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 power systems and legally required 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, fuel tanks connected to emergency and legally required standby power 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.

603.3.2 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).

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

2. Tanks installed in accordance with Administrative Rule 34.01.04 Use of Protected Aboveground Tanks For Fuel Storage Inside Buildings and any future revisions of this rule adopted by the fire code official.

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.

Exceptions: 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, and 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 dwellings.
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 Chimbneys and appliances. Chimbneys, 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 arrester. 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 LEGALLY REQUIRED 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 legally required 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. Emergency power shall be provided for smoke control systems in accordance with Section 909.11.

Exception: Legally required standby power is acceptable for shaft pressurization systems in low-rise buildings.

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. Emergency 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. Emergency power 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. Emergency 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. Legally required 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 legally required 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. Emergency 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 m²) and open mall buildings exceeding 50,000 square feet (4645 m²) within the established perimeter line shall be provided with legally required standby power systems that are capable of operating the emergency voice/alarm communication system.

604.2.14 High-rise buildings. Emergency 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 Emergency power. An emergency power system shall be provided. Where the emergency 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.

Exception: A separate room for the generator set is not required for systems having fuel quantities meeting the limits of Section 603.3 when located in a sprinklered parking garage of Type I or II construction.
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.

(\text{Exception: When approved, the system shall be allowed to be supplied by natural gas pipelines.)}

604.2.14.1.2 Capacity. The ((standby)) emergency 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 403.6 and 403.((4.3.2)) of the International Building Code, as applicable, shall be transferable to the ((standby)) emergency source. ((Standby)) Emergency 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)) emergency 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)) emergency 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)) Emergency power. An ((standby)) emergency power system complying with this section and NFPA 70 shall be provided for ((standby)) emergency power loads as specified in Section 604.2.15.1.1.

[B] 604.2.15.1.1 ((Standby)) Emergency power loads. The following loads are classified as ((standby)) emergency power loads:

1. Smoke control system.
2. Ventilation and automatic fire detection equipment for smokeproof enclosures.
3. Fire pumps.
4. ((Standby)) Emergency power shall be provided for elevators in accordance with Section 3003 of the International Building Code and escalators in accordance with NFPA 130.
5. Emergency voice/alarm communication systems.
6. Fire alarm systems.
7. Automatic fire detection systems.
8. Elevator car lighting.

604.2.15.1.2 Pickup time. The ((standby)) emergency 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.)

[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-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.

604.2.17 Airport traffic control towers. A legally required 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.

604.2.18 Elevators. In buildings and structures where legally required standby or emergency power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 604.2.18.1 through 604.2.18.4.
604.2.18.1 Manual transfer. (standby) Legally required standby power or emergency power shall be manually transferable to all elevators in each bank.

604.2.18.2 One elevator. Where only one elevator is installed, the elevator shall automatically transfer to (standby) legally required standby power or emergency power within 60 seconds after failure of normal power. 

604.2.18.3 Two or more elevators. Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to (standby) legally required standby power or emergency power within 60 seconds after failure of normal power where the (standby) legally required standby power or emergency power source is of sufficient capacity to operate all elevators at the same time. Where the (standby) legally required standby power or emergency power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to (standby) legally required standby power or emergency power in sequence, return to the designated landing and disconnect from the (standby) legally required standby power or emergency power source. After all elevators have been returned to the designated level, at least one elevator shall remain operable from the (standby) legally required standby power or emergency power source.

604.2.18.4 Machine room ventilation. Where (standby) legally required standby power or emergency power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the (standby) legally required standby power or emergency power source.

604.2.19 Refrigeration systems. If treatment, detection, continuous ventilation, or alarm systems are required for refrigeration systems, such systems shall be connected to a legally required standby power source in the event of loss from the primary source.

604.3 Maintenance. Emergency and legally required 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 legally required 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 legally required 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 legally required standby power system and (be available for inspection by) shall be submitted to the fire code official in accordance with Administrative Rule 9.02.09. Confidence Test Requirements for Life Safety Systems and any future revisions of this rule adopted by the fire code official.

604.3.3 Switch maintenance. Emergency and legally required 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 or legally required 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 overcurrent 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 environmental 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 multiplug 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-2 and in accordance with Sections 605.10.1 through 605.10.4.

Exception: The use of portable, electric space heaters in which the heating element cannot exceed a temperature of 212°F (100°C) shall be permitted in nonsleeping staff and employee areas in Group I-2 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 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Section [W].
BUILDING SERVICES AND SYSTEMS

Sections 605.11.1 through 605.11.4, the International Building Code and NFPA 70.

Exception: Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.

605.11.1 Marking. Marking is required on interior and exterior direct-current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes, and disconnects.

605.11.1.1 Materials. The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in Sections 605.11.1.2 through 605.11.1.4 shall have all letters capitalized with a minimum height of 1/8 inch (9.5 mm) white on red background.

605.11.1.2 Marking content. The marking shall contain the words “WARNING: PHOTOVOLTAIC POWER SOURCE.”

605.11.1.3 Main service disconnect. The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.

605.11.1.4 Location of marking. Marking shall be placed on interior and exterior DC conduit, raceways, enclosures, and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends and within 1 foot (305 mm) above and below penetrations of roof/ceiling assemblies, walls or barriers.

605.11.2 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members.

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.

Exceptions:

1. Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.

2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

605.11.3.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

605.11.3.2 Residential systems for one- and two-family dwellings. Access to residential systems for one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.

605.11.3.2.1 Residential buildings with hip roof layouts. Panels/modules installed on residential buildings with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels/modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.2 Residential buildings with a single ridge. Panels/modules installed on residential buildings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels/modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.3 Residential buildings with roof hips and valleys. Panels/modules installed on residential buildings with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.4 Residential building smoke ventilation. Panels/modules installed on residential buildings shall be located no higher than 3 feet (914 mm) below the ridge in order to allow for fire department smoke ventilation operations.

605.11.3.3 Other than residential buildings. Access to systems for occupancies other than one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.
Exception: Where it is determined by the fire code official that the roof configuration is similar to that of a one- or two-family dwelling, the residential access and ventilation requirements in Sections 605.11.3.2.1 through 605.11.3.2.4 shall be permitted to be used.

605.11.3.3.1 Access. There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, there shall be a minimum 4-foot-wide (1290 mm) clear perimeter around the edges of the roof.

605.11.3.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting the live load of fire fighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof.
3. Shall be a straight line not less than 4 feet (1290 mm) clear to skylights or ventilation hatches.
4. Shall be a straight line not less than 1 feet (1290 mm) clear to roof standpipes.
5. Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

605.11.3.3.3 Smoke ventilation. The solar installation shall be designed to meet the following requirements:

1. Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:
   2.1. A pathway 8 feet (2438 mm) or greater in width.
   2.2. A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or smoke and heat vents.
   2.3. A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) “venting cutouts” every 20 feet (6096 mm) on alternating sides of the pathway.

605.11.4 Ground-mounted photovoltaic arrays. Ground mounted photovoltaic arrays shall comply with Sections 605.11 through 605.11.2 and this section. Set-back requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground-mounted photovoltaic arrays.)

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)) detection system. Machinery rooms shall contain a refrigerant ((detector)) detection system
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) Seattle 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 in the machinery room. Additionally, this equipment shall be automatically shut off whenever the refrigerant 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 accord-
dance 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 systems 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.

606.17 Standby power. Where mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be provided with legally required standby power.

Exception: Legally required standby power is not required where an approved fail-safe engineered system is installed.

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 and Seattle Building Code.

[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 elevator key box in accordance with Section 506.12.

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

( Exceptions: 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:
TABLE 608.1
BATTERY REQUIREMENTS

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>NONRECOMBINANT BATTERIES</th>
<th>RECOMBINANT BATTERIES</th>
<th>OTHER BATTERIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vented (Flooded) Lead Acid Batteries</td>
<td>Vented (Flooded) Nickel-Cadmium (Ni-Cd) Batteries</td>
<td>Valve Regulated Lead-Acid (VRLA) Cells</td>
</tr>
<tr>
<td>Safety caps</td>
<td>Venting caps (608.2.1)</td>
<td>Venting caps (608.2.1)</td>
<td>Self-resealing flame-arresting caps (608.2.2)</td>
</tr>
<tr>
<td>Thermal runaway management</td>
<td>Not required</td>
<td>Not required</td>
<td>Required (608.3)</td>
</tr>
<tr>
<td>Spill control</td>
<td>Required (608.5)</td>
<td>Required (608.5)</td>
<td>Not required</td>
</tr>
<tr>
<td>Neutralization</td>
<td>Required (608.5.1)</td>
<td>Required (608.5.1)</td>
<td>Required (608.5.2)</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Required (608.6.1; 608.6.2)</td>
<td>Required (608.6.1; 608.6.2)</td>
<td>Required (608.6.1; 608.6.2)</td>
</tr>
<tr>
<td>Signage</td>
<td>Required (608.7)</td>
<td>Required (608.7)</td>
<td>Required (608.7)</td>
</tr>
<tr>
<td>Seismic protection</td>
<td>Required (608.8)</td>
<td>Required (608.8)</td>
<td>Required (608.8)</td>
</tr>
<tr>
<td>Smoke detection</td>
<td>Required (608.9)</td>
<td>Required (608.9)</td>
<td>Required (608.9)</td>
</tr>
</tbody>
</table>

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. Stationary storage battery systems having an electrolyte capacity of more than 50 gallons (189 L) for flooded lead-acid, nickel cadmium (Ni-Cd) and valve-regulated lead-acid (VRLA), or more than 1,000 pounds (454 kg) for lithium-ion and lithium metal polymer, used for facility legally required standby power, emergency power or uninterruptible power supplies shall comply with this section and Table 608.1.

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 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 ft³/min/ft²) [0.0051 m³/(s · m²)] 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 ft³/min/ft² or 0.0051 m³/(s · m²)] 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.

[W] [M] 609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and
国内用于商业用途的烹饪设备，产生油脂蒸汽。

**例外：**
1. 型I通气罩在R-2用途许可的州不被要求。
2. 型I通气罩不应要求在线电烹饪设备，根据批准的测试机构提供的数据，当在5 mg/m³或更少的流量下测量时，产生的副产品当在500 cfm的流量下。

609.3 操作和维护。商业烹饪系统应根据609.3.1到609.3.4和NFPA 96中所述进行操作和维护。

609.3.1 通气系统。通风系统与通气罩应保持在要求的速率下工作，并且分类的滤网应安装在设备下厨房通气罩是使用的。

609.3.2 油脂提取器。当油脂提取器被安装时，它们应当商业型烹饪设备使用时间而被操作。

609.3.3 清洁。罩子，油脂去除装置，风扇，管道和其他装置应按表609.3.3.1或根据火官的要求被检查。

609.3.3.1 检查。罩子，油脂去除装置，风扇，管道和其他装置应按表609.3.3.1或根据火官的要求被检查。检查应由合格的个人完成。

### 表609.3.3.1

<table>
<thead>
<tr>
<th>类型的烹饪系统</th>
<th>检查频率</th>
</tr>
</thead>
<tbody>
<tr>
<td>高密度烹饪操作，如24小时烹饪，烧烤或火锅烹饪</td>
<td>3个月</td>
</tr>
<tr>
<td>低密度烹饪操作，如宗教场所，季节性企业和老人中心</td>
<td>12个月</td>
</tr>
<tr>
<td>利用固体燃料烹饪设备的烹饪操作</td>
<td>1个月</td>
</tr>
<tr>
<td>其他所有烹饪操作</td>
<td>6个月</td>
</tr>
</tbody>
</table>

609.3.3.2 油脂积累。如果在检查期间发现罩子，油脂去除装置，风扇，管道或其他装置有油脂的积累，这样的部件应被清洁。

609.3.3.3 记录。记录应由个人和公司完成。

609.4 灭火系统服务。自动灭火系统应按NFPA 70，第904.11.6节所述进行维护。

### 部分610

#### 610.1 通用

商业烹饪操作的存储应符合第577节。系统用于存储超过60加仑（227 L）的烹饪油，应按部610.2和610.5所述进行维护。对于本部分，烹饪油应被分类为IIIIB液体，除非另有规定。

610.2 存储罐。烹饪油存储罐应按UL 142或UL 80所述进行安装。

610.3 其他存储部件。烹饪油存储系统应包括，但不局限到，管道，接头，阀门，软管和其他相关部件。

610.4 储罐通风。正常和紧急通风应按5704。2.7.3和5704.2.7.4所述进行。

610.5 电气设备。电气设备应按5704.2.7.3和5704.2.7.4所述进行。

### 附录

#### 610.3

<table>
<thead>
<tr>
<th>类型的烹饪操作</th>
<th>检查频率</th>
</tr>
</thead>
<tbody>
<tr>
<td>高密度烹饪操作，如24小时烹饪，烧烤或火锅烹饪</td>
<td>3个月</td>
</tr>
<tr>
<td>低密度烹饪操作，如宗教场所，季节性企业和老人中心</td>
<td>12个月</td>
</tr>
<tr>
<td>利用固体燃料烹饪设备的烹饪操作</td>
<td>1个月</td>
</tr>
<tr>
<td>其他所有烹饪操作</td>
<td>6个月</td>
</tr>
</tbody>
</table>

609.3.3.2 油脂积累。如果在检查期间发现罩子，油脂去除装置，风扇，管道或其他装置有油脂的积累，这样的部件应被清洁。

609.3.3.3 记录。记录应由个人和公司完成。