FC 3704.2.1.1 through 3704.2.1.3.

**3704.2.1.1 Quantities not exceeding the maximum allowable quantity per control area.** The indoor storage, handling or use of highly toxic and toxic gases in amounts not exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(2) shall be in accordance with FC 2701, 2703, 3701 and 3704.1.

**3704.2.1.2 Quantities exceeding the maximum allowable quantity per control area.** The indoor storage, handling or use of highly toxic and toxic gases in amounts exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(2) shall be in accordance with FC 3701, 3704.1, 3704.2 and FC Chapter 27.

**3704.2.1.3 Ozone gas generators.** The indoor use of ozone gas-generating equipment shall be in accordance with FC3705.

**3704.2.2 General indoor requirements.** The general requirements applicable to the indoor storage, handling and use of highly toxic and toxic compressed gases shall be in accordance with FC 3704.2.2.1 through 3704.2.2.10.3.

**3704.2.2.1 Container location.** Portable containers shall be located within gas cabinets, exhausted enclosures or gas rooms. All other containers shall be located within gas rooms or exhausted enclosures.

**3704.2.2.2 Ventilated areas.** The room or other area in which gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.

**3704.2.2.3 Leaking containers.** One or more gas cabinets or exhausted enclosures shall be available on the premises to capture the gas from the containers until such time as the leaking container can be removed from the premises and disposed of lawfully.

**Exceptions:**

1. Where containers are located within gas cabinets or exhausted enclosures.
2. Where approved containment vessels or containment systems are provided in accordance with the following requirements:
  - 2.1. Containment vessels or containment systems shall be capable of fully containing or terminating a release.
  - 2.2. Trained personnel shall be available at an approved location.
  - 2.3. Containment vessels or containment systems shall be capable of being transported to the leaking container.

**3704.2.2.3.1 Location.** Gas cabinets and exhausted enclosures shall be located in gas rooms and connected to an exhaust system.

**3704.2.2.4 Local exhaust for portable containers.** A means of local exhaust shall be provided to capture leaks from portable containers. The local exhaust shall consist of portable ducts or collection systems designed to be applied to the site of a leak in a valve or fitting on the container. The local exhaust system shall be located in a gas room. Exhaust shall be directed to a treatment system in accordance with FC3704.2.2.7.

**3704.2.2.5 Piping and controls—stationary containers.** In addition to the requirements of FC2703.2.2, piping and controls on stationary containers shall comply with the following requirements:

1. Pressure relief devices shall be vented to a treatment system designed in accordance with FC3704.2.2.7.

**Exception:** Pressure relief devices on outdoor containers provided exclusively for relieving pressure due to fire exposure are not required to be vented to a treatment system provided that:

1. The material in the container is not flammable.
  2. The container is not located in a diked area with other containers containing combustible materials.
  3. The container is located not less than 30 feet (9144 mm) from combustible materials or structures or is shielded by a fire barrier complying with the requirements of FC3704.3.2.1.1.
2. Filling or dispensing connections shall be provided with a means of local exhaust. Such exhaust shall be designed to capture fumes and vapors. The exhaust shall be directed to a treatment system in accordance with FC3704.2.2.7.

3. Stationary containers shall be provided with a means of excess flow control on all container inlet or outlet connections.

**Exceptions:**

1. Inlet connections designed to prevent backflow.
2. Pressure relief devices.

**3704.2.2.6 Gas rooms.** Gas rooms shall comply with the requirements of FC2703.8.4 and both of the following requirements:

1. The exhaust ventilation from gas rooms shall be directed to an exhaust system.
2. Gas rooms shall be protected throughout by a sprinkler system. Alternative fire extinguishing systems shall not be used in lieu of a sprinkler system.

**3704.2.2.7 Treatment systems.** The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required by FC 3704.2.2.4 and 3704.2.2.5 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system shall be designed in accordance with FC 3704.2.2.7.1 through 3704.2.2.7.5 and Chapter 5 of the Mechanical Code.

**Exceptions:**

1. Highly toxic and toxic gases—storage. A treatment system is not required for containers in storage when the following controls are provided:
  - 1.1. Valve outlets are equipped with gas-tight outlet plugs or caps.
  - 1.2. Handwheel-operated valves have handles secured to prevent movement.
  - 1.3. Approved containment vessels or containment systems are provided in accordance with FC3704.2.2.3.
2. Toxic gases—use. Treatment systems are not required for toxic gases supplied by portable containers not exceeding 1,700 pounds (772 kg) water capacity when the following controls are provided:
  - 2.1. A listed or approved gas detection system with a sensing interval not exceeding 5 minutes.
  - 2.2. A listed or approved automatic-closing fail-safe valve located immediately adjacent to container valves. The fail-safe valve shall close when gas is detected at the permissible exposure limit (PEL) by a gas



detection system monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room. The gas detection shall comply with the requirements of FC3704.2.2.10.

**3704.2.2.7.1 Design.** Treatment systems shall be capable of diluting, adsorbing, absorbing, containing, neutralizing, burning or otherwise processing the contents of the largest compressed gas container. Where a total containment system is used, the system shall be designed to handle the maximum anticipated pressure of release to the system when it reaches equilibrium.

**3704.2.2.7.2 Performance.** Treatment systems shall be designed to reduce the maximum allowable discharge concentrations of the gas to one-half immediate dangerous to life and health (IDLH) at the point of discharge to the atmosphere. Where more than one gas is emitted to the treatment system, the treatment system shall be designed to handle the worst-case release based on the release rate, the quantity and the IDLH for all compressed gases stored or used.

**3704.2.2.7.3 Sizing.** Treatment systems shall be sized to process the maximum worst-case release of gas based on the maximum flow rate of release and the entire contents from the largest container utilized.

**3704.2.2.7.4 Stationary containers.** Stationary containers shall be labeled with the maximum rate of release for the compressed gas contained based on valves or fittings that are inserted directly into the container. Where multiple valves or fittings are provided, the maximum flow rate of release for valves or fittings with the highest flow rate shall be indicated. Where liquefied compressed gases are in contact with valves or fittings, the liquid flow rate shall be utilized for computation purposes. Flow rates indicated on the label shall be converted to SCF.

**3704.2.2.7.5 Portable containers.** The maximum flow rate of release for portable containers shall be calculated based on the total release from the container within 5 minutes for containers with nonliquefied content and 30 minutes for containers with liquefied content. When portable containers are equipped with approved excess flow or reduced flow valves, the worst-case release shall be determined by the maximum achievable flow from the valve as determined by the valve manufacturer or compressed gas supplier. Reduced flow and excess flow valves shall be permanently marked by the valve manufacturer to indicate the maximum design flow rate. Such markings shall indicate the flow rate for air under normal temperature and pressure.

**3704.2.2.8 Emergency power.** Emergency power shall be provided in accordance with the Electrical Code and the Building Code where any of the following systems are required:

1. Exhaust ventilation system.

2. Treatment system.
3. Gas detection system.
4. Smoke detection system.
5. Temperature control system.
6. Fire alarm system.
7. Emergency alarm system.

**Exception:** Emergency power is not required for mechanical exhaust ventilation, treatment systems and temperature control systems where approved fail-safe engineered systems are installed.

**3704.2.2.9 Automatic fire detection system—highly toxic compressed gases.** An approved automatic fire detection system shall be installed in rooms or areas where highly toxic compressed gases are stored or used. Activation of the detection system shall sound a local alarm. The fire detection system shall comply with the requirements of the Building Code.

**3704.2.2.10 Gas detection system.** A gas detection system shall be provided to detect the presence of gas at or below the permissible exposure limit (PEL) or ceiling limit of the gas for which detection is provided. The system shall be capable of monitoring the discharge from the treatment system at or below one-half the IDLH limit.

**Exception:** A gas detection system is not required for toxic gases when the physiological warning properties for the gas are at a level below the accepted PEL for the gas.

**3704.2.2.10.1 Alarms.** The gas detection system shall initiate a local alarm and transmit a signal to a continuously attended control station on the premises whenever it detects the presence of the gas in the atmosphere. The alarm shall be both visual and audible and shall provide warning both inside and outside the area where gas is detected.

**Exception:** Signal transmission to a continuously attended control station is not required where not more than one container of highly toxic or toxic gas is stored.

**3704.2.2.10.2 Shutoff of gas supply.** The gas-detection system shall automatically close the shutoff valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected.

**Exception:** Automatic shutdown is not required for reactors utilized for the production of highly toxic or toxic compressed gases where such reactors are:

1. Operated at pressures less than 15 pounds per square inch gauge (psig) (103.4 kPa).
2. Continuously attended.
3. Provided with readily accessible emergency shutoff valves.

**3704.2.2.10.3 Valve closure.** When the gas-detection sampling point initiating the gas-detection system alarm is at a use location or within a gas valve enclosure of a branch line downstream of a piping distribution manifold, the shutoff valve in the gas valve enclosure for the branch line located in the piping distribution manifold enclosure shall automatically close. Under all other circumstances, shutoff valves shall comply with the following automatic closure requirements:

1. When the gas-detection sampling point initiating the gas detection system alarm is within a gas cabinet or exhausted enclosure, the shutoff valve in the gas cabinet or exhausted enclosure for the specific gas detected shall automatically close.
2. Where the gas-detection sampling point initiating the gas detection system alarm is within a gas room and compressed gas containers are not in gas cabinets or exhausted enclosures, the shutoff valves on all gas lines for the specific gas detected shall automatically close.
3. Where the gas-detection sampling point initiating the gas detection system alarm is within a piping distribution manifold enclosure, the shutoff valve for the container of specific gas detected supplying the manifold shall automatically close.

**3704.3 Outdoor storage, handling and use.** The outdoor storage, handling and use of highly toxic and toxic compressed gases shall be in accordance with FC 3704.3.1 through 3704.3.4.

**3704.3.1 Applicability.** The outdoor storage, handling and use of highly toxic and toxic compressed gases shall be in accordance with FC 3704.3.1.1 through 3704.3.1.3.

**3704.3.1.1 Quantities not exceeding the maximum allowable quantity per control area.** The outdoor storage, handling or use of highly toxic and toxic gases in amounts not exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(4) shall be in accordance with FC 2701, 2703 and 3701.

**3704.3.1.2 Quantities exceeding the maximum allowable quantity per control area.** The outdoor storage, handling or use of highly toxic and toxic gases in amounts exceeding the maximum allowable quantity per control area set forth in FC Table 2703.1.1(4) shall be in accordance with FC 3701 and 3704.3 and FC Chapter 27.

**3704.3.1.3 Ozone gas generators.** The outdoor use of ozone gas-generating equipment shall be in accordance with FC3705.

**3704.3.2 General outdoor requirements.** The outdoor storage, handling and use of highly toxic and toxic compressed gases shall be in accordance with FC 3704.3.2.1 through 3704.3.2.7.

**3704.3.2.1 Location.** Outdoor storage, handling or use of highly toxic or toxic compressed gases shall be located in accordance with FC 3704.3.2.1.1 through 3704.3.2.1.3.

**Exception:** Compressed gases located in gas cabinets complying with the requirements of FC 2703.8.6 and 3704.1.2 and located 5 feet (1524 mm) or more from buildings and 25 feet (7620 mm) or more from an exit discharge.

**3704.3.2.1.1 Distance limitation to exposures.** Outdoor storage, handling or use of highly toxic or toxic compressed gases shall not be located within 75 feet (22 860 mm) of a lot line, public street, private road, exit discharge or building not associated with the manufacture or distribution of such gases, unless all of the following conditions are met:

1. Storage is shielded by a 2-hour fire-resistant barrier which interrupts the line of sight between the storage and the exposure.
2. The 2-hour fire-resistant barrier shall be located at least 5 feet (1524 mm) from any exposure.
3. The 2-hour fire-resistant barrier shall not have more than two sides at approximately 90-degree (1.57 rad) directions, or three sides with connecting angles of approximately 135 degrees (2.36 rad).

**3704.3.2.1.2 Openings in exposed buildings.** Where the storage, handling or use area is located within 75 feet (22 860 mm) of a building not associated with the manufacture or distribution of highly toxic or toxic compressed gases, openings into such building other than for piping are not allowed above the height of the top of the 2-hour fire-resistant barrier or within 50 feet (15 240 mm) horizontally from the storage area whether or not shielded by a fire barrier.

**3704.3.2.1.3 Air intakes.** Any area used for storage, handling or use shall not be located within 75 feet (22 860 mm) of air intakes.

**3704.3.2.2 Leaking containers.** The requirements of FC3704.2.2.3 shall apply to outdoor containers. Gas cabinets and exhausted enclosures shall be located within or immediately adjacent to outdoor storage, handling or use areas.

**3704.3.2.3 Local exhaust for portable containers.** Local exhaust for outdoor portable containers shall be provided in accordance with FC3704.2.2.4.

**3704.3.2.4 Piping and controls—stationary containers.** Piping and controls for outdoor stationary containers shall be in accordance with FC3704.2.2.5.

**3704.3.2.5 Treatment systems.** The treatment system requirements set forth in FC3704.2.2.7 shall apply to highly toxic or toxic gases located outdoors.

**3704.3.2.6 Emergency power.** The requirements for emergency power set forth in FC3704.2.2.8 shall apply to highly toxic or toxic gases located outdoors.

**3704.3.2.7 Gas detection system.** The gas detection system requirements set forth in FC3704.2.2.10 shall apply to highly toxic or toxic gases located outdoors.

**3704.3.3 Outdoor storage weather protection for portable containers.** Weather protection in accordance with FC2704.13 shall be provided for portable containers located outdoors and not within gas cabinets or exhausted enclosures. The storage area shall be protected throughout by a sprinkler system.

**Exception:** A sprinkler system is not required when:

1. all materials under the weather protection structure, including hazardous materials and the containers in which they are stored, are noncombustible.
2. the weather protection structure is located not less than 30 feet (9144 mm) from combustible materials or structures or is separated from such materials or structures using a fire barrier complying with the requirements of FC3704.3.2.1.1.

**3704.3.4 Outdoor use of portable containers.** Portable containers in outdoor use shall be located in gas cabinets or exhausted enclosures.

## **SECTION FC 3705 OZONE GAS GENERATORS**

**3705.1 Scope.** This section shall govern the design, installation, operation and maintenance of ozone gas generators with a maximum ozone-generating capacity of ½ pound (0.23 kg) or more over a 24-hour period.

**Exceptions:**

1. Ozone-generating equipment used in Group R-3 occupancies.
2. Ozone-generating equipment used in Group H-5 occupancies in compliance with FC Chapters 18 and 27 and the provisions of FC Chapter 37 governing highly toxic gases.

**3705.2 Design.** Ozone gas generators shall be designed, manufactured and tested in accordance with NEMA 250.

**3705.3 Location.** Ozone gas generators shall be located in approved cabinets or ozone generator rooms in accordance with FC 3705.3.1 or 3705.3.2.

**3705.3.1 Cabinets.** Ozone cabinets shall be constructed of approved materials and compatible with ozone. Cabinets shall display an approved sign that reads: OZONE GAS GENERATOR—HIGHLY TOXIC—OXIDIZER.

**3705.3.1.1 Seismic design.** Cabinets shall be braced for seismic activity in accordance with the Building Code.

**3705.3.1.2 Ventilation.** Cabinets shall be mechanically ventilated in accordance with the Mechanical Code.

**3705.3.2 Ozone gas generator rooms.** Ozone gas-generator rooms shall be mechanically ventilated in accordance with the Mechanical Code. Ozone gas generator rooms shall be equipped with a continuous gas detection system which will shut off the generator and sound a local audible and visible alarm when concentrations above the permissible exposure limit occur.

**3705.3.2.1 Signage.** Ozone gas-generator rooms shall not be normally occupied, and such rooms shall be kept free of combustible and hazardous material storage. An approved sign that reads, “OZONE GAS GENERATOR—HIGHLY TOXIC—OXIDIZER,” shall be posted on or near each entrance door to an ozone gas-generator room.

**3705.4 Piping, valves and fittings.** Piping, valves, fittings and related components used to convey ozone shall be in accordance with FC 3705.4.1 through 3705.4.3.

**3705.4.1 Piping.** Only welded stainless steel piping or tubing shall be used.

**Exceptions:**

1. Double-walled piping.
2. Piping, valves, fittings and related components located in exhausted enclosures.

**3705.4.2 Materials.** Materials shall be compatible with ozone and shall be rated for the design operating pressures.

**3705.4.3 Signage or marking.** Piping shall be marked, or identified by a durable sign posted on or near the piping that reads, as follows: “OZONE GAS—HIGHLY TOXIC—OXIDIZER.”

**3705.5 Automatic shutdown.** Ozone gas generators shall be designed to shut down automatically under the following conditions:

1. When the dissolved ozone concentration in the water being treated is above saturation when measured at the point where the water is exposed to the atmosphere.
2. When the process using generated ozone is shut down.
3. When the gas detection system detects ozone.
4. Failure of the ventilation system for the cabinet or ozone-generator room.
5. Failure of the gas-detection system.

**3705.6 Manual shutdown.** Manual shutdown controls shall be provided at the ozone gas generator and, when the generator is in a room, within 10 feet (3048 mm) of the main exit or exit access door.