2013 Refrigeration Machinery Rooms Equipment Reminder List

Applicable Codes and Standards
CBC 2013, CMC 2013, CFC 2013

I. SCOPE
1. The provisions of the California Mechanical Code shall apply to the installation, alterations, repairs and replacement of mechanical systems, including equipment, appliances, fixtures, fittings and/or appurtenances, including ventilating, heating, cooling, airconditioning and refrigeration systems, incinerators and other energy-related systems.

2. Refrigeration systems, equipment and devices, including the replacement of parts, alterations and substitution of a different refrigerant shall conform to the requirements of

3. Refrigerants are regulated under the provisions CFC Section 606 and CMC Chapter 11; refrigerant quantities are not regulated by CFC Chapter 50 or CBC Chapters 3 and 4.

4. Except as modified by the CMC, refrigeration systems shall comply with ASHRAE 15. In addition, ammonia refrigeration shall comply with IIAR 2.

II. CLASSIFICATION OF REFRIGERANTS/SYSTEMS

1. The refrigerant used shall be of a type listed in Table 1102.2 or as classified under Section 1103.0 as approved.

2. Refrigerants shall be classified in accordance with the referenced standard in Chapter 17 (ASHRAE 34).

3. Refrigeration systems shall be classified as a High-Probability or Low-Probability System according to the degree of probability that a leakage of refrigerant could enter a normally occupied area.

4. When a refrigeration system is located in a refrigeration machinery room, the classification of the refrigeration system is not required.

III. LOCATION OF REFRIGERATION SYSTEMS

1. The refrigerant quantity of a high-probability system shall not exceed the amount of Table 1102.2 based on the volume of the smallest, enclosed space which the system is located in, serves, or passes through. Not applicable to a refrigeration machinery room.

2. Refrigeration systems or portions thereof shall not be located within a required exit enclosure.

3. Refrigeration compressors >5 horsepower (3.7 kW) rating shall be located at least 10 feet from an exit opening in a Group A, B, E, F, I, R Div. 1, S Occupancy unless separated by a one-hour fire-resistive occupancy separation.

4. Refrigerant piping shall not be located within a required exit.
### IV. REFRIGERATION MACHINERY ROOMS

1. Refrigeration systems shall be provided with a refrigeration machinery room when any of the following conditions exist:
   - The quantity of refrigerant in a single system exceeds Table 1102.2 amounts.
   - Direct-fired and indirect-fired absorption equipment, except lithium bromide systems using water as the refrigerant.
   - An A1 system having an aggregate compressor horsepower of 100 (74.6 kW) or more.
   - The system contains other than a Group A1 refrigerant. (see exceptions)

   See the following exceptions where a machinery room is not required:
   1. Lithium bromide absorption systems using water as the refrigerant.
   2. Ammonia-water absorption unit systems installed outdoors, provided that the quantity of refrigerant in a single system does not exceed Table 1102.2 amounts and the discharge is shielded and dispersed.
   3. Systems containing less than 300 pounds (136.1 kg) of refrigerant R-123 and located in an approved exterior location.
   4. Systems containing less than 300 pounds (136.1 kg) of refrigerant R-123 and located in an approved exterior location.

2. All components containing refrigerant shall be located either in a machinery room or outdoors.

3. When a refrigeration system is located outdoors more than 20 ft from building openings and is enclosed by a penthouse, lean-to, or other open structure, natural or mechanical ventilation shall be provided.

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### V. REFRIGERATION MACHINERY ROOM CONSTRUCTION

1. Refrigeration machinery rooms shall be separated from other portions of the building per CBC Table 509.

2. Penetrations into machinery rooms shall be sealed to inhibit the passage of refrigerant vapor.

### VI. REFRIGERATION MACHINERY ROOM CONTENTS

1. Refrigeration machinery rooms shall house all refrigerant-containing portions of the system other than the piping and evaporators permitted by CMC Section 1105.3, discharge piping required by CMC Chapter 11, and cooling towers regulated by CMC Chapter 11, Part II and their essential piping.

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2. Open flames or devices having an exposed surface exceeding 800°F are prohibited in refrigeration machinery rooms.

3. Combustion air or return air shall not be taken from or through a refrigeration machinery room.

4. Equipment, piping, ducts, vents or similar devices which are not essential for the refrigeration process, maintenance of the equipment or for the illumination, ventilation or fire protection of the room shall not be placed in or pass through a refrigeration machinery room.

V. REFRIGERATION MACHINERY ROOM ACCESS/EGRESS

1. Refrigeration machinery rooms shall be of such dimensions that all system parts are readily accessible with adequate space for maintenance and operations.

2. An unobstructed walking space at least 3 feet in width and 6 feet 8 inches in height shall be maintained throughout allowing free access to at least two sides of all moving machinery and approaching each stop valve.

3. Access to refrigeration machinery rooms shall be restricted to authorized personnel and posted with a permanent sign.

4. Refrigeration systems having more than 220 lbs of A1 or 30 lbs any other group refrigerant shall be accessible to the fire department at all times.

5. Refrigeration machinery rooms larger than 1,000 sq. ft. shall have access to not less than 2 exits.

6. The exits shall be separated by a minimum distance equal to 1/2 the maximum horizontal dimension of the room.

7. When 2 exits are required, one such exit may be by a fixed ladder or alternating tread device.

8. All portions of machinery rooms must be within 150 ft. travel of an exit or exit access door and doors shall swing in direction of egress travel.

9. Doors shall be tight-fitting and self-closing.

VIII. REFRIGERANT VAPOR DETECTION AND ALARMS

1. Machinery rooms shall have approved refrigerant-vapor detectors.

2. Refrigerant-vapor detectors or sampling tube shall be located in an area where refrigerant from a leak will concentrate and will activate visual and audible alarms inside room and outside each entrance.

3. The alarm shall have manual reset type and shall be located inside the refrigeration machinery room.

4. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in the CMC for the refrigerant classification.

5. Approved refrigerant-vapor detection and alarm systems shall utilize alarm signaling devices of at least 15 dba above the operating ambient noise level of the space installed and shall provide an approved, distinctive visual alarm.
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<td>1. Refrigeration machinery rooms shall be provided with a source of outside air for ventilation and removal of rejected heat.</td>
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<td>2. Exhaust inlets or permanent openings shall be arranged to provide ventilation throughout the entire machinery room.</td>
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<td>3. Fans providing machinery room temperature control or automatic purge of refrigerant-vapor are allowed to be automatically controlled to provide intermittent ventilation as conditions require.</td>
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<td>4. Emergency purge fans shall have a break-glass type or tamper resistant covered on-only control switch immediately adjacent to and outside each principal refrigeration machinery room exit.</td>
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<td>5. Two colored and labeled indicator lamps responding to the differential pressure across the purge fan or current through the fan motor shall be provided for each switch. One lamp shall indicate flow; the other shall indicate no flow.</td>
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<td>6. Exhaust from mechanical ventilation systems shall discharge not less than 20 feet from a property line or a</td>
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<td>7. Exhausts capable of discharges exceeding 25% of the LFL or 50% of the IDLH shall be provided with an approved treatment system.</td>
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<td>8. Emergency purge fans and their associated equipment provided for the exhausting of other than Group A1 and Group B1 refrigerants shall meet the requirements of Class I, Division 1 hazardous locations.</td>
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<td>9. Makeup-air intakes to replace exhaust air shall provide air directly from the outside of the building.</td>
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<td>10. Intakes shall be fitted with backdraft dampers or similar flow-control means to prevent reverse flow.</td>
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11. Distribution of makeup-air shall be arranged to provide thorough mixing within the room to prevent short circuiting of makeup-air directly to exhaust. CMC 1108.9

12. Exhaust from ventilation systems serving flammable, toxic or highly toxic refrigerants capable of exceeding 25% of the LFL or 50% of the IDLH shall be equipped with an approved treatment system. CFC 606.13

X. EMERGENCY CONTROL

1. Regardless of the refrigerant group or the type of electrical installation provided, an emergency break-glass type off-only control switch shall be provided immediately adjacent and outside the principal machinery room exit. CMC 1109.4

2. The emergency control switch shall provide off-only control of refrigerant compressors, pumps and normally closed automatic refrigerant valves located in the machinery room. CMC 1109.4

3. The emergency control switch shall be automatically shutoff where the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LFL, whichever is lower. CMC 1109.4

4. Refrigeration machinery rooms are not required to be classified as a hazardous location for electrical equipment except as provided in Section 1108.8. CMC 1109.2

5. Where refrigerants of A2, A3, B2 and B3 are used, the machinery room shall conform to the Class I, Division 2 hazardous location requirement of the CEC. CFC 606.16

6. Refrigeration systems containing more than 6.6 lbs of flammable, toxic or highly toxic refrigerant or ammonia shall be provided with an automatic crossover valve and automatic emergency stop. CFC 606.10

XI. Control Valves

1. Stop valves shall be installed in refrigerant piping at the following locations:

(1) At inlet and outlet of a positive-displacement-type compressor, compressor unit or condensing unit. CMC 1112.1

(2) At refrigerant outlet from a liquid receiver. CMC 1112.1

(3) At the refrigerant inlet of a pressure vessel containing liquid refrigerant with a volume of greater than 3 cubic feet. CMC 1112.1

Exceptions:

(1) Systems with non-positive-displacement compressors CMC 1112.1

(2) Systems having a pump-out receiver for storage of the charge CMC 1112.1

(3) Systems containing less than 110 lbs. of Group A1 refrigerant CMC 1112.1

(4) Self-contained systems do not require a stop valve at the inlet of the receiver CMC 1112.1

2. Stop valves shall be readily accessible from the refrigeration floor or platform. CMC 1112.3
XII. EMERGENCY SIGNS AND LABELS

1. Stop valves shall be identified by tagging in accordance with the referenced standard for identification. (ASME A 13.1-2007)

2. A valve chart shall be mounted under glass at a location near the principal entrance to the machinery room.

3. Piping shall be identified with the type of refrigerant, function and pressure.

4. Refrigeration units or systems with over 220 lbs of group A1 or other group over 30 lbs shall be provided with approved emergency signs, charts and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the CMC for the classification of refrigerants listed therein.

XIII. PROTECTION OF PIPING AND EQUIPMENT

1. Refrigeration systems and portions thereof shall not be located in an elevator shaft, dumbwaiter shaft or a shaft containing moving objects nor in a location where they will be subject to mechanical damage.

2. Air conditioning refrigerant circuit access ports located outdoors shall be protected from unauthorized access with locking-type tamper resistant caps or in a manner approved by the Authority Having Jurisdiction.

3. Equipment subject to vehicular damage shall be protected in accordance with CFC Section 312.

XIV. PRESSURE RELIEF DEVICES

1. Refrigeration systems shall be protected by a pressure relief device or other means to safely relieve pressure due to fire or abnormal conditions.

2. Pressure relief devices, fusible plugs and purge systems for refrigeration systems containing >6.6 lbs of flammable, toxic or highly toxic refrigerants shall be provided with an approved discharge system as required by CFC 606.12.1, 606.12.2 and 606.12.3.

NOTE
Compliance with all items on this list does not necessarily assure compliance with all provisions of the applicable codes and standards. This check list should be used only by persons with a comprehensive knowledge of the applicable codes and standards.

APPLICABLE CODES AND STANDARDS

2013 California Building Code - Part 2, Title 24, CCR

2013 California Mechanical Code - Part 4, Title 24, CCR
(2012 Uniform Mechanical Code and 2013 California Amendments)

2013 California Fire Code - Part 9, Title 24, CCR
(2012 International Fire Code and 2013 California Amendments)
ASHRAE 15-2010 Safety Refrigeration Systems
ASHRAE 34-2010 Designation and Safety Classification of Refrigerants
ASME A13.1-2007 Scheme for the Identification of Piping Systems
IIAR2-2008 Mechanical Refrigeration, Equipment, Design, and Installation of Ammonia Systems

http://www.oshpd.ca.gov/FDD/Regulations/CANs/index.html
OSHPD Project Review Status
http://www.oshpd.ca.gov/FDD/project_status/index.asp
OSHPD Public Use Forms
http://www.oshpd.ca.gov/FDD/Forms/index.html