

## 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 equipment.

**601.2 Permits.** Permits shall be obtained for refrigeration systems, battery systems and solar photovoltaic power systems as set forth in Sections 105.6 and 105.7.

### SECTION 602 DEFINITIONS

**602.1 Definitions.** The following terms are defined in Chapter 2:

**BATTERY SYSTEM, STATIONARY LEAD-ACID.**

**BATTERY TYPES.**

**COMMERCIAL COOKING APPLIANCES.**

**HOOD.**

Type I.

Type II.

**REFRIGERANT.**

**REFRIGERATION SYSTEM.**

### SECTION 603 FUEL-FIRED APPLIANCES

**603.1 Installation.** The installation of nonportable fuel gas appliances and systems shall comply with 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 NFPA 70.

**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 NFPA 70. Clearances between oil-fired equipment and oil supply tanks shall be in accordance with NFPA 31.

**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 Fuel oil storage in outside, above-ground tanks.** 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.

**603.3.1.1 Plan review.** Plan review requirements for above-ground fuel oil tanks. See Section 5701.6.

**603.3.2 Fuel oil storage inside buildings.** Fuel oil storage inside buildings shall comply with Sections 603.3.2.1 through 603.3.2.5 or Chapter 57.

**603.3.2.1 Quantity limits.** One or more fuel oil storage tanks containing Class II or III *combustible liquid* shall be permitted in a building. The aggregate capacity of all such tanks shall not exceed 660 gallons (2498 L).

**Exception:** The aggregate capacity limit shall be permitted to be increased to 3,000 gallons (11 356 L) of Class II or III liquid for storage in protected above-ground tanks complying with Section 5704.2.9.7, when all of the following conditions are met:

1. The entire 3,000-gallon (11 356 L) quantity shall be stored in protected above-ground tanks;
2. The 3,000-gallon (11 356 L) capacity shall be permitted to be stored in a single tank or multiple smaller tanks; and
3. The tanks shall be located in a room protected by an *automatic sprinkler system* complying with Section 903.3.1.1.

**603.3.2.2 Restricted use and connection.** Tanks installed in accordance with Section 603.3.2 shall be used only to supply fuel oil to fuel-burning or generator equipment installed in accordance with Section 603.3.2.4. Connections between tanks and equipment supplied by such tanks shall be made using closed piping systems.

**603.3.2.3 Applicability of maximum allowable quantity and control area requirements.** The quantity of *combustible liquid* stored in tanks complying with Section 603.3.2 shall not be counted towards the maximum allowable quantity set forth in Table 5003.1.1(1), and such tanks shall not be required to be located in a *control area*.

**603.3.2.4 Installation.** Tanks and piping systems shall be installed and separated from other uses in accordance with Section 915 and Chapter 13, both of the *International Mechanical Code*, as applicable.

**Exception:** Protected above-ground tanks complying with Section 5704.2.9.7 shall not be required to be separated from surrounding areas.

**603.3.2.5 Tanks in basements.** Tanks in *basements* shall be located not more than two stories below grade plane.

**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.

**Exceptions:**

1. *Listed* and *approved* unvented fuel-fired heaters, including portable outdoor gas-fired heating appliances, in one- and two-family *dwelling*s.
2. Portable outdoor gas-fired heating appliances shall be allowed in accordance with Section 603.4.2.

**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.

**603.4.2 Portable outdoor gas-fired heating appliances.** Portable gas-fired heating appliances located outdoors shall be in accordance with Sections 603.4.2.1 through 603.4.2.3.4.

**603.4.2.1 Location.** Portable outdoor gas-fired heating appliances shall be located in accordance with Sections 603.4.2.1.1 through 603.4.2.1.4.

**603.4.2.1.1 Prohibited locations.** The storage or use of portable outdoor gas-fired heating appliances is prohibited in any of the following locations:

1. Inside of any occupancy when connected to the fuel gas container.
2. Inside of tents, canopies and membrane structures.
3. On exterior balconies.

**Exception:** As allowed in Section 6.19 of NFPA 58.

**603.4.2.1.2 Clearance to buildings.** Portable outdoor gas-fired heating appliances shall be located at least 5 feet (1524 mm) from buildings.

**603.4.2.1.3 Clearance to combustible materials.** Portable outdoor gas-fired heating appliances shall not be located beneath, or closer than 5 feet (1524 mm) to combustible decorations and combustible overhangs, awnings, sunshades or similar combustible attachments to buildings.

**603.4.2.1.4 Proximity to exits.** Portable outdoor gas-fired heating appliances shall not be located within 5 feet (1524 mm) of *exits* or *exit discharges*.

**603.4.2.2 Installation and operation.** Portable outdoor gas-fired heating appliances shall be installed and operated in accordance with Sections 603.4.2.2.1 through 603.4.2.2.4.

**603.4.2.2.1 Listing and approval.** Only *listed* and *approved* portable outdoor gas-fired heating appliances utilizing a fuel gas container that is integral to the appliance shall be used.

**603.4.2.2.2 Installation and maintenance.** Portable outdoor gas-fired heating appliances shall be installed and maintained in accordance with the manufacturer's instructions.

**603.4.2.2.3 Tip-over switch.** Portable outdoor gas-fired heating appliances shall be equipped with a tilt or tip-over switch that automatically shuts off the flow of gas if the appliance is tilted more than 15 degrees (0.26 rad) from the vertical.

**603.4.2.2.4 Guard against contact.** The heating element or combustion chamber of portable outdoor gas-fired heating appliances shall be permanently guarded so as to prevent accidental contact by persons or material.

**603.4.2.3 Gas containers.** Fuel gas containers for portable outdoor gas-fired heating appliances shall comply with Sections 603.4.2.3.1 through 603.4.2.3.4.

**603.4.2.3.1 Approved containers.** Only *approved* DOTn or ASME gas containers shall be used.

**603.4.2.3.2 Container replacement.** Replacement of fuel gas containers in portable outdoor gas-fired heating appliances shall not be conducted while the public is present.

**603.4.2.3.3 Container capacity.** The maximum individual capacity of gas containers used in connection with portable outdoor gas-fired heating appliances shall not exceed 20 pounds (9 kg).

**603.4.2.3.4 Indoor storage prohibited.** Gas containers shall not be stored inside of buildings except in accordance with Section 6109.9.

**603.5 Heating appliances.** Heating appliances shall be *listed* and shall comply with Sections 603.5.1 and 603.5.2.

**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 NFPA 70.

**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 be discharged into the building, or which are cracked as to be dangerous, shall be repaired or relined with a *listed* chimney 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 com-

plying 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.

**Exception:** Fuel supply requirements of NFPA 110, Section 5.1.2 may be reduced, when approved by the building official, based on the operational needs and of the facility served by the emergency or standby power system.

**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 604.2.18.4.

**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 907.2.1.1.

**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 1011.6.3.

**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 1008.1.4.3.

**604.2.8 Semiconductor fabrication facilities.** Emergency power shall be provided for semiconductor fabrication facilities in accordance with Section 2703.15.

**604.2.9 Membrane structures.** Emergency power shall be provided for *exit* signs in temporary tents and membrane structures in accordance with Section 3103.12.6.1. 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 5004.7 and 5005.1.5.

**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 6004.2.2.8 and 6004.3.4.2.

**604.2.12 Organic peroxides.** Standby power shall be provided for occupancies with organic peroxides in accordance with Section 6204.1.11.

**604.2.13 Covered and open mall buildings.** Covered mall buildings exceeding 50,000 square feet (4645 m<sup>2</sup>) and open mall buildings exceeding 50,000 square feet (4645 m<sup>2</sup>) within the established perimeter line shall be provided with standby power systems that are capable of operating the emergency voice/alarm communication system.

**604.2.14 High-rise buildings.** Standby power, light and emergency systems in high-rise buildings shall comply with the requirements of Sections 604.2.14.1 through 604.2.14.3.

**604.2.14.1 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* constructed in accordance with Section 707 of the *International Building Code* or *horizontal assemblies* constructed in accordance with Section 711 of the *International Building Code*, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

**604.2.14.1.1 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.

**604.2.14.1.2 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.

**604.2.14.1.3 Connected facilities.** Power and lighting facilities for the *fire command center* and elevators specified in Sections 403.4.8.2 and 403.6 of the *International Building Code*, as applicable, 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.

**604.2.14.2 Separate circuits and luminaires.** Separate lighting circuits and luminaires shall be required to provide sufficient light with an intensity of not less than 1 footcandle (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.*

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

**604.2.14.3 Emergency systems.** *Exit* signs, *exit* illumination as required by Chapter 10, electrically powered fire pumps required to maintain pressure, 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.

**604.2.15 Underground buildings.** Emergency and standby power systems in underground buildings covered in Chapter 4 of the *International Building Code* shall comply with Sections 604.2.15.1 and 604.2.15.2.

**604.2.15.1 Standby power.** A standby power system complying with this section and NFPA 70 shall be provided for standby power loads as specified in Section 604.2.15.1.1.

**[B] 604.2.15.1.1 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*.

**604.2.15.1.2 Pickup time.** The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.

**604.2.15.2 Emergency power.** An emergency power system complying with this code and NFPA 70 shall be provided for emergency power loads as specified in Section 604.2.15.2.1.

**[B] 604.2.15.2.1 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.

**604.2.16 Group I-2 health care facilities.** Automatic emergency and/or standby power supplies shall be provided for all health care facilities, as defined in NFPA 99. The approved alternative power supply shall maintain operating energy to the facility for a period of not less than 90 minutes. Emergency and standby power supplies shall

be installed as required in the *Oregon Electrical Specialty Code* and in accordance with NFPA 99.

**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 more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. Pressurization equipment, mechanical equipment and lighting.
2. Elevator operating equipment.
3. Fire alarm and smoke detection systems.

**604.2.19 Elevators.** In buildings and structures where standby power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 604.2.19.1 through 604.2.19.4. Elevators under standby power shall operate as required by ASME A17.1.

**604.2.19.1 Manual transfer.** Standby power shall be manually transferable to all elevators in each bank.

**604.2.19.2 One elevator.** Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.

**604.2.19.3 Two or more elevators.** Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, the operation of all elevators shall comply with ASME A17.1

**604.2.19.4 Machine room ventilation.** Where standby power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the standby power source.

**604.3 Maintenance.** Emergency and standby power systems shall be maintained in accordance with NFPA 110 and NFPA 111 such that the system is capable of supplying service within the time specified for the type and duration required.

**604.3.1 Schedule.** Inspection, testing and maintenance of emergency and standby power systems shall be in accordance with an *approved* schedule established upon completion and approval of the system installation.

**604.3.2 Written record.** Written records of the inspection, testing and maintenance of emergency and standby

power systems shall include the date of service, name of the servicing technician, a summary of conditions noted and a detailed description of any conditions requiring correction and what corrective action was taken. Such records shall be kept on the premises served by the emergency or standby power system and be available for inspection by the *fire code official*.

**604.3.3 Switch maintenance.** Emergency and standby power system transfer switches shall be included in the inspection, testing and maintenance schedule required by Section 604.3.1. Transfer switches shall be maintained free from accumulated dust and dirt. Inspection shall include examination of the transfer switch contacts for evidence of deterioration. When evidence of contact deterioration is detected, the contacts shall be replaced in accordance with the transfer switch manufacturer's instructions.

**604.4 Operational inspection and testing.** Emergency power systems, including all appurtenant components shall be inspected and tested under load in accordance with NFPA 110 and NFPA 111.

**Exception:** Where the emergency power system is used for standby power or peak load shaving, such use shall be recorded and shall be allowed to be substituted for scheduled testing of the generator set, provided that appropriate records are maintained.

**604.4.1 Transfer switch test.** The test of the transfer switch shall consist of electrically operating the transfer switch from the normal position to the alternate position and then return to the normal position.

**604.5 Emergency lighting equipment.** Emergency lighting shall be inspected and tested in accordance with Sections 604.5.1 through 604.5.2.1.

**604.5.1 Activation test.** An activation test of the emergency lighting equipment shall be completed monthly. The activation test shall ensure the emergency lighting activates automatically upon normal electrical disconnect and stays sufficiently illuminated for a minimum of 30 seconds.

**604.5.1.1 Activation test record.** Records shall be maintained on the premises for a minimum of three years and submitted to the *fire code official* upon request. The record shall include the location of the emergency lighting tested, whether the unit passed or failed, the date of the test, and the person completing the test.

**604.5.2 Power test.** For battery-powered emergency lighting, a power test of the emergency lighting equipment shall be completed annually. The power test shall operate the emergency lighting for a minimum of 90 minutes and shall remain sufficiently illuminated for the duration of the test.

**604.5.2.1 Power test record.** Records shall be maintained on the premises for a minimum of three years and submitted to the *fire code official* upon request. The record shall include the location of the emergency lighting tested, whether the unit passed or failed, the date of the test, and the person completing the test.

**604.6 Supervision of maintenance and testing.** Routine maintenance, inspection and operational testing shall be overseen by a properly instructed individual.

## SECTION 605

### ELECTRICAL EQUIPMENT, WIRING AND HAZARDS

**605.1 Abatement of electrical hazards.** Identified electrical hazards shall be abated. Identified hazardous electrical conditions in permanent wiring shall be brought to the attention of the responsible code official. Electrical wiring, devices, appliances and other equipment that is modified or damaged and constitutes an electrical shock or fire hazard shall not be used.

**605.2 Illumination.** Illumination shall be provided for service equipment areas, motor control centers and electrical panelboards.

**605.3 Working space and clearance.** A working space of not less than 30 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height shall be provided in front of electrical service equipment. Where the electrical service equipment is wider than 30 inches (762 mm), the working space shall not be less than the width of the equipment. No storage of any materials shall be located within the designated working space.

#### Exceptions:

1. Where other dimensions are required or allowed by NFPA 70.
2. Access openings into attics or under-floor areas which provide a minimum clear opening of 22 inches (559 mm) by 30 inches (762 mm).

**605.3.1 Labeling.** Doors into electrical control panel rooms shall be marked with a plainly visible and legible sign stating ELECTRICAL ROOM or similar approved wording. The disconnecting means for each service, feeder or branch circuit originating on a switchboard or panelboard shall be legibly and durably marked to indicate its purpose unless such purpose is clearly evident.

**605.4 Multiplug adapters.** Multiplug adapters, such as cube adapters, unfused plug strips or any other device not complying with NFPA 70 shall be prohibited.

**605.4.1 Power tap design.** Relocatable power taps shall be of the polarized or grounded type, equipped with over-current protection, and shall be *listed* in accordance with UL 1363.

**605.4.2 Power supply.** Relocatable power taps shall be directly connected to a permanently installed receptacle.

**605.4.3 Installation.** Relocatable power tap cords shall not extend through walls, ceilings, floors, under doors or floor coverings, or be subject to environmental or physical damage.

**605.5 Extension cords.** Extension cords and flexible cords shall not be a substitute for permanent wiring. Extension cords and flexible cords shall not be affixed to structures, extended through walls, ceilings or floors, or under doors or floor coverings, nor shall such cords be subject to environ-

mental damage or physical impact. Extension cords shall be used only with portable appliances.

**605.5.1 Power supply.** Extension cords shall be plugged directly into an *approved* receptacle, power tap or multi-plug adapter and, except for *approved* multiplug extension cords, shall serve only one portable appliance.

**605.5.2 Ampacity.** The ampacity of the extension cords shall not be less than the rated capacity of the portable appliance supplied by the cord.

**605.5.3 Maintenance.** Extension cords shall be maintained in good condition without splices, deterioration or damage.

**605.5.4 Grounding.** Extension cords shall be grounded when serving grounded portable appliances.

**605.6 Unapproved conditions.** Open junction boxes and open-wiring splices shall be prohibited. *Approved* covers shall be provided for all switch and electrical outlet boxes.

**605.7 Appliances.** Electrical appliances and fixtures shall be tested and *listed* in published reports of inspected electrical equipment by an *approved* agency and installed and maintained in accordance with all instructions included as part of such listing.

**605.8 Electrical motors.** Electrical motors shall be maintained free from excessive accumulations of oil, dirt, waste and debris.

**605.9 Temporary wiring.** Temporary wiring for electrical power and lighting installations is allowed for a period not to exceed 90 days. Temporary wiring methods shall meet the applicable provisions of NFPA 70.

**Exception:** Temporary wiring for electrical power and lighting installations is allowed during periods of construction, remodeling, repair or demolition of buildings, structures, equipment or similar activities.

**605.9.1 Attachment to structures.** Temporary wiring attached to a structure shall be attached in an *approved* manner.

**605.10 Portable, electric space heaters.** Where not prohibited by other sections of this code, portable, electric space heaters shall be permitted to be used in all occupancies other than Group I and R-4 and in accordance with Sections 605.10.1 through 605.10.4.

> **Exception:** The use of portable, electric space heaters shall be permitted in nonsleeping staff and employee areas in Group I and R-4 occupancies.

**605.10.1 Listed and labeled.** Only *listed* and *labeled* portable, electric space heaters shall be used.

**605.10.2 Power supply.** Portable, electric space heaters shall be plugged directly into an *approved* receptacle.

**605.10.3 Extension cords.** Portable, electric space heaters shall not be plugged into extension cords.

**605.10.4 Prohibited areas.** Portable, electric space heaters shall not be operated within 3 feet (914 mm) of any combustible materials. Portable, electric space heaters shall be operated only in locations for which they are *listed*.

**605.11 Building-mounted solar photovoltaic power systems.** See *Oregon Solar Installation Specialty Code (OSISC)* as adopted by Oregon Administrative Rule (OAR) 918-800-0020.

**605.11.1 Marking and labeling.** Marking and labeling required by the *Oregon Electrical Specialty Code*, Section 690.31 shall be maintained.

**605.12 Ground-mounted solar photovoltaic power systems.** Ground-mounted solar photovoltaic power systems shall be installed in accordance with Sections 605.12.1 through 605.12.3 and NFPA 70.

**605.12.1 Clearances.** A clear, brush-free area of 10 feet (3038 mm) shall be required for ground-mounted photovoltaic arrays.

**605.12.2 Noncombustible base.** A gravel base or other noncombustible base acceptable to the fire code official shall be installed and maintained under and around the installation.

**605.12.3 Security barriers.** Fencing, skirting, or other suitable security barriers shall be installed when required by the fire code official.

**SECTION 606  
MECHANICAL REFRIGERATION**

[M] **606.1 Scope.** Refrigeration systems shall be installed in accordance with the *International Mechanical Code*.

[M] **606.2 Refrigerants.** The use and purity of new, recovered and reclaimed refrigerants shall be in accordance with the *International Mechanical Code*.

[M] **606.3 Refrigerant classification.** Refrigerants shall be classified in accordance with the *International Mechanical Code*.

[M] **606.4 Change in refrigerant type.** A change in the type of refrigerant in a refrigeration system shall be in accordance with the *International Mechanical Code*.

**606.5 Access.** Refrigeration systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be accessible to the fire department at all times as required by the *fire code official*.

**606.6 Testing of equipment.** Refrigeration equipment and systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be subject to periodic testing in accordance with Section 606.6.1. A written record of required testing shall be maintained on the premises. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

**606.6.1 Periodic testing.** The following emergency devices or systems shall be periodically tested in accordance with the manufacturer's instructions and as required by the *fire code official*.

1. Treatment and flaring systems.

2. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
3. Fans and associated equipment intended to operate emergency ventilation systems.
4. Detection and alarm systems.

**606.7 Emergency signs.** Refrigeration units or systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be provided with *approved* emergency signs, charts and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the *International Mechanical Code* for the classification of refrigerants listed therein.

**606.8 Refrigerant detector.** Machinery rooms shall contain a refrigerant detector with an audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in the *International Mechanical Code* for the refrigerant classification. Detectors and alarms shall be placed in *approved* locations. The detector shall transmit a signal to an *approved* location.

**606.9 Remote controls.** Where flammable refrigerants are used and compliance with Section 1106 of the *International Mechanical Code* is required, remote control of the mechanical equipment and appliances located in the machinery room as required by Sections 606.9.1 and 606.9.2 shall be provided at an approved location immediately outside the machinery room and adjacent to its principal entrance.

**606.9.1 Refrigeration system emergency shutoff.** A clearly identified switch of the break-glass type or with an *approved* tamper-resistant cover shall provide off-only control of refrigerant compressors, refrigerant pumps and normally closed automatic refrigerant valves located at an approved location immediately outside the machinery room and adjacent to its primary entrance. Additionally, this equipment shall be automatically shut off whenever the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LEL, whichever is lower.

**606.9.2 Ventilation system.** A clearly identified switch of the break-glass type shall provide on-only control of the machinery room ventilation fans.

**606.10 Emergency pressure control system.** Refrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerant or ammonia shall be provided with an emergency pressure control system in accordance with Sections 606.10.1 and 606.10.2.

**606.10.1 Automatic crossover valves.** Each high- and intermediate-pressure zone in a refrigeration system shall be provided with a single automatic valve providing a crossover connection to a lower pressure zone. Automatic crossover valves shall comply with Sections 606.10.1.1 through 606.10.1.3.

**606.10.1.1 Overpressure limit set point.** Automatic crossover valves shall be arranged to automatically relieve excess system pressure to a lower pressure zone

if the pressure in a high- or intermediate-pressure zone rises to within 90 percent of the set point for emergency pressure relief devices.

**606.10.1.2 Manual operation.** When required by the *fire code official*, automatic crossover valves shall be capable of manual operation.

**606.10.1.3 System design pressure.** Refrigeration system zones that are connected to a higher pressure zone by an automatic crossover valve shall be designed to safely contain the maximum pressure that can be achieved by interconnection of the two zones.

**606.10.2 Automatic emergency stop.** An automatic emergency stop feature shall be provided in accordance with Sections 606.10.2.1 and 606.10.2.2.

**606.10.2.1 Operation of an automatic crossover valve.** Operation of an automatic crossover valve shall cause all compressors on the affected system to immediately stop. Dedicated pressure-sensing devices located immediately adjacent to crossover valves shall be permitted as a means for determining operation of a valve. To ensure that the automatic crossover valve system provides a redundant means of stopping compressors in an overpressure condition, high-pressure cutout sensors associated with compressors shall not be used as a basis for determining operation of a crossover valve.

**606.10.2.2 Overpressure in low-pressure zone.** The lowest pressure zone in a refrigeration system shall be provided with a dedicated means of determining a rise in system pressure to within 90 percent of the set point for emergency pressure relief devices. Activation of the overpressure sensing device shall cause all compressors on the affected system to immediately stop.

**606.11 Storage, use and handling.** Flammable and combustible materials shall not be stored in machinery rooms for refrigeration systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant. Storage, use or handling of extra refrigerant or refrigerant oils shall be as required by Chapters 50, 53, 55 and 57.

**Exception:** This provision shall not apply to spare parts, tools and incidental materials necessary for the safe and proper operation and maintenance of the system.

**606.12 Termination of relief devices.** Pressure relief devices, fusible plugs and purge systems for refrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerants shall be provided with an *approved* discharge system as required by Sections 606.12.1, 606.12.2 and 606.12.3. Discharge piping and devices connected to the discharge side of a fusible plug or rupture member shall have provisions to prevent plugging the pipe in the event of the fusible plug or rupture member functions.

**606.12.1 Flammable refrigerants.** Systems containing flammable refrigerants having a density equal to or greater than the density of air shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section 606.12.4 or a flaring system in



accordance with Section 606.12.5. Systems containing flammable refrigerants having a density less than the density of air shall be permitted to discharge vapor to the atmosphere provided that the point of discharge is located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or *exit*.

**606.12.2 Toxic and highly toxic refrigerants.** Systems containing toxic or highly toxic refrigerants shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section 606.12.4 or a flaring system in accordance with Section 606.12.5.

**606.12.3 Ammonia refrigerant.** Systems containing ammonia refrigerant shall discharge vapor to the atmosphere through an *approved* treatment system in accordance with Section 606.12.4, a flaring system in accordance with Section 606.12.5, or through an *approved* ammonia diffusion system in accordance with Section 606.12.6, or by other *approved* means.

**Exceptions:**

1. Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.
2. When the *fire code official* determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire, health or environmental hazard would not result from discharging ammonia directly to the atmosphere.

**606.12.4 Treatment systems.** Treatment systems shall be designed to reduce the allowable discharge concentration of the refrigerant gas to not more than 50 percent of the IDLH at the point of exhaust. Treatment systems shall be in accordance with Chapter 60.

**606.12.5 Flaring systems.** Flaring systems for incineration of flammable refrigerants shall be designed to incinerate the entire discharge. The products of refrigerant incineration shall not pose health or environmental hazards. Incineration shall be automatic upon initiation of discharge, shall be designed to prevent blowback and shall not expose structures or materials to threat of fire. Standby fuel, such as LP gas, and standby power shall have the capacity to operate for one and one-half the required time for complete incineration of refrigerant in the system.

**606.12.6 Ammonia diffusion systems.** Ammonia diffusion systems shall include a tank containing 1 gallon of water for each pound of ammonia (4 L of water for each 1 kg of ammonia) that will be released in 1 hour from the largest relief device connected to the discharge pipe. The water shall be prevented from freezing. The discharge pipe from the pressure relief device shall distribute ammonia in the bottom of the tank, but no lower than 33 feet (10 058 mm) below the maximum liquid level. The tank shall contain the volume of water and ammonia without overflowing.

**606.13 Discharge location for refrigeration machinery room ventilation.** Exhaust from mechanical ventilation sys-

tems serving refrigeration machinery rooms containing flammable, toxic or highly toxic refrigerants, other than ammonia, capable of exceeding 25 percent of the LFL or 50 percent of the IDLH shall be equipped with *approved* treatment systems to reduce the discharge concentrations to those values or lower.

**606.14 Notification of refrigerant discharges.** The *fire code official* shall be notified immediately when a discharge becomes reportable under state, federal or local regulations in accordance with Section 5003.3.1.

**606.15 Records.** A written record shall be kept of refrigerant quantities brought into and removed from the premises. Such records shall be available to the *fire code official*.

**606.16 Electrical equipment.** Where refrigerants of Groups A2, A3, B2 and B3, as defined in the *International Mechanical Code*, are used, refrigeration machinery rooms shall conform to the Class I, Division 2 hazardous location classification requirements of NFPA 70.

**Exception:** Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.3 of the *International Mechanical Code*.

## SECTION 607 ELEVATOR OPERATION, MAINTENANCE AND FIRE SERVICE KEYS

**607.1 Emergency operation.** Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in Chapter 11. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1.

**[B] 607.2 Emergency signs.** An *approved* pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the *exit stairways* and not to use the elevators in case of fire. The sign shall read: IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS.

**Exceptions:**

1. The emergency sign shall not be required for elevators that are part of an accessible *means of egress* complying with Section 1007.4.
2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008 of the *International Building Code*.

**607.3 Fire service access elevator lobbies.** Where fire service access elevators are required by Section 3007 of the *International Building Code*, fire service access elevator lobbies shall be maintained free of storage and furniture.

**607.4 Elevator key location.** Keys for the elevator car doors and fire-fighter service keys shall be kept in an *approved* location for immediate use by the fire department.

**607.5 Standardized fire service elevator keys.** Buildings with elevators equipped with Phase I emergency recall, Phase II emergency in-car operation, or a fire service access eleva-

tor shall be equipped to operate with a standardized fire service elevator key *approved* by the *fire code official*.

**Exception:** The owner shall be permitted to place the building’s nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.

**607.5.1 Requirements for standardized fire service elevator keys.** Standardized fire service elevator keys shall comply with all of the following:

1. All fire service elevator keys within the jurisdiction shall be uniform and specific for the jurisdiction. Keys shall be cut to a uniform key code.
2. Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.
3. Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. No uncut key blanks shall be permitted to leave the factory.
4. Fire service elevator keys subject to these rules shall be engraved with the words “DO NOT DUPLICATE.”

**607.5.2 Access to standardized fire service keys.** Access to standardized fire service elevator keys shall be restricted to the following:

1. Elevator owners or their authorized agents.
2. Elevator contractors.
3. Elevator inspectors of the jurisdiction.
4. *Fire code officials* of the jurisdiction.
5. The fire department and other emergency response agencies designated by the *fire code official*.

**607.5.3 Duplication or distribution of keys.** No person shall duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.

**607.5.4 Responsibility to provide keys.** The building *owner* shall provide up to three standardized fire service elevator keys where required by the *fire code official*, upon installation of a standardized fire service key switch or switches in the building.

**SECTION 608  
STATIONARY STORAGE BATTERY SYSTEMS**

**608.1 Scope.** Flooded lead-acid, nickel cadmium and valve-regulated lead-acid (VRLA) stationary storage battery systems of greater than seven batteries or over 600 amp-hour capacity, or more than 1,000 pounds (454 kg) for lithium-ion and lithium metal polymer, used for facility standby power, emergency power or uninterruptible power supplies shall comply with this section and Table 608.1. Stationary storage battery systems shall not be located in a space with an open combustion source.

**608.2 Safety caps.** Safety caps for stationary storage battery systems shall comply with Sections 608.2.1 and 608.2.2.

**608.2.1 Nonrecombinant batteries.** Vented lead-acid, nickel-cadmium or other types of nonrecombinant batteries shall be provided with safety venting caps.

**608.2.2 Recombinant batteries.** VRLA batteries shall be equipped with self-resealing flame-arresting safety vents.

**608.3 Thermal runaway.** VRLA and lithium metal polymer battery systems shall be provided with a *listed* device or other

**TABLE 608.1  
BATTERY REQUIREMENTS**

REQUIREMENT	NONRECOMBINANT BATTERIES		RECOMBINANT BATTERIES		OTHER BATTERIES
	Vented (Flooded) Lead Acid Batteries	Vented (Flooded) Nickel-Cadmium (Ni-Cd) Batteries	Valve Regulated Lead-Acid (VRLA) Cells	Lithium-Ion Cells	Lithium Metal Cells
Safety caps	Venting caps (608.2.1)	Venting caps (608.2.1)	Self-resealing flame-arresting caps (608.2.2)	No caps	No caps
Thermal runaway management	Not required	Not required	Required (608.3)	Not required	Required (608.3)
Spill control	Required (608.5)	Required (608.5)	Not required	Not required	Not required
Neutralization	Required (608.5.1)	Required (608.5.1)	Required (608.5.2)	Not required	Not required
Ventilation	Required (608.6.1; 608.6.2)	Required (608.6.1; 608.6.2)	Required (608.6.1; 608.6.2)	Not required	Not required
Signage	Required (608.7)	Required (608.7)	Required (608.7)	Required (608.7)	Required (608.7)
Seismic protection	Required (608.8)	Required (608.8)	Required (608.8)	Required (608.8)	Required (608.8)
Smoke detection	Required (608.9)	Required (608.9)	Required (608.9)	Required (608.9)	Required (608.9)

*approved* method to preclude, detect and control thermal runaway.

**608.4 Room design and construction.** Enclosure of stationary battery systems shall comply with the *International Building Code*. Battery systems shall be allowed to be in the same room with the equipment they support.

**608.4.1 Separate rooms.** When stationary batteries are installed in a separate equipment room accessible only to authorized personnel, they shall be permitted to be installed on an open rack for ease of maintenance.

**608.4.2 Occupied work centers.** When a system of VRLA, lithium-ion, or other type of sealed, nonventing batteries is situated in an occupied work center, it shall be allowed to be housed in a noncombustible cabinet or other enclosure to prevent access by unauthorized personnel.

**608.4.3 Cabinets.** When stationary batteries are contained in cabinets in occupied work centers, the cabinet enclosures shall be located within 10 feet (3048 mm) of the equipment that they support.

**608.5 Spill control and neutralization.** An *approved* method and materials for the control and neutralization of a spill of electrolyte shall be provided in areas containing lead-acid, nickel-cadmium or other types of batteries with free-flowing liquid electrolyte. For purposes of this paragraph, a “spill” is defined as any unintentional release of electrolyte.

**Exception:** VRLA, lithium-ion, lithium metal polymer or other types of sealed batteries with immobilized electrolyte shall not require spill control.

**608.5.1 Nonrecombinant battery neutralization.** For battery systems containing lead acid, nickel cadmium or other types of batteries with free-flowing electrolyte, the method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5.0 and 9.0.

**608.5.2 Recombinant battery neutralization.** For VRLA or other types of batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.

**Exception:** Lithium-ion and lithium metal polymer batteries shall not require neutralization.

**608.6 Ventilation.** Ventilation of stationary storage battery systems shall comply with Sections 608.6.1 and 608.6.2.

**608.6.1 Room ventilation.** Ventilation shall be provided in accordance with the *International Mechanical Code* and the following:

1. For flooded lead-acid, flooded Ni-Cd and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the room; or
2. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot

(1 ft<sup>3</sup>/min/ft<sup>2</sup>) [0.0051 m<sup>3</sup>/s · m<sup>2</sup>] of floor area of the room.

**Exception:** Lithium-ion and lithium metal polymer batteries shall not require additional ventilation beyond that which would normally be required for human occupancy of the space in accordance with the *International Mechanical Code*.

**608.6.2 Cabinet ventilation.** When VRLA batteries are installed inside a cabinet, the cabinet shall be *approved* for use in occupied spaces and shall be mechanically or naturally vented by one of the following methods:

1. The cabinet ventilation shall limit the maximum concentration of hydrogen to 1 percent of the total volume of the cabinet during the worst-case event of simultaneous “boost” charging of all the batteries in the cabinet; or
2. When calculations are not available to substantiate the ventilation rate, continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot [1 ft<sup>3</sup>/min/ft<sup>2</sup> or 0.0051 m<sup>3</sup>/(s · m<sup>2</sup>)] of floor area covered by the cabinet. The room in which the cabinet is installed shall also be ventilated as required in Section 608.6.1.

**608.6.3 Supervision.** Mechanical ventilation systems where required by Sections 608.6.1 and 608.6.2 shall be supervised by an *approved* central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

**608.7 Signage.** Signs shall comply with Sections 608.7.1 and 608.7.2.

**608.7.1 Equipment room and building signage.** Doors into electrical equipment rooms or buildings containing stationary battery systems shall be provided with *approved* signs. The signs shall state that:

1. The room contains energized battery systems.
2. The room contains energized electrical circuits.
3. The battery electrolyte solutions, where present, are *corrosive* liquids.

**608.7.2 Cabinet signage.** Cabinets shall have exterior labels that identify the manufacturer and model number of the system and electrical rating (voltage and current) of the contained battery system. There shall be signs within the cabinet that indicate the relevant electrical, chemical and fire hazards.

**608.8 Seismic protection.** The battery systems shall be seismically braced in accordance with the *International Building Code*.

**608.9 Smoke detection.** An *approved* automatic smoke detection system shall be installed in accordance with Section 907.2 in rooms containing stationary battery systems.

**SECTION 609  
COMMERCIAL KITCHEN HOODS**

[M] **609.1 General.** Commercial kitchen exhaust hoods shall comply with the requirements of the *International Mechanical Code*.

[M] **609.2 Where required.** A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease vapors. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.

**Exception:** Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.

[M] **609.2.1 Type I hoods.** Type I hoods shall be installed where cooking *appliances* produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over *medium-duty, heavy-duty and extra-heavy-duty cooking appliances*. Type I hoods shall be installed over *light-duty cooking appliances* that produce grease or smoke.

**Exception:** A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m<sup>3</sup> or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m<sup>3</sup>/s) in accordance with Section 17 of UL 710B.

[M] **609.2.1.1 Operation.** Type I hood systems shall be designed and installed to automatically activate the exhaust fan whenever cooking operations occur. The activation of the exhaust fan shall occur through an interlock with the cooking appliances, by means of heat sensors or by means of other *approved* methods. A method of interlock between an exhaust hood system and appliances equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking appliances shall not involve or depend upon any component of a fire extinguishing system.

[M] **609.2.1.2 Exhaust flow rate label.** Type I hoods shall bear a label indicating the minimum flow rate in CFM per linear foot (1.55 L/s per linear meter) of hood that provides for capture and containment of the exhaust effluent for the cooking appliances served by the hood, based on the cooking appliances duty classifications defined in this code.

[M] **609.2.2 Type II hoods.** Type II hoods shall be installed above dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all appliances that produce products of *combustion* and do not

produce grease or smoke as a result of the cooking process. Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m<sup>3</sup>/s). For the purpose of determining the floor area required to be exhausted, each individual *appliance* that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m<sup>2</sup>). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [.00356 m<sup>3</sup>/(s · m<sup>2</sup>)].

[M] **609.2.3 Domestic cooking appliances used for commercial purposes.** Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 609.2, 609.2.1 and 609.2.2.

**Exception:** A single domestic cooking appliance installed where domestic cooking operations occur, such as in a church, day-care center, fire station, employee lunchroom, or similar types of commercial occupancies shall meet the requirements of Section 505.1 of the *International Mechanical Code*.

[M] **609.2.4 Extra-heavy duty.** Type I hoods for use over *extra-heavy-duty cooking appliances* shall not cover *heavy-, medium- or light-duty appliances*. Such hoods shall discharge to an exhaust system that is independent of other exhaust systems.

**609.3 Operations and maintenance.** Commercial cooking systems shall be operated and maintained in accordance with Sections 609.3.1 through 609.3.4 and NFPA 96.

**609.3.1 Ventilation system.** The ventilation system in connection with hoods shall be operated at the required rate of air movement, and classified grease filters shall be in place when equipment under a kitchen grease hood is used.

**609.3.2 Grease extractors.** Where grease extractors are installed, they shall be operated when the commercial-type cooking equipment is used.

**609.3.3 Cleaning.** Hoods, grease-removal devices, fans, ducts and other appurtenances shall be cleaned at intervals as required by Sections 609.3.3.1 through 609.3.3.3.

**609.3.3.1 Inspection.** Hoods, grease-removal devices, fans, ducts and other appurtenances shall be inspected at intervals specified in Table 609.3.3.1 or as *approved* by the *fire code official*. Inspections shall be completed by qualified individuals.

**TABLE 609.3.3.1  
COMMERCIAL COOKING SYSTEM INSPECTION FREQUENCY**

TYPE OF COOKING OPERATIONS	FREQUENCY OF INSPECTION
High-volume cooking operations such as 24-hour cooking, charbroiling or wok cooking	3 months
Low-volume cooking operations such as places of religious worship, seasonal businesses and senior centers	12 months
Cooking operations utilizing solid fuel-burning cooking appliances	1 month
All other cooking operations	6 months

**609.3.3.2 Grease accumulation.** If during the inspection it is found that hoods, grease-removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned.

**609.3.3.3 Records.** Records for inspections shall state the individual and company performing the inspection, a description of the inspection and when the inspection took place. Records for cleanings shall state the individual and company performing the cleaning and when the cleaning took place. Such records shall be completed after each inspection or cleaning, maintained on the premises for a minimum of three years and be copied to the *fire code official* upon request.

**609.3.4 Extinguishing system service.** Automatic fire-extinguishing systems protecting commercial cooking systems shall be serviced as required in Section 904.11.6.

**SECTION 610  
COMMERCIAL KITCHEN COOKING  
OIL STORAGE**

**610.1 General.** Storage of cooking oil (grease) in commercial cooking operations shall comply with Chapter 57. Systems used to store cooking oils in larger than 60-gallon (227 L) above-ground tanks shall also comply with Sections 610.2 through 610.5. For purposes of this section, cooking oil shall be classified as a Class IIIB liquid unless otherwise determined by testing.

**610.2 Storage tanks.** Cooking oil storage tanks shall be installed in accordance with Section 5704 and the tank manufacturer's instructions.

**610.3 Other storage components.** Cooking oil storage system components including, but not limited to, piping, connections, fittings, valves, tubing and other related components used for the transfer of cooking oil from the cooking appliance to the storage tank, and from the storage tank to the discharge point, shall be installed in accordance with Section 5703.6.

**610.4 Tank venting.** Normal and emergency venting for cooking oil storage tanks shall terminate outside the building as specified in Sections 5704.2.7.3 and 5704.2.7.4.

**610.5 Electrical equipment.** Electrical equipment used for the operation and heating of the cooking oil storage system shall be listed and comply with NFPA 70.

