CHAPTER 6
BUILDING SERVICES AND SYSTEMS

SECTION 601
GENERAL

601.1 Scope. The provisions of this chapter shall apply to the installation, operation and maintenance of fuel-fired appliances and heating systems, emergency and standby power systems, electrical systems and equipment, mechanical refrigeration systems, elevator recall, stationary storage battery systems and commercial kitchen hoods.

601.2 Permits. Permits shall be obtained for refrigeration systems and battery systems as set forth in Sections 105.6 and 105.7.

SECTION 602
DEFINITIONS

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

BATTERY SYSTEM, STATIONARY LEAD ACID. A system which consists of three interconnected subsystems:

1. A lead-acid battery.
2. A battery charger.
3. A collection of rectifiers, inverters, converters, and associated electrical equipment as required for a particular application.

BATTERY TYPES

Nickel cadmium (Ni-Cd) battery. An alkaline storage battery in which the positive active material is nickel oxide, the negative contains cadmium and the electrolyte is potassium hydroxide.

Nonrecombinant battery. A storage battery in which, under conditions of normal use, hydrogen and oxygen gasses created by electrolysis are vented into the air outside of the battery.

Recombinant battery. A storage battery in which, under conditions of normal use, hydrogen and oxygen gases created by electrolysis are converted back into water inside the battery instead of venting into the air outside of the battery.

Stationary storage battery. A group of electrochemical cells interconnected to supply a nominal voltage of DC power to a suitably connected electrical load, designed for service in a permanent location. The number of cells connected in a series determines the nominal voltage rating of the battery. The size of the cells determines the discharge capacity of the entire battery. After discharge, it may be restored to a fully charged condition by an electric current flowing in a direction opposite to the flow of current when the battery is discharged.

Valve-regulated lead-acid (VRLA) battery. A lead-acid battery consisting of sealed cells furnished with a valve that opens to vent the battery whenever the internal pressure of the battery exceeds the ambient pressure by a set amount. In VRLA batteries, the liquid electrolyte in the cells is immobilized in an absorptive glass mat (AGM cells or batteries) or by the addition of a gelling agent (gel cells or gelled batteries).

Vented (Flooded) lead-acid battery. A lead-acid battery consisting of cells that have electrodes immersed in liquid electrolyte. Flooded lead-acid batteries have a provision for the user to add water to the cell and are equipped with a flame-arresting vent which permits the escape of hydrogen and oxygen gas from the cell in a diffused manner such that a spark, or other ignition source, outside the cell will not ignite the gases inside the cell.

[M] COMMERCIAL COOKING APPLIANCES. Appliances used in a commercial food service establishment for heating or cooking food and which produce grease vapors, steam, fumes, smoke or odors that are required to be removed through a local exhaust ventilation system. Such appliances include deep fat fryers; upright broilers; griddles; broilers; steam-jacketed kettles; hot-top ranges; under-fired broilers (charbroilers); ovens; barbecues; rotisseries; and similar appliances. For the purpose of this definition, a food service establishment shall include any building or a portion thereof used for the preparation and serving of food.

[M] HOOD. An air-intake device used to capture by entrapment, impingement, adhesion or similar means, grease and similar contaminants before they enter a duct system.

Type I. A kitchen hood for collecting and removing grease vapors and smoke.

REFRIGERANT. The fluid used for heat transfer in a refrigerating system; the refrigerant absorbs heat and transfers it at a higher temperature and a higher pressure, usually with a change of state.

REFRIGERATION SYSTEM. A combination of interconnected refrigerant-containing parts constituting one closed refrigerant circuit in which a refrigerant is circulated for the purpose of extracting heat.

SECTION 603
FUEL-FIRED APPLIANCES

603.1 Installation. The installation of nonportable fuel gas appliances and systems shall comply the *International Fuel Gas Code*. The installation of all other fuel-fired appliances, other than internal combustion engines, oil lamps and portable devices such as blow torches, melting pots and weed burners, shall comply with this section and the *International Mechanical Code*.

603.1.1 Manufacturer's instructions. The installation shall be made in accordance with the manufacturer's instructions and applicable federal, state, and local rules and

regulations. Where it becomes necessary to change, modify, or alter a manufacturer's instructions in any way, written approval shall first be obtained from the manufacturer.

603.1.2 Approval. The design, construction and installation of fuel-fired appliances shall be in accordance with the *International Fuel Gas Code* and the *International Mechanical Code*.

603.1.3 Electrical wiring and equipment. Electrical wiring and equipment used in connection with oil-burning equipment shall be installed and maintained in accordance with Section 605 and the ICC *Electrical Code*.

603.1.4 Fuel oil. The grade of fuel oil used in a burner shall be that for which the burner is approved and as stipulated by the burner manufacturer. Oil containing gasoline shall not be used. Waste crankcase oil shall be an acceptable fuel in Group F, M and S occupancies, when utilized in equipment listed for use with waste oil and when such equipment is installed in accordance with the manufacturer's instructions and the terms of its listing.

603.1.5 Access. The installation shall be readily accessible for cleaning hot surfaces; removing burners; replacing motors, controls, air filters, chimney connectors, draft regulators, and other working parts; and for adjusting, cleaning and lubricating parts.

603.1.6 Testing, diagrams and instructions. After installation of the oil-burning equipment, operation and combustion performance tests shall be conducted to determine that the burner is in proper operating condition and that all accessory equipment, controls, and safety devices function properly.

603.1.6.1 Diagrams. Contractors installing industrial oil-burning systems shall furnish not less than two copies of diagrams showing the main oil lines and controlling valves, one copy of which shall be posted at the oil-burning equipment and another at an approved location that will be accessible in case of emergency.

603.1.6.2 Instructions. After completing the installation, the installer shall instruct the owner or operator in the proper operation of the equipment. The installer shall also furnish the owner or operator with the name and telephone number of persons to contact for technical information or assistance and routine or emergency services.

603.1.7 Clearances. Working clearances between oil-fired appliances and electrical panelboards and equipment shall be in accordance with the ICC *Electrical Code*. Clearances between oil-fired equipment and oil supply tanks shall be in accordance with NFPA 31.

[B, M, FG] 603.2 Chimneys. Masonry chimneys shall be constructed in accordance with the *International Building Code*. Factory-built chimneys shall be installed in accordance with the *International Mechanical Code*. Metal chimneys shall be constructed and installed in accordance with NFPA 211.

603.3 Fuel oil storage systems. Fuel oil storage systems shall be installed in accordance with this code. Fuel oil piping systems shall be installed in accordance with the *International Mechanical Code*.

603.3.1 Maximum outside fuel oil storage above ground. Where connected to a fuel-oil piping system, the maximum amount of fuel oil storage allowed outside above ground without additional protection shall be 660 gallons (2498 L). The storage of fuel oil above ground in quantities exceeding 660 gallons (2498 L) shall comply with NFPA 31.

603.3.2 Maximum inside fuel oil storage. Where connected to a fuel-oil piping system, the maximum amount of fuel oil storage allowed inside any building shall be 660 gallons (2498 L). Where the amount of fuel oil stored inside a building exceeds 660 gallons (2498 L), the storage area shall be in compliance with the *International Building Code*.

603.3.3 Underground storage of fuel oil. The storage of fuel oil in underground storage tanks shall comply with NFPA 31.

603.4 Portable unvented heaters. Portable unvented fuel-fired heating equipment shall be prohibited in occupancies in Groups A, E, I, R-1, R-2, R-3 and R-4.

Exception: Listed and approved unvented fuel-fired heaters in one- and two-family dwellings.

603.4.1 Prohibited locations. Unvented fuel-fired heating equipment shall not be located in, or obtain combustion air from, any of the following rooms or spaces: sleeping rooms, bathrooms, toilet rooms or storage closets.

603.5 Heating appliances. Heating appliances shall be listed and shall comply with this section.

603.5.1 Guard against contact. The heating element or combustion chamber shall be permanently guarded so as to prevent accidental contact by persons or material.

603.5.2 Heating appliance installation and maintenance. Heating appliances shall be installed and maintained in accordance with the manufacturer's instructions, the *International Building Code*, the *International Mechanical Code*, the *International Fuel Gas Code* and the ICC *Electrical Code*.

603.6 Chimneys and appliances. Chimneys, incinerators, smokestacks or similar devices for conveying smoke or hot gases to the outer air and the stoves, furnaces, fireboxes or boilers to which such devices are connected, shall be maintained so as not to create a fire hazard.

603.6.1 Masonry chimneys. Masonry chimneys that, upon inspection, are found to be without a flue liner and that have open mortar joints which will permit smoke or gases to bed as to be dangerous, shall be repaired or relined with a listed chimne discharged into the building, or which are crackey liner system installed in accordance with the manufacturer's installation instructions or a flue lining system installed in accordance with the requirements of the *International Building Code* and appropriate for the intended class of chimney service.

603.6.2 Metal chimneys. Metal chimneys which are corroded or improperly supported shall be repaired or replaced.

603.6.3 Decorative shrouds. Decorative shrouds installed at the termination of factory-built chimneys shall be removed except where such shrouds are listed and labeled for use with the specific factory-built chimney system and are installed in accordance with the chimney manufacturer's installation instructions.

603.6.4 Factory-built chimneys. Existing factory-built chimneys that are damaged, corroded or improperly supported shall be repaired or replaced.

603.6.5 Connectors. Existing chimney and vent connectors that are damaged, corroded or improperly supported shall be repaired or replaced.

603.7 Discontinuing operation of unsafe heating appliances. The fire code official is authorized to order that measures be taken to prevent the operation of any existing stove, oven, furnace, incinerator, boiler or any other heat-producing device or appliance found to be defective or in violation of code requirements for existing appliances after giving notice to this effect to any person, owner, firm or agent or operator in charge of the same. The fire code official is authorized to take measures to prevent the operation of any device or appliance without notice when inspection shows the existence of an immediate fire hazard or when imperiling human life. The defective device shall remain withdrawn from service until all necessary repairs or alterations have been made.

603.7.1 Unauthorized operation. It shall be a violation of this code for any person, user, firm or agent to continue the utilization of any device or appliance (the operation of which has been discontinued or ordered discontinued in accordance with Section 603.7), unless written authority to resume operation is given by the fire code official. Removing or breaking the means by which operation of the device is prevented shall be a violation of this code.

603.8 Incinerators. Commercial, industrial and residential-type incinerators and chimneys shall be constructed in accordance with the *International Building Code,* the *International Fuel Gas Code* and the *International Mechanical Code.*

603.8.1 Residential incinerators. Residential incinerators shall be of an approved type.

603.8.2 Spark arrestor. Incinerators shall be equipped with an effective means for arresting sparks.

603.8.3 Restrictions. Where the fire code official determines that burning in incinerators located within 500 feet (152 m) of mountainous, brush or grass-covered areas will create an undue fire hazard because of atmospheric conditions, such burning shall be prohibited.

603.8.4 Time of burning. Burning shall take place only during approved hours.

603.8.5 Discontinuance. The fire code official is authorized to require incinerator use to be discontinued immediately if the fire code official determines that smoke emissions are offensive to occupants of surrounding property or if the use of incinerators is determined by the fire code official to constitute a hazardous condition.

603.9 Gas meters. Above-ground gas meters, regulators and piping subject to damage shall be protected by a barrier complying with Section 312 or otherwise protected in an approved manner.

SECTION 604
EMERGENCY AND STANDBY POWER SYSTEMS

604.1 Installation. Emergency and standby power systems required by this code or the *International Building Code* shall be installed in accordance with this code, NFPA 110 and NFPA 111. Existing installations shall be maintained in accordance with the original approval.

604.1.1 Stationary generators. Stationary emergency and standby power generators required by this code shall be listed in accordance with UL 2200.

604.2 Where required. Emergency and standby power systems shall be provided where required by Sections 604.2.1 through 604.2.19.4.

604.2.1 Group A occupancies. Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with Section 907.2.12.2.

604.2.2 Smoke control systems. Standby power shall be provided for smoke control systems in accordance with Section 909.11.

604.2.3 Exit signs. Emergency power shall be provided for exit signs in accordance with Section 1011.5.3

604.2.4 Means of egress illumination. Emergency power shall be provided for means of egress illumination in accordance with Section 1006.3.

604.2.5 Accessible means of egress elevators. Standby power shall be provided for elevators that are part of an accessible means of egress in accordance with Section 1007.4.

604.2.6 Accessible means of egress platform lifts. Standby power in accordance with this section or ASME A18.1 shall be provided for platform lifts that are part of an accessible means of egress in accordance with Section 1007.5.

604.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors in accordance with Section 1008.1.3.3.

604.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities in accordance with Section 1803.15.

604.2.9 Membrane structures. Emergency power shall be provided for exit signs in temporary tents and membrane structures in accordance with Section 2403.12.6.1. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures in accordance with the *International Building Code.*

604.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials in accordance with Sections 2704.7 and 2705.1.5.

604.2.11 Highly toxic and toxic materials. Emergency power shall be provided for occupancies with highly toxic

or toxic materials in accordance with Sections 3704.2.2.8 and 3704.3.2.6.

604.2.12 Organic peroxides. Standby power shall be provided for occupancies with organic peroxides in accordance with Section 3904.1.11.

604.2.13 Pyrophoric materials. Emergency power shall be provided for occupancies with silane gas in accordance with Sections 4106.2.3 and 4106.4.3.

604.2.14 Covered mall buildings. Covered mall buildings exceeding 50,000 square feet (4645 m^2) shall be provided with standby power systems which are capable of operating the emergency voice/alarm communication.

604.2.15 High-rise buildings. Standby power, light and emergency systems in high-rise buildings shall comply with the requirements of Sections 604.2.15.1 through 604.2.15.3.

604.2.15.1 Standby power. A standby power system shall be provided. Where the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour fire barriers or horizontal assemblies constructed in accordance with the *International Building Code*, or both. System supervision with manual start and transfer features shall be provided at the fire command center.

604.2.15.1.1 Fuel supply. An on-premises fuel supply, sufficient for not less than 2-hour full-demand operation of the system, shall be provided.

Exception: When approved, the system shall be allowed to be supplied by natural gas pipelines.

604.2.15.1.2 Capacity. The standby system shall have a capacity and rating that supplies all equipment required to be operational at the same time. The generating capacity is not required to be sized to operate all of the connected electrical equipment simultaneously.

604.2.15.1.3 Connected facilities. Power and lighting facilities for the fire command center and elevators specified in Sections 403.8 and 403.9 of the *International Building Code*, as applicable, and electrically powered fire pumps required to maintain pressure, shall be transferable to the standby source. Standby power shall be provided for at least one elevator to serve all floors and be transferable to any elevator.

604.2.15.2 Separate circuits and luminaires. Separate lighting circuits and luminaires shall be required to provide sufficient light with an intensity of not less than 1 foot-candle (11 lux) measured at floor level in all means of egress corridors, stairways, smokeproof enclosures, elevator cars and lobbies, and other areas that are clearly a part of the escape route.

604.2.15.2.1 Other circuits. Circuits supplying lighting for the fire command center and mechanical equipment rooms shall be transferable to the standby source.

604.2.15.3 Emergency systems. Exit signs, exit illumination as required by Chapter 10, and elevator car lighting are classified as emergency systems and shall operate within 10 seconds of failure of the normal power supply and shall be capable of being transferred to the standby source.

Exception: Exit sign, exit and means of egress illumination are permitted to be powered by a standby source in buildings of Group F and S occupancies.

604.2.16 Underground buildings. Emergency and standby power systems in underground buildings covered in Chapter 4 of the *International Building Code* shall comply with Sections 604.2.16.1 and 604.2.16.2.

604.2.16.1 Standby power. A standby power system complying with the ICC *Electrical Code* shall be provided for standby power loads as specified in Section 604.2.16.1.1.

[B] 604.2.16.1.1 Standby power loads. The following loads are classified as standby power loads:

1. Smoke control system.
2. Ventilation and automatic fire detection equipment for smokeproof enclosures.
3. Fire pumps.
4. Standby power shall be provided for elevators in accordance with Section 3003 of the *International Building Code*.

[B] 604.2.16.1.2 Pickup time. The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.

604.2.16.2 Emergency power. An emergency power system complying with the ICC *Electrical Code* shall be provided for emergency power loads as specified in Section 604.2.15.2.1.

604.2.16.2.1 Emergency power loads. The following loads are classified as emergency power loads:

1. Emergency voice/alarm communication systems.
2. Fire alarm systems.
3. Automatic fire detection systems.
4. Elevator car lighting.
5. Means of egress lighting and exit sign illumination as required by Chapter 10.

604.2.17 Group I-3 occupancies. Power-operated sliding doors or power-operated locks for swinging doors in Group I-3 occupancies shall be operable by a manual release mechanism at the door, and either emergency power or a remote mechanical operating release shall be provided.

Exception: Emergency power is not required in facilities where provisions for remote locking and unlocking of occupied rooms in Occupancy Condition 4 are not required as set forth in the *International Building Code*.

604.2.18 Airport traffic control towers. A standby power system shall be provided in airport traffic control towers