

1301:7-7-06**Building services and systems.****(A) Section 601 General**

(1) 601.1 Scope. The provisions of this rule 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.

(2) 601.2 Permits. Permits shall be obtained for refrigeration systems, battery systems and solar photovoltaic power systems as set forth in rule 1301:7-7-01 of the Administrative Code.

(B) Section 602 Definitions

(1) 602.1 Definitions. The following terms are defined in rule 1301:7-7-02 of the Administrative Code.

"Battery system, stationary lead acid."

"Battery types."

[M] "Commercial cooking appliances."

"Critical circuit."

"Emergency power system."

[M] "Hood."

"Type I."

"Type II."

"Refrigerant."

"Refrigeration system."

"Standby power system."

(C) Section 603 Fuel-fired appliances

(1) 603.1 Installation. The installation of nonportable fuel gas appliances and systems shall comply with the International Fuel Gas Code as listed in rule 1301:7-7-80 of the Administrative Code. The installation of all other fuel-fired appliances,

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other than internal combustion engines, oil lamps and portable devices such as blow torches, melting pots and weed burners, shall comply with this paragraph and the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.

- (a) 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.
- (b) 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 mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.
- (c) 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 paragraph (E)(605) of this rule and NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code.
- (d) 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 where utilized in equipment listed for use with waste oil and where such equipment is installed in accordance with the manufacturer's instructions and the terms of its listing.
- (e) 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.
- (f) 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.
 - (i) 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.

(ii) 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 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.

(g) 603.1.7 Clearances. Working clearances between oil-fired appliances and electrical panelboards and equipment shall be in accordance with NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code. Clearances between oil-fired equipment and oil supply tanks shall be in accordance with NFPA 31 as listed in rule 1301:7-7-80 of the Administrative Code.

(2) 603.2 Chimneys. Masonry chimneys shall be constructed in accordance with the building code as listed in rule 1301:7-7-80 of the Administrative Code. Factory-built chimneys shall be installed in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code. Metal chimneys shall be constructed and installed in accordance with NFPA 211 as listed in rule 1301:7-7-80 of the Administrative Code.

(3) 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 mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.

(a) 603.3.1 Permits. Permits shall be required as set forth in rule 1301:7-7-01 of the Administrative Code for fuel oil storage systems exceeding 60 gallons in storage capacity.

Exception: Fuel oil storage tanks with a capacity of less than 1,100 gallons and utilized for residential purposes.

(b) 603.3.2 Fuel oil storage in outside, aboveground 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 as listed in rule 1301:7-7-80 of the Administrative Code.

(c) 603.3.3 Fuel oil storage inside buildings. Fuel oil storage inside buildings shall comply with paragraphs (C)(3)(c)(i)(603.3.3.1) to (C)(3)(c)(v) (603.3.3.5) of this rule or rule 1301:7-7-57 of the Administrative Code.

(i) 603.3.3.1 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 aboveground tanks complying with paragraph (D)(2)(i)(vii)(5704.2.9.7) of rule 1301:7-7-57 of the Administrative Code, where all of the following conditions are met:

1. The entire 3,000 gallon (11 356 L) quantity shall be stored in protected aboveground tanks.

2. The 3,000 gallon (11 356 L) capacity shall be permitted to be stored in a single tank or multiple smaller tanks.

3. Normal and emergency venting shall be provided in accordance with NFPA 30 as listed in rule 1301:7-7-80 of the Administrative Code except that the vent capacity reduction factors shall not be allowed. Normal vent shall terminate to the outside of the building.

4. Flame arrestors or pressure vacuum breather valves shall be installed in normal vents.

5. Secondary containment, drainage control or diking shall be provided in accordance with paragraph (D)(2)(5004.2) of rule 1301:7-7-50 of the Administrative Code.

6. An overfill prevention system that prevents the tank from being filled in excess of 95 per cent of its capacity shall be provided for each tank. Filling procedure information shall be available accessible to the person filling the tanks.

7. The fill pipe shall be provided with a means of making a direct connection to the fuel delivery hose so that the delivery of fuel is not exposed to the open air during the filling operation. The fill line shall terminate to the outside.

8. A noncombustible fixed spill container having a capacity of not less than 5 gallons (19 L) shall be provided for each fill connection. The spill container shall be equipped with a manual drain valve that drains into the primary tank.
9. Approved anti-siphon devices shall be installed in each external pipe connected to the protected above-ground tank when the pipe extends below the level of the top of the tank; and
10. The tanks shall be located in a room protected by an automatic sprinkler system complying with paragraph (C)(3)(a)(i)(903.3.1.1) of rule 1301:7-7-09 of the Administrative Code.
- (ii) 603.3.3.2 Restricted use and connection. Tanks installed in accordance with paragraph (C)(3)(c)(603.3.3) of this rule shall be used only to supply fuel oil to fuel-burning or generator equipment installed in accordance with paragraph (C)(3)(c)(iv)(603.3.3.4) of this rule. Connections between tanks and equipment supplied by such tanks shall be made using closed piping systems.
- (iii) 603.3.3.3 Applicability of maximum allowable quantity and control area requirements. The quantity of combustible liquid stored in tanks complying with paragraph (C)(3)(c)(603.3.3) of this rule shall not be counted towards the maximum allowable quantity set forth in Table 5003.1.1(1) of rule 1301:7-7-50 of the Administrative Code, and such tanks shall not be required to be located in a control area.
- (iv) 603.3.3.4 Installation. Tanks and piping systems shall be installed and separated from other uses in accordance with section 915 and chapter 13 both of the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code, as applicable.
- Exception: Protected aboveground tanks complying with paragraph (D0(2)(i)(vii)(5704.2.9.7) of rule 1301:7-7-57 of the Administrative Code shall not be required to be separated from surrounding areas.
- (v) 603.3.3.5 Tanks in basements. Tanks in basements shall be located not more than two stories below grade plane.
- (d) 603.3.4 Additional protection. Aboveground tanks for the storage of fuel oil shall be safeguarded from public access or unauthorized entry. Additional

protection meeting the requirements of paragraph (D)(1)(b)(3404.1.2) of rule 1301:7-7-34 of the Administrative Code shall be provided.

Exceptions:

1. Facilities enclosed by a perimeter security fence where the public is prohibited from accessing the fuel oil storage area.

2. Tanks enclosed in vaults.

3. Fuel oil storage tanks with a capacity of less than 660 gallons and utilized for residential purposes.

(e) 603.3.5 Underground storage of fuel oil. The storage of fuel oil in underground storage tanks shall comply with NFPA 31 as listed in rule 1301:7-7-80 of the Administrative Code.

(4) 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. Portable kerosene-fired space or room heaters shall be equipped with an automatic extinguishing tip-over device. Any natural gas-fired or liquid petroleum gas-fired space or room heater shall be equipped with an oxygen depletion safety shutoff system and the source of fuel shall be piped from a location outside the building. All unvented heaters shall be marked by the manufacturer in some conspicuous manner that the heater has been approved and listed by one of the authoritative sources listed in rule 1301:7-7-01 of the Administrative Code.

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 paragraph (C)(5)(b)(603.5.2) of this rule.

(a) 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. No unvented kerosene heater shall be located in any building means of egress.

- (b) 603.4.2 Elevation not permitted. No unvented kerosene heater shall be elevated by being placed upon a stand or otherwise placed or suspended above the floor.
- (c) 603.4.3 Placement restrictions. No unvented kerosene heater shall be placed within three feet of any furniture, drapery, curtain, decorative material, accessory, appliance, equipment, merchandise, goods, or fixture, or any other thing, which is or may be combustible.
- (d) 603.4.4 Must be attended. No unvented kerosene heater shall be left unattended while it is operating.
- (e) 603.4.5 Non-combustible mat required. Every unvented kerosene heater shall be set and centered upon a noncombustible mat or shallow base, the dimensions of which shall be sufficient to allow at least three feet of the mat or base to extend outward in any direction from any part of the unvented kerosene heater.
- (f) 603.4.6 Ventilation required. Every unvented kerosene heater shall be used in an area where there is adequate ventilation, as recommended by the manufacturer of such heater.
- (g) 603.4.7 Cool-down required. No unvented kerosene heater shall be fueled or refueled while it is operating or within ten minutes of flame extinguishment, or contrary to the instructions of its manufacturer.
- (h) 603.4.8 Fueling prohibited. No unvented kerosene heater or its fuel reservoir shall be fueled or refueled inside a building. All such fueling operations shall be performed outdoors.
- (i) 603.4.9 Fueling guidelines. Every unvented kerosene heater shall be fueled or refueled strictly in accordance with the instructions of its manufacturer.
- (j) 603.4.10 Fuel requirements. The fuel in every unvented kerosene heater shall be only No. 1-K kerosene as prescribed in paragraph (F)(9)(3406.9) of rule 1301:7-7-34 of the Administrative Code.
- (k) 603.4.11 Fuel storage. The fuel used in every unvented kerosene heater shall be stored away from occupied areas and in an approved container which shall be marked or labeled in a conspicuous manner to read: "1-K kerosene."
- (l) 603.4.12 Fire extinguisher requirements. At least one fire extinguisher with a minimum 2-A, 20-B:C rating and capacity shall be provided and available

for use within twenty-five feet of every unvented kerosene heater during its operation.

(m) 603.4.13 Manufacturer's instructions. No persons shall sell or offer for sale any kerosene heater in this state unless the manufacturer has provided instructions for operating the heater and certain information about its use, which shall include the following:

(i) All pertinent information bearing upon the assembly and installation of the heater.

(ii) All pertinent information bearing upon the proper operation, maintenance, and storage of the heater.

(iii) All pertinent information which might reasonably bear upon the health or life safety of persons in the vicinity of the heater if recommended assembly, installation, operational, or maintenance procedures are not respected.

(iv) All safety features incorporated in the heater shall be described.

(v) Instructions for starting or lighting the heater, regulating its flame or heat, and turning it off or extinguishing its flame.

(vi) Proper fueling procedures shall be set forth.

(vii) A cautionary warning that the heater may be extremely hot while in operation; that, therefore, it may burn, injure, or damage any person or thing contacting it; and that, in particular, infants, children, physically or mentally incompetent persons, and pets should be kept away from the unit.

(viii) A cautionary warning that the heater may be extremely hot while in operation; that, therefore, the heat radiating from it may ignite any combustible thing in close proximity; that it should not be placed within three feet of any furniture, drapery, curtain, clothing, or other thing which is or may be combustible; that, however, the heater may be placed against or within three feet of a combustible wall, provided the heater is specifically designed for such installation or placement.

(ix) A cautionary warning that the heater may be extremely hot while in operation; that, therefore, no fueling procedure, including the

removal of the fuel reservoir, should be carried out while the unit is operating and until it has cooled down.

- (x) A cautionary warning that the heater should not be moved while it is in operation.
 - (xi) A cautionary warning that neither the heater nor any surface of the heater should be used for the purpose of cooking or warming food, unless the heater is specifically designed for cooking and warming food.
 - (xii) A cautionary warning that no additive for the heater's fuel with a flashpoint below 100°F shall be used.
 - (xiii) The recommended minimum room size for the Btu output of the heater shall be set forth.
 - (xiv) The type and grade of fuel the heater is designed to use shall be set forth, together with any safety or fire hazard which might be involved if improper fuel is used.
 - (xv) A cautionary warning for every unvented kerosene heater, warning that when the heater is in operation the combustion process uses oxygen from the space being heated and returns carbon monoxide to the atmosphere as a product of combustion; that, without adequate ventilation, the depletion of oxygen may present a risk of asphyxiation; and that carbon monoxide is a colorless, odorless, highly poisonous gas which, without adequate ventilation, may cause headaches, dizziness, and nausea, or even be fatal.
 - (xvi) The ventilation requirements necessary for the safe operation of every unvented kerosene heater shall be set forth.
 - (xvii) A cautionary warning for every unvented kerosene heater, warning that the fuel used in such heater should be restricted to No. 1-K kerosene, as prescribed in this code, or "Fresh, High Quality, Crystal Clear Kerosene."
- (n) 603.4.14 Issuance of citation. If the state fire marshal, his authorized representative, or a certified fire safety inspector finds that the use of an unvented kerosene heater or the storage of its fuel is not in compliance with the provisions of this rule, the state fire marshal, his authorized representative, or a certified fire safety inspector shall issue a citation to

the responsible person as authorized by section 3737.42 of the Revised Code.

(5) 603.5 Portable outdoor gas-fired heating appliances. Portable gas-fired heating appliances located outdoors shall be in accordance with paragraphs (C)(5)(a)(603.5.1) to (C)(5)(c)(iv)(603.5.3.4) of this rule.

(a) 603.5.1 Location. Portable outdoor gas-fired heating appliances shall be located in accordance with paragraphs (C)(5)(a)(i)(603.5.1.1) to (C)(5)(b)(iv)(603.5.2.4) of this rule.

(i) 603.5.1.1 Prohibited locations. The storage or use of portable outdoor gas-fired heating appliances is prohibited in any of the following locations:

(a) Inside any occupancy when connected to the fuel gas container.

(b) Inside of tents, canopies and membrane structures.

(c) On exterior balconies.

Exception: As allowed in section 6.20 of NFPA 58 as listed in rule 1301:7-7-80 of the Administrative Code.

(ii) 603.5.1.2 Clearance to buildings. Portable outdoor gas-fire heating appliances shall be located not less than 5 feet (1524 mm) from buildings.

(iii) 603.5.1.3 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.

(iv) 603.5.1.4 Proximity to exits. Portable outdoor gas-fired heating appliances shall not be located within 5 feet (1524 mm) of exits or exit discharges.

(b) 603.5.2 Installation and operation. Portable outdoor gas-fired heating appliances shall be installed and operated in accordance with paragraphs (C)(5)(b)(i)(603.5.2.1) to (C)(5)(b)(iv)(603.5.2.4) of this rule.

- (i) 603.5.2.1 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.
- (ii) 603.5.2.2 Installation and maintenance. Portable outdoor gas-fired heating appliances shall be installed and maintained in accordance with the manufacturer's instructions.
- (iii) 603.5.2.3 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.
- (iv) 603.5.2.4 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.
- (c) 603.5.3 Gas containers. Fuel gas containers for portable outdoor gas-fired heating appliances shall comply with paragraphs (C)(5)(c)(i)(603.5.3.1) to (C)(5)(c)(iv)(603.5.3.4) of this rule.

 - (i) 603.5.3.1 Approved containers. Only approved DOTn or ASME gas containers shall be used.
 - (ii) 603.5.3.2 Container replacement. Replacement of fuel gas containers in portable outdoor gas-fired heating appliances shall not be conducted while the public is present.
 - (iii) 603.5.3.3 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).
 - (iv) 603.5.3.4 Indoor storage prohibited. Gas containers shall not be stored inside of buildings except in accordance with paragraph (I) (9)(6109.9) of rule 1301:7-7-61 of the Administrative Code.
- (6) 603.6 Heating appliances. Heating appliances shall be listed and shall comply with paragraphs (C)(6)(a)(603.6.1) to (C)(6)(b)(603.6.2) of this rule.

 - (a) 603.6.1 Guard against contact. The heating element or combustion chamber shall be permanently guarded so as to prevent accidental contact by persons or material.

- (b) 603.6.2 Heating appliance installation and maintenance. Heating appliances shall be installed and maintained in accordance with the manufacturer's instructions, the building code, the mechanical code, the International Fuel Gas Code and NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code.
- (7) 603.7 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.
- (a) 603.7.1 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 instructions or a flue lining system installed in accordance with the requirements of the building code as listed in rule 1301:7-7-80 of the Administrative Code and appropriate for the intended class of chimney service.
- (b) 603.7.2 Metal chimneys. Metal chimneys which are corroded or improperly supported shall be repaired or replaced.
- (c) 603.7.3 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 instructions.
- (d) 603.7.4 Factory-built chimneys. Existing factory-built chimneys that are damaged, corroded or improperly supported shall be repaired or replaced.
- (e) 603.7.5 Connectors. Existing chimney and vent connectors that are damaged, corroded or improperly supported shall be repaired or replaced.
- (8) 603.8 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.

- (a) 603.8.1 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 paragraph (C)(8)(603.8) of this rule) 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.
- (9) 603.9 Incinerators. Commercial, industrial and residential-type incinerators and chimneys shall be constructed in accordance with the building code, the mechanical code, and the International Fuel Gas Code as listed in rule 1301:7-7-80 of the Administrative Code.
- (a) 603.9.1 Residential incinerators. Residential incinerators shall be of an approved type.
- (b) 603.9.2 Spark arrestor. Incinerators shall be equipped with an effective means of arresting sparks.
- (c) 603.9.3 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.
- (d) 603.9.4 Time of burning. Burning shall take place only during approved hours.
- (e) 603.9.5 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 the incinerators is determined by the fire code official to constitute a hazardous condition.
- (f) 603.9.6 Flue-fed incinerators in Group I-2. In Group I-2 occupancies, the continued use of existing flue-fed incinerators is prohibited.
- (g) 603.9.7 Incinerator inspection in Group I-2. Incinerators in Group I-2 occupancies shall be inspected not less than annually in accordance with the manufacturer's instructions. Inspection records shall be maintained on the premises and made available to the fire code official upon request.

(10) 603.10 Gas meters. Above-ground gas meters, regulators and piping subject to damage shall be protected by a barrier complying with paragraph (L)(312) of rule 1301:7-7-03 of the Administrative Code or otherwise protected in an approved manner.

(D) Section 604 Emergency and standby power systems

(1) 604.1 General. Emergency power systems and standby power systems required by this code or the building code as listed in rule 1301:7-7-80 of the Administrative Code shall comply with paragraphs (D)(1)(a)(604.1.1) to (D)(1)(h)(604.1.8) of this rule.

(a) 604.1.1 Stationary generators. Stationary emergency and standby power generators required by this code shall be listed in accordance with UL 2200 as listed in rule 1301:7-7-80 of the Administrative Code.

(b) 604.1.2 Installation. Emergency power systems and standby power systems shall be installed in accordance with the building code, NFPA 70, NFPA 110 and NFPA 111 as listed in rule 1301:7-7-80 of the Administrative Code.

(c) 604.1.3 Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. Standby power systems shall automatically provide secondary power within 60 seconds after primary power is lost unless specified otherwise in this code.

(d) 604.1.4 Load duration. Emergency power systems and standby power systems shall be designed to provide the required power for a minimum duration of 2 hours without being refueled or recharged, unless specified otherwise in this code.

(e) 604.1.5 Uninterruptable power source. An uninterrupted source of power shall be provided for equipment where required by the manufacturer's instructions, the listing, this code or applicable referenced standards.

(f) 604.1.6 Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

(g) 604.1.7 Group I-2 occupancies. In Group I-2 occupancies, where an essential electrical system is located in flood hazard areas established in section 1612.3 of the building code as listed in rule 1301:7-7-80 of the Administrative Code and where new or replacement essential electrical system generators are installed, the system shall be located and

installed in accordance with ASCE 24 as listed in rule 1301:7-7-80 of the Administrative Code.

- (h) 604.1.8 Maintenance. Existing installations shall be maintained in accordance with the original approval and paragraph (D)(4)(604.4) of this rule.
- (2) 604.2 Where required. Emergency and standby power systems shall be provided where required by paragraphs (D)(2)(a)(604.2.1) to (D)(2)(p)(604.2.16) of this rule.
- (a) 604.2.1 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required by paragraph (G)(2)(607.2) of this rule, paragraphs (I)(4)(1009.4) and (I)(5)(1009.5) of rule 1301:7-7-10 of the Administrative Code.
- (b) 604.2.2 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by section 414 of the building code as listed in rule 1301:7-7-80 of the Administrative Code.
- (c) 604.2.3 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems as required in paragraph (J)(4)(b)(iii)(510.4.2.3) of rule 1301:7-7-05 of the Administrative Code. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.
- (d) 604.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in paragraph (G)(5)(b)(ii)(e)(907.5.2.2.5) of rule 1301:7-7-09 of the Administrative Code. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72 as listed in rule 1301:7-7-80 of the Administrative Code.
- (e) 604.2.5 Exit signs. Emergency power shall be provided for exit signs as required in paragraph (M)(6)(c)(1013.6.3) of rule 1301:7-7-10 of the Administrative Code. The system shall be capable of powering the required load for a duration of not less than 90 minutes.
- (f) 604.2.6 Group I-2 occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with section 407.10 of the building code as listed in rule 1301:7-7-80 of the Administrative Code.

(g) 604.2.7 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. Emergency power shall be provided for the doors and locks in accordance with paragraph (D)(604) of this rule.

Exceptions:

1. 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 building code as listed in rule 1301:7-7-80 of the Administrative Code.

2. Emergency power is not required where remote mechanical operating releases are provided.

(h) 604.2.8 Hazardous materials. Emergency and standby power shall be provided in occupancies with hazardous materials as required in the following paragraphs:

(i) Paragraphs (D)(7)(5004.7) and (E)(1)(e)(5005.1.5) of rule 1301:7-7-50 of the Administrative Code for hazardous materials.

(ii) Paragraphs (D)(2)(b)(viii)(6004.2.2.8) and (D)(3)(d)(ii)(6004.3.4.2) of rule 1301:7-7-60 of the Administrative Code for highly toxic and toxic gases.

(iii) Paragraph (D)(1)(k)(6204.1.11) of rule 1301:7-7-62 of the Administrative Code for organic peroxides.

(i) 604.2.9 High-rise buildings. Standby power and emergency power shall be provided for high-rise buildings as required in Section 403 of the building code as listed in rule 1301:7-7-80 of the Administrative Code, and shall be in accordance with paragraph (D)(604) of this rule.

(j) 604.2.10 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in paragraph (J)(1)(d)(iii)(1010.1.4.3) of rule 1301:7-7-10 of the Administrative Code. The standby power supply shall have a capacity to operate not fewer than 50 closing cycles of the door.

(k) 604.2.11 Hydrogen fuel gas rooms. Standby power shall be provided for hydrogen fuel gas rooms as required by paragraph (H)(7)(5808.7) of rule 1301:7-7-58 of the Administrative Code.

- (l) 604.2.12 Means of egress illumination. Emergency power shall be provided for means of egress illumination in accordance with paragraphs (H)(3) (1008.3) of rule 1301:7-7-10 of the Administrative Code and (D)(5)(a) (1104.5.1) of rule 1301:7-7-11 of the Administrative Code.
- (m) 604.2.13 Membrane structures. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures in accordance with section 2702 of the building code as listed in rule 1301:7-7-80 of the Administrative Code. Auxiliary inflation systems shall be provided in temporary air-supported and air-inflated membrane structures in accordance with paragraph (C)(10)(d)(3103.10.4) of rule 1301:7-7-31 of the Administrative Code.
- (n) 604.2.14 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities as required in paragraph (C)(15)(2703.15) of rule 1301:7-7-27 of the Administrative Code.
- (o) 604.2.15 Smoke control systems. Standby power shall be provided for smoke control systems as required in paragraph (I)(11)(909.11) of rule 1301:7-7-09 of the Administrative Code.
- (p) 604.2.16 Underground buildings. Emergency and standby power shall be provided in underground buildings as required in section 405 of the building code as listed in rule 1301:7-7-80 of the Administrative Code and shall be in accordance with paragraph (D)(604) of this rule.
- (3) 604.3 Critical circuits. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 as listed in rule 1301:7-7-80 of the Administrative Code. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
- (4) 604.4 Maintenance. Emergency and standby power systems shall be maintained in accordance with NFPA 110 and NFPA 111 as listed in rule 1301:7-7-80 of the Administrative Code such that the system is capable of supplying service within the time specified for the type and duration required.
- (a) 604.4.1 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.
- (b) 604.4.2 Records. 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 maintained.

(c) 604.4.3 Switch maintenance. Emergency and standby power system transfer switches shall be included in the inspection, testing and maintenance schedule required by paragraph (D)(4)(a)(604.4.1) of this rule. 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.

(5) 604.5 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 as listed in rule 1301:7-7-80 of the Administrative Code.

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.

(a) 604.5.1 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.

(6) 604.6 Emergency lighting equipment. Emergency lighting shall be inspected and tested in accordance with paragraphs (D)(6)(a)(604.6.1) to (D)(6)(b)(i)(604.6.2.1) of this rule.

(a) 604.6.1 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 not less than 30 seconds.

(i) 604.6.1.1 Activation test record. Records of tests shall be maintained. 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.

(b) 604.6.2 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 not less than 90

minutes and shall remain sufficiently illuminated for the duration of the test.

(i) 604.6.2.1 Power test record. Records of tests shall be maintained. 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.

(7) 604.7 Supervision of maintenance and testing. Routine maintenance, inspection and operational testing shall be overseen by a properly instructed individual.

(8) 604.8 Exit and emergency lighting equipment. Exit and emergency lighting equipment with self contained battery back-up power shall be inspected and tested in accordance with paragraphs (D)(6)(a)(604.6.1) to (D)(6)(c)(604.6.3) of this rule.

(a) 604.8.1 Activation test. An activation test of the exit and emergency lighting equipment with self contained battery back-up power shall be performed monthly for a period of not less than 30 seconds.

(b) 604.8.2 Duration test. To insure continued illumination for a duration of not less than 90 minutes as listed in paragraph (K)(5)(c)(1011.5.3) of rule 1301:7-7-10 of the Administrative Code, exit and emergency lights equipped with self contained battery back-up power shall be tested annually for a period of not less than 90 minutes.

(c) 604.8.3 Test records. A written record of all inspection, testing and maintenance of exit and emergency lighting equipment shall be documented and available for review by the fire code official.

(E) Section 605 Electrical equipment, wiring and hazards

(1) 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.

(2) 605.2 Illumination. Illumination shall be provided for service equipment areas, motor control centers and electrical panelboards.

(3) 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 be not less than the width of the equipment. Storage of materials shall not be located within the designated working space.

Exceptions:

1. Where other dimensions are required or allowed by NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code.
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).
 - (a) 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.
- (4) 605.4 Multiplug adapters. Multiplug adapters, such as cube adapters, unfused plug strips or any other device not complying with NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code shall be prohibited.
 - (a) 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 as listed in rule 1301:7-7-80 of the Administrative Code.
 - (b) 605.4.2 Power supply. Relocatable power taps shall be directly connected to a permanently installed receptacle.
 - (c) 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.
- (5) 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.
 - (a) 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.

- (b) 605.5.2 Ampacity. The ampacity of the extension cords shall be not less than the rated capacity of the portable appliance supplied by the cord.
- (c) 605.5.3 Maintenance. Extension cords shall be maintained in good condition without splices, deterioration or damage.
- (d) 605.5.4 Grounding. Extension cords shall be grounded when serving grounded portable appliances.
- (6) 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.
- (7) 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.
- (8) 605.8 Electrical motors. Electrical motors shall be maintained free from excessive accumulations of oil, dirt, waste and debris.
- (9) 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 as listed in rule 1301:7-7-80 of the Administrative Code.

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.

- (a) 605.9.1 Attachment to structures. Temporary wiring attached to a structure shall be attached in an approved manner.
- (10) 605.10 Portable, electric space heaters. Where not prohibited by other paragraphs 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 paragraphs (E)(10)(a)(605.10.1) to (E)(10)(d)(605.10.4) of this rule.

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.

- (a) 605.10.1 Listed and labeled. Only listed and labeled portable, electric space heaters shall be used.
- (b) 605.10.2 Power supply. Portable, electric space heaters shall be plugged directly into an approved receptacle.
- (c) 605.10.3 Extension cords. Portable, electric space heaters shall not be plugged into extension cords.
- (d) 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.
- (11) 605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with paragraphs (E)(11)(a)(605.11.1) to (E)(11)(b)(605.11.2) of this rule, the building code or residential code and NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code.
- (a) 605.11.1 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with paragraphs (E)(11)(a)(i)(605.11.1.1) to (E)(11)(a)(iii)(c)(605.11.1.3.3) of this rule.
- Exceptions:
1. Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures.
 2. Roof access, pathways and spacing requirements need not be provided where the fire chief has determined that rooftop operations will not be employed.
- (i) 605.11.1.1 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.
- (ii) 605.11.1.2 Solar photovoltaic systems for Group R-3 buildings. Solar photovoltaic systems for Group R-3 buildings shall comply with paragraphs (E)(11)(a)(ii)(a)(605.11.1.2.1) to (E)(11)(a)(ii)(e)(605.11.1.2.5) of this rule.

Exception: These requirements shall not apply to structures designed and constructed in accordance with the residential code as listed in rule 1301:7-7-80 of the Administrative Code.

(a) 605.11.1.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a 3-foot-wide (914 mm) clear access pathway.

(b) 605.11.1.2.2 Hip roof layouts. Panels and modules installed on Group R-3 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 and modules are located. The access pathway shall be at a location on the building capable of supporting the 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.

(c) 605.11.1.2.3 Single-ridge roofs. Panels and modules installed on Group R-3 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 and 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.

(d) 605.11.1.2.4 Roofs with hips and valleys. Panels and modules installed on Group R-3 buildings with roof hips and valleys shall not be located closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both side 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.

(e) 605.11.1.2.5 Allowance for smoke ventilation operations. Panels and modules installed on Group R-3 buildings shall be located not less than 3 feet (914 mm) from the ridge in order to allow for fire department smoke ventilation operations.

Exception: Panels and 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.

(iii) 605.11.1.3 Other than Group R-3 buildings. Access to systems for buildings, other than those containing Group R-3 occupancies, shall be provided in accordance with paragraphs (E)(11)(a)(iii)(a) (605.11.1.3.1) to (E)(11)(a)(iii)(c)(605.11.1.3.3) of this rule.

Exception: Where it is determined by the fire code official that the roof configuration is similar to that of a Group R-3 occupancy, the residential access and ventilation requirements in paragraphs (E) (11)(a)(ii)(a)(605.11.1.2.1) to (E)(11)(a)(ii)(e)(605.11.1.2.5) of this rule shall be permitted to be used.

(a) 605.11.1.3.1 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, the clear perimeter around the edges of the roof shall be permitted to be reduced to a minimum 4 foot wide (1290 mm).

(b) 605.11.1.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

(i) The pathway shall be over areas capable of supporting fire fighters accessing the roof.

(ii) 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 fire fighters accessing the roof.

(iii) Pathways shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes or ventilation hatches.

(iv) Pathways shall provide not less than 4 feet (1290 mm) clear around roof access hatch with not less than one singular pathway not less than 4 feet (1290 mm) clear to a parapet or roof edge.

(c) 605.11.1.3.3 Smoke ventilation. The solar installation shall be designed to meet the following requirements:

(i) Arrays shall be not greater than 150 feet (45 720 mm) by 150 feet (45720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.

(ii) Smoke ventilation options between array sections shall be one of the following:

(A) A pathway 8 feet (2438 mm) or greater in width.

(B) A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or gravity-operated dropout smoke and heat vents on not less than one side.

(C) A 4-foot (1290 mm) or greater in width pathway and bordering all sides of nongravity-operated dropout smoke and heat vents.

(D) 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.

(b) 605.11.2 Ground-mounted photovoltaic arrays. Ground-mounted photovoltaic arrays shall comply with paragraph (E)(11)(605.11) of this rule and this paragraph. Setback 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.

(12) 605.12 Abandoned wiring in plenums. Accessible portions of abandoned cables in air-handling plenums shall be removed. Cables that are unused and have not been tagged for future use shall be considered abandoned.

(F) Section 606 Mechanical refrigeration

- (1) [M] 606.1 Scope. Refrigeration systems shall be installed in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.
- (2) [M] 606.2 Refrigerants. The use and purity of new, recovered and reclaimed refrigerants shall be in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.
- (3) [M] 606.3 Refrigerant classification. Refrigerants shall be classified in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.
- (4) [M] 606.4 Change in refrigerant type. A change in the type of refrigerant in a refrigeration system shall be in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.
- (5) 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.
- (6) 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 paragraph (F)(6)(a)(606.6.1) of this rule. Records of tests shall be maintained. Tests of emergency devices or systems required by this rule shall be conducted by persons trained and qualified in refrigeration systems.
 - (a) 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.
 - (i) Treatment and flaring systems.
 - (ii) Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
 - (iii) Fans and associated equipment intended to operate emergency ventilation systems.
 - (iv) Detection and alarm systems.
- (7) 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 as listed in rule 1301:7-7-80 of the Administrative Code. Hazard signs shall be in accordance with the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code for the classification of refrigerants listed therein.

- (8) 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 mechanical code as listed in rule 1301:7-7-80 of the Administrative Code for the refrigerant classification. Detectors and alarms shall be placed in approved locations. The detector shall transmit a signal to an approved location.
- (9) 606.9 Remote controls. Where flammable refrigerants are used and compliance with section 1106 of the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code is required, remote control of the mechanical equipment and appliances located in the machinery room as required by paragraphs (F)(9)(a)(606.9.1) and (F)(9)(b)(606.9.2) of this rule shall be provided at an approved location immediately outside the machinery room and adjacent to its principal entrance.
- (a) 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 when the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 per cent of the LEL, whichever is lower.
- (b) 606.9.2 Ventilation system. A clearly identified switch of the break-glass type or with an approved tamper-resistant cover shall provide on-only control of the machinery room ventilation fans.
- (10) 606.10 Emergency pressure control system. Permanently installed 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 paragraphs (F)(10)(a)(606.10.1) and (F)(10)(b)(606.10.2) of this rule.

- (a) 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 paragraphs (F)(10)(a)(i)(606.10.1.1) to (F)(10)(a)(iii)(606.10.1.3) of this rule.
- (i) 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 per cent of the set point for emergency pressure relief devices.
- (ii) 606.10.1.2 Manual operation. Where required by the fire code official, automatic crossover valves shall be capable of manual operation.
- (iii) 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.
- (b) 606.10.2 Automatic emergency stop. An automatic emergency stop feature shall be provided in accordance with paragraphs (F)(10)(b)(i)(606.10.2.1) and (F)(10)(b)(ii)(606.10.2.2) of this rule.
- (i) 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.
- (ii) 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 per cent 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.

(11) 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 rule 1301:7-7-50, rule 1301:7-7-53, rule 1301:7-7-55 and rule 1301:7-7-57 of the Administrative Code.

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.

(12) 606.12 Discharge and termination of pressure relief and purge systems. Pressure relief devices, fusible plugs and purge systems discharging to the atmosphere from refrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerants or ammonia shall comply with paragraphs (F)(12)(c)(606.12.3) to (F)(12)(e)(606.12.5) of this rule.

(a) 606.12.1 Standards. Refrigeration systems and the buildings in which such systems are installed shall be in accordance with ASHRAE 15 as listed in rule 1301:7-7-80 of the Administrative Code.

(i) 606.12.1.1 Ammonia refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with IAR-2 as listed in rule 1301:7-7-80 of the Administrative Code for system design and installation and IAR-7 as listed in rule 1301:7-7-80 of the Administrative Code for operating procedures.

(b) 606.12.2 Fusible plugs and rupture members. 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 the fusible plug or rupture member functions.

(c) 606.12.3 Flammable refrigerants. Systems containing more than 6.6 pounds (3 kg) of 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 paragraph (F)(12)(f)(606.12.6) of this rule or a flaring system in accordance with paragraph (F)(12)(g)(606.12.7) of this rule. Systems containing more than 6.6 pounds (3 kg) of 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.

(d) 606.12.4 Toxic and highly toxic refrigerants. Systems containing more than 6.6 pounds (3 kg) of toxic or highly toxic refrigerants shall discharge vapor to the atmosphere only through an approved treatment system in accordance with paragraph (F)(12)(f)(606.12.6) of this rule or a flaring system in accordance with paragraph (F)(12)(g)(606.12.7) of this rule.

(e) 606.12.5 Ammonia refrigerant. Systems containing more than 6.6 pounds (3 kg) of ammonia refrigerant shall discharge vapor to the atmosphere in accordance with one of the following methods:

(i) Directly to atmosphere where the fire code official determines, on review of an engineering analysis prepared in accordance with paragraph (D)(7)(b)(104.7.2) of rule 1301:7-7-01 of the Administrative Code, that a fire, health or environmental hazard would not result from atmospheric discharge of ammonia.

(ii) Through an approved treatment system in accordance with paragraph (F)(12)(f)(606.12.6) of this rule.

(iii) Through a flaring system in accordance with paragraph (F)(12)(g)(606.12.7) of this rule.

(iv) Through an approved ammonia diffusion system in accordance with paragraph (F)(12)(h)(606.12.8) of this rule.

(v) By other approved means.

Exception: Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.

(f) 606.12.6 Treatment systems. Treatment systems shall be designed to reduce the allowable discharge concentration of the refrigerant gas to not more than 50 per cent of the IDLH at the point of exhaust. Treatment systems shall be in accordance with rule 1301:7-7-60 of the Administrative Code.

(g) 606.12.7 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. Standby electrical power, where required to complete the incineration process, shall be in accordance with paragraph (D)(604) of this rule.

- (h) 606.12.8 Ammonia diffusion systems. Ammonia diffusion systems shall include a tank containing 1 gallon of water for each pound of ammonia (8.3 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.
- (13) 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 per cent of the LFL or 50 per cent of the IDLH shall be equipped with approved treatment systems to reduce the discharge concentrations to those values or lower.
- (14) 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 paragraph (C)(3)(a)(5003.3.1) of rule 1301:7-7-50 of the Administrative Code.
- (15) 606.15 Records. A record of refrigerant quantities brought into and removed from the premises shall be maintained.
- (16) 606.16 Electrical equipment. Where refrigerants of Groups A2, A3, B2 and B3, as defined in the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code, are used, refrigeration machinery rooms shall conform to the Class I, Division 2 hazardous location classification requirements of NFPA 70 as listed in rule 1301:7-7-80 of the Administrative Code.

Exception: Ammonia machinery rooms that are provided with ventilation in accordance with section 1106.3 of the mechanical code as listed in rule 1301:7-7-80 of the Administrative Code.

(G) Section 607 Elevator operation, maintenance and fire service keys

- (1) 607.1 Emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in rule 1301:7-7-11 of the Administrative Code. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1 as listed in rule 1301:7-7-80 of the Administrative Code.
- (2) 607.2 Standby power. In buildings and structures where standby power is required or furnished to operate an elevator, standby power shall be provided in accordance with paragraph (D)(604) of this rule. Operation of the system shall be in accordance with paragraphs (G)(2)(a)(607.2.1) to (G)(2)(d)(607.2.4) of this rule.
- (a) 607.2.1 Manual transfer. Standby power shall be manually transferable to all elevators in each bank.
- (b) 607.2.2 One elevator. Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.
- (c) 607.2.3 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, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, not less than one elevator shall remain operable from the standby power source.
- (d) 607.2.4 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.
- (3) [BE] 607.3 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 paragraph (D)(4)(1009.4) of rule 1301:7-7-10 of the Administrative Code.
 2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with section 3008 of the building code as listed in rule 1301:7-7-80 of the Administrative Code.
- (4) 607.4 Fire service access elevator lobbies. Where fire service access elevators are required by section 3007 of the building code as listed in rule 1301:7-7-80 of the Administrative Code, fire service access elevator lobbies shall be maintained free of storage and furniture.
 - (5) 607.5 Occupant evacuation elevator lobbies. Where occupant evacuation elevators are provided in accordance with section 3008 of the building code as listed in rule 1301:7-7-80 of the Administrative Code, occupant evacuation elevator lobbies shall be maintained free of storage and furniture.
 - (6) 607.6 Water protection of hoistway enclosures. Methods to prevent water from infiltrating into a hoistway enclosure required by section 3007.4 and section 3008.4 of the building code as listed in rule 1301:7-7-80 of the Administrative Code shall be maintained.
 - (7) 607.7 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.
 - (8) 607.8 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.

Exception: The owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with paragraph (F)(1)(b)(506.1.2) of rule 1301:7-7-05 of the Administrative Code.

- (a) 607.8.1 Requirements for standardized fire service elevator keys. Standardized fire service elevator keys shall comply with all of the following:
 - (i) 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.

- (ii) Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.
 - (iii) Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. Uncut key blanks shall not be permitted to leave the factory.
 - (iv) Fire service elevator keys subject to these rules shall be engraved with the words "DO NOT DUPLICATE."
- (b) 607.8.2 Access to standardized fire service keys. Access to standardized fire service elevator keys shall be restricted to the following:
- (i) Elevator owners or their authorized agents.
 - (ii) Elevator contractors.
 - (iii) Elevator inspectors of the jurisdiction.
 - (iv) Fire code officials of the jurisdiction.
 - (v) The fire department and other emergency response agencies designated by the fire code official.
- (c) 607.8.3 Duplication or distribution of keys. A person shall not duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.
- (d) 607.8.4 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.

(H) Section 608 Stationary storage battery systems

- (1) 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 standby power, emergency power or uninterruptible power supplies shall comply with this paragraph and Table 608.1 of this rule.

Replaces: This rule was previously located (and will remain) at 1301:7-7-06.

Effective:

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Date

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