Orange County Fire Authority

Community Risk Reduction

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Refrigeration Systems

Guideline G-02

Serving the Cities of Aliso Viejo • Buena Park • Cypress • Dana Point • Garden Grove • Irvine • Laguna Hills • Laguna Niguel • Laguna Woods
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Refrigeration Systems

1. PURPOSE

The intent of this guideline is to clarify certain requirements for refrigeration systems regulated by Chapter 6 of the 2025 California Fire Code (CFC) and by Chapter 11 of the 2025 California Mechanical Code (CMC). Not all refrigeration system requirements will be identified in this guideline.

Refrigeration systems pose a significant risk to workers and the public if refrigerant is released or leaked out in sufficient quantities. Freon-based refrigerants are the most widely used in Orange County; they are colorless and odorless gases undetectable by our senses. Accidents around the country involving ammonia refrigeration continue to injure and kill people. However, any refrigerant leak will displace oxygen in a closed area and can lead to asphyxiation. New A2L refrigerants are liquified flammable gases.

2. SCOPE

This guideline is applicable to existing refrigeration systems and new refrigeration systems where the amount of refrigerant in a single system exceeds 220 pounds of Group A1 or 30 pounds of any other Group. Existing systems will be regulated by the Code in effect at the time of construction or major upgrade, while new installations are regulated by the 2025 CFC Chapter 608 and 2025 CMC Chapter 11. When an existing refrigeration system is upgraded or modified, the Authority Having Jurisdiction (AHJ) will determine how the application of the codes shall be applied.

The following definitions are provided to assist in the use of this guideline:

IDLH (*Immediately Dangerous to Life and Health)*: A concentration of airborne contaminants, normally expressed in parts per million (ppm), that represents the maximum level from which one can escape within 30 minutes without escape-impairing symptoms or irreversible health effects.

LFL (Lower Flammability Limit): The minimum concentration of a substance that propagates a flame through a homogeneous mixture of the substance in air under specified test conditions. LFL is sometimes referred to as LEL (Lower Explosive Limit).

PEL (*Permissible Exposure Limit)*: The time-weighted average concentration (set by OSHA) for a normal 8-hour workday and a 40-hour workweek to which nearly all workers can be repeatedly exposed without adverse effects.

Classification

Refrigerants are classified according to toxicity and flammability. A1, A2, A2L, A3 are flammable. B1, B2, B2L, B3 are toxic. E*xample: ammonia is a Class B2L while R-404A and R-507A are Class A1*. The "L" designation is for slightly flammable.

Toxicity Classification and Flammability Classifications are defined in the 2025 CMC. Group A3 and B3 refrigerants shall not be used except when approved by the AHJ (see CMC 1103.3 for requirements and exceptions).

2.1 Permits and Plans: A permit is required to install or operate a mechanical refrigeration system if the amount in any single system is greater than 220 pounds of Group A1 refrigerants or 30 pounds of any other Group. Installation, upgrade, retrofit, and modification plans of refrigeration systems shall be submitted for review to the OCFA prior to installation. The plans shall include the scope of work, design details, specifications of the system, and demonstrate full compliance with applicable codes and industry standards/guidelines (such as IIAR, ASHRAE, CFC, or CMC). Any combination of these codes and/or standards are subject to approval by OCFA.

2.1.1 Access: Refrigeration systems shall always be accessible to the fire department as required by the Fire Code Official. OCFA recommends an approved Knox key box for machine rooms, compressor rooms or mechanical rooms (per CFC).

2.1.2 Emergency Fire Control Box: Emergency fire control boxes are no longer required by the CFC or the CMC. Existing refrigeration systems are expected to maintain and test their fire control box. Removing or altering the fire control box shall be approved by OCFA. The fire control box for existing ammonia refrigeration systems shall be in accordance with the Code in effect at the time of construction or major upgrade, and contain a compressor shut down switch, clear emergency instructions, and the refrigeration engineer's emergency 24-hour telephone contact numbers.

2.1.3 Ammonia Refrigerant: Systems containing more than 6.6 pounds of ammonia refrigerant shall discharge vapor to the atmosphere in accordance with methods described in section 608.13.4 of the CFC.

2.1.4 The following is a summary of significant machinery room safety features (per CMC 1106.2):

2.1.4.1 Vapor leak detectors to have blue visual strobes in/out of exits

2.1.4.2 Vapor leak detectors to have local audible horns in/out of exits

2.1.4.3 Normal ventilation

2.1.4.4 Emergency purge ventilation

2.1.4.5 Automatic shutdown device

2.1.4.6 Emergency shutdown device

2.1.4.7 Exit door 36” width, swing outward, panic hardware, illuminated sign

2.1.5 Testing of Equipment: At the time of the final NCO inspection, the owner/operator shall demonstrate that the leak detection, notification, automatic shutdown, and Call-Out features are functioning as per the plan design. It is the responsibility of the contractor to coordinate all trades for the inspections.

2.2 Leak Detection and Alarms: This section’s purpose is to provide additional direction in meeting the refrigerant alarm and detection requirements of the 2025 CFC and the 2025 CMC.

2.2.1 Enclosed Machinery Rooms require refrigerant alarm and detection systems.

2.2.2 Walk-in freezers and coolers require refrigerant alarm and detection systems if refrigerant quantities exceed 2025 CMC Table 1102.3 amounts as indicated on the OCFA Refrigerant Disclosure Form.

2.2.3 Refrigerant alarm and detection systems shall provide supervisory trouble and supervisory detection signals to an off-premises central monitoring station. The refrigerant alarm and detection systems should be connected to a security panel or local fire alarm/sprinkler monitoring system, or auto dialer directly to a refrigeration engineer with a maintenance contract.

2.2.4 Refrigerant alarm and detection signals shall not activate fire alarm/sprinkler monitoring alarm devices. Only the blue-colored horn/strobes of the refrigerant alarm and detection system shall be activated by a refrigerant detector.

2.2.5 OCFA may require refrigeration trouble and/or detection signals as alarm signals (and dispatch first responders) if unusually hazardous conditions may result from a significant refrigerant leak.

REFRIGERANT DISCLOSURE FORM

Date:_____ OCFA SR# (if applicable):_____

Business Name (Where system is located):_____

Complete Business Address: _____

_____

Business Phone: (___)_____

Refrigerant Contractor or Engineering Firm:_____

Refrigerant Contractor or Engineering Firm Phone: (___)_____

Instructions:

Column [1] Identify each refrigerant system included in this submittal.
Column [2] List the refrigerant name and the CMC Table 1102.3 Refrigerant Concentration Limit (RCL).
Column [3] Identify the refrigerant IDLH or PEL or LEL from Table 1102.3
Column [4] Identify the total amount of refrigerant in each system (in pounds).
Column [5] Identify the volume of the refrigerated space (in cubic feet).
Column [6] Calculate by using: column [4] divided by column [5] divided by 1000. If this value exceeds the RCL Factor for the specific refrigerant type, then submit a refrigeration plan including an alarm and detection plan
Column [7] When Column [6] exceeds the Factor in CMC Table 1102.3 for each refrigerated space, then section CMC 1104.4 applies, enter Yes or No?

[1] Identify Each System	[2] Refrigerant Name and RCL Factor	[3] IDLH or PEL or LEL	[4] Quantity of Refrigerant (Pounds)	[5] Volume of Refrigerated space (Cubic Feet)	[6] Pounds of Refrigerant per 1,000 Cubic Feet of Refrigerated Space	[7] Does Column [6] Quantity Exceed the Factor? (Y/N)

_____ _____

Completed by (Print name) Date Completed

_____

Email and phone contact information

Note: If more than one system is connected to a common header or cooling tower/condenser, then the total refrigerant charge is used in Column [4]