



# Fire Department

## HEADQUARTERS

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## **CODE SUMMARY**

### **PERMITS – REFRIGERATION EQUIPMENT**

A code summary is a compilation of code sections related to a specific occupancy or permit. This code summary lists sections of code pertaining to occupancies and operations as defined by the **California Fire Code**. Under each heading you will find the correlating code language and the reference cited. These requirements pertain to existing buildings. New construction may be subject to additional requirements. Please direct any questions to the Fire Prevention Division at (805) 681-5500.

#### **SCOPE:**

This summary is applicable to refrigeration machinery and systems having a refrigeration circuit containing more than 220 pounds of Group 1A, 30 pounds of any other group refrigerant, 6.6 pounds of flammable or combustible refrigerant or any amount of highly toxic refrigerant.

1. Refrigeration systems shall be installed in accordance with the *California Mechanical Code*. (See CMC Table 1102.2 below)
2. Refrigerants shall be classified in accordance with the *California Mechanical Code*.
3. A change in the type of refrigerant in a refrigeration system shall be in accordance with the *California Mechanical Code*. (CFC 606.1)

#### **1. An operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6 of the California Fire Code.**

A permit issued by the Santa Barbara County Fire Department is required for refrigeration machinery and systems having a refrigeration circuit containing more than 220 pounds of Group A1, 30 pounds of any other group refrigerant, 6.6 pounds of flammable or combustible refrigerant or any amount of highly toxic refrigerant. (CFC 105.6.38)

#### **2. Refrigeration units shall be accessible at all times to the fire department.**

Refrigeration machinery and systems meeting or exceeding the quantity limits above shall be accessible to the fire department at all times. (CFC 606.5)

#### **3. Refrigeration equipment shall be subject to periodic testing.**

A written record of required testing shall be maintained on the premises at all times. Testing shall be conducted by persons trained and qualified in refrigeration systems. The following emergency devices or systems shall be periodically tested in accordance with manufacturer's instructions:

- A. Treatment and flaring systems.
- B. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
- C. Fans and associated equipment intended to operate emergency ventilation systems.
- D. Detection and alarm systems. (CFC 606.6.1)

**4. Emergency signs are required.**

Refrigeration machinery and systems meeting or exceeding the quantity limits above shall be provided with approved emergency signs, charts, and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the *California Mechanical Code*. (CFC 606.7)

**5. 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. See *California Fire Code* Chapter 6 for additional detection system specifics. (CFC 606.8)

**6. Remote controls are required for refrigeration systems using flammable refrigerants.**

- A. Remote control of refrigerant equipment located in the machinery room shall be provide at an approved location outside the machinery room and adjacent to its principal entrance.
- B. A clearly identified switch shall provide off-only control of refrigerant compressors, pumps and normally closed automatic refrigerant valves located in the machinery room. See *California Fire Code* chapter 6 for additional control system specifics.
- C. A clearly identified switch shall provide on-only control of machinery ventilation fans. (CFC 606.9)

**7. Refrigeration systems using 6.6 pounds or more of flammable, toxic or ammonia refrigerant shall be provided with an emergency pressure control system.**

See *California Fire Code* Chapter 6 for pressure control system specifics. (CFC 606.10)

**8. Flammable and combustible materials shall not be stored in machinery rooms for refrigeration systems meeting or exceeding the quantity limits above. (CFC 606.11)**

**9. Pressure relief devices, fusible plugs and purge systems for refrigeration systems containing more than 6.6 pounds of flammable or toxic refrigerants shall be provided with an approved discharge system as required by Chapter 6 of the *California Fire Code*.**

See *California Fire Code* Chapter 6 for discharge system specifics. (CFC 606.12.1 thru 606.14)

**10. A written record shall be kept of refrigerant quantities brought into and removed from the premises.**

Such records shall be made available to the fire official. (CFC 606.15)

**11. Where refrigerants of Groups A2, A3, B2, and B3 are used, refrigeration machinery rooms shall conform to the Class 1, Division 2 hazardous location requirements of the *California Electrical Code*.**

Exception: Ammonia machinery rooms that are provided with ventilation systems in accordance with the *California Mechanical Code*. (CFC 606.16)

## **TECHNICAL ASSISTANCE**

For additional specific requirements referenced above, contact the Santa Barbara County Fire Department Fire Prevention Services Division at 805-681-5500. Due to the complex building design of the requirements specified within the CFC and adopted standards, it is often necessary to obtain the service of a fire protection design professional to assist with developing a protection scheme that meets the requirements of both the business and the California Fire Code.

**TABLE 1102.2**  
**REFRIGERANT GROUPS, PROPERTIES, AND ALLOWABLE QUANTITIES<sup>1, 2, 3, 9</sup>**  
**[ASHRAE 34: TABLE 1, TABLE 2]**

REFRIGERANT	CHEMICAL FORMULA	CHEMICAL NAME <sup>4</sup> (COMPOSITION FOR BLENDS)	SAFETY GROUP <sup>1</sup>	OEL <sup>5</sup> (ppm)	IDLH <sup>6</sup> (ppm)	POUNDS PER 1000 CUBIC FEET OF SPACE <sup>7</sup>
R-11	CCl <sub>3</sub> F	Trichlorofluoromethane	A1	C1000 <sup>8</sup>	2000	0.39
R-12	CCl <sub>2</sub> F <sub>2</sub>	Dichlorodifluoromethane	A1	1000	15 000	5.6
R-13	CClF <sub>3</sub>	Chlorotrifluoromethane	A1	1000 <sup>10</sup>	67 000	—
R-13B1	CBrF <sub>3</sub>	Bromotrifluoromethane	A1	1000	40 000	—
R-14	CF <sub>4</sub>	Tetrafluoromethane (carbon tetrafluoride)	A1	1000 <sup>10</sup>	67 000	25
R-21	CHCl <sub>2</sub> F	Dichlorofluoromethane	B1	10 <sup>14</sup>	5000	—
R-22	CHClF <sub>2</sub>	Chlorodifluoromethane	A1	1000 <sup>14</sup>	42 000 <sup>11</sup>	13
R-23	CHF <sub>3</sub>	Trifluoromethane	A1	1000 <sup>10</sup>	—	7.3
R-30	CH <sub>2</sub> Cl <sub>2</sub>	Dichloromethane (methylene chloride)	B2	C1000 <sup>8</sup>	2300	—
R-32	CH <sub>2</sub> F <sub>2</sub>	Difluoromethane (methylene fluoride)	A2	1000 <sup>13</sup>	—	4.8
R-40	CH <sub>3</sub> Cl	Chloromethane (methyl chloride)	B2	100	2000	—
R-50	CH <sub>4</sub>	Methane	A3	1000 <sup>10</sup>	—	—
R-113	CCl <sub>2</sub> FCClF <sub>2</sub>	1, 1, 2-trichloro-1, 2, 2 - trifluoroethane	A1	1000	2000	1.2
R-114	CClF <sub>2</sub> CClF <sub>2</sub>	1, 2-dichloro-1, 1, 2, 2 - tetrafluoroethane	A1	1000	15 000	8.7
R-115	CClF <sub>2</sub> CF <sub>3</sub>	Chloropentafluoroethane	A1	1000 <sup>14</sup>	—	47
R-116	CF <sub>3</sub> CF <sub>3</sub>	Hexafluoroethane	A1	1000 <sup>10</sup>	—	34
R-123	CHCl <sub>2</sub> CF <sub>3</sub>	2, 2-dichloro-1, 1, 1, - trifluoroethane	B1	50 <sup>13</sup>	4000 <sup>11</sup>	3.5
R-124	CHClFCF <sub>3</sub>	2-chloro-1, 1, 1, 2 - tetrafluoroethane	A1	1000 <sup>13</sup>	—	3.5
R-125	CHF <sub>2</sub> CF <sub>3</sub>	Pentafluoroethane	A1	1000 <sup>13</sup>	—	23
R-134a	CH <sub>2</sub> FCF <sub>3</sub>	1, 1, 1, 2-tetrafluoroethane	A1	1000 <sup>13</sup>	50 000 <sup>11</sup>	13
R-141b	CH <sub>3</sub> CCl <sub>2</sub> F	1, 1-dichloro-1-fluoroethane	A1	500 <sup>13</sup>	—	0.78
R-142b	CH <sub>3</sub> CClF <sub>2</sub>	1-chloro-1, 1-difluoroethane	A2	1000 <sup>13</sup>	—	5.1
R-143a	CH <sub>3</sub> CF <sub>3</sub>	1, 1, 1-trifluoroethane	A2	1000 <sup>13</sup>	—	4.5
R-152a	CH <sub>3</sub> CHF <sub>2</sub>	1, 1-difluoroethane	A2	1000 <sup>13</sup>	—	2.0
R-170	CH <sub>3</sub> CH <sub>3</sub>	Ethane	A3	1000	6400	0.54
R-E170	CH <sub>3</sub> OCH <sub>3</sub>	Dimethyl ether	A3	1000 <sup>10</sup>	—	1.0
R-218	CF <sub>3</sub> CF <sub>2</sub> CF <sub>3</sub>	Octafluoropropane	A1	1000	—	43
R-227ea	CF <sub>3</sub> CHFCF <sub>3</sub>	1, 1, 1, 2, 3, 3, 3- heptafluoropropane	A1	1000	—	36
R-236fa	CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	1, 1, 1, 3, 3, 3-hexafluoropropane	A1	1000 <sup>13</sup>	—	21
R-245fa	CHF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	1, 1, 1, 3, 3-pentafluoropropane	B1	300 <sup>13</sup>	—	12
R-290	CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	Propane	A3	1000	2100	0.56
R-C318	-(CF <sub>2</sub> ) <sub>4</sub> -	Octafluorocyclobutane	A1	1000 <sup>10</sup>	—	41
R-400	zeotrope	R-12/114 (50/50)	A1	1000 <sup>10</sup>	—	10
R-400	zeotrope	R-12/114 (60/40)	A1	1000	—	11
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	1000 <sup>10</sup>	—	6.6
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	1000 <sup>10</sup>	—	7.2

**TABLE 1102.2 (continued)**  
**REFRIGERANT GROUPS, PROPERTIES, AND ALLOWABLE QUANTITIES<sup>1, 2, 3, 9</sup>**  
**[ASHRAE 34: TABLE 1, TABLE 2]**

REFRIGERANT	CHEMICAL FORMULA	CHEMICAL NAME <sup>4</sup> (COMPOSITION FOR BLENDS)	SAFETY GROUP <sup>1</sup>	OEL <sup>5</sup> (ppm)	IDLH <sup>6</sup> (ppm)	POUNDS PER 1000 CUBIC FEET OF SPACE <sup>7</sup>
R-600a	CH(CH <sub>3</sub> ) <sub>2</sub> CH <sub>3</sub>	Isobutane (2-methyl propane)	A3	1000	3400	0.6
R-601	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	Pentane	A3	600	—	0.2
R-601a	(CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>2</sub> CH <sub>3</sub>	2-methylbutane (isopentane)	A3	600	—	0.2
R-611	HCOOCH <sub>3</sub>	Methyl formate	B2	100	—	—
R-702	H <sub>2</sub>	Hydrogen	A3	—	—	—
R-704	He	Helium	A1	—	—	—
R-717	NH <sub>3</sub>	Ammonia	B2	50 <sup>12</sup>	300	0.014
R-718	H <sub>2</sub> O	Water	A1	—	—	See footnote 15
R-720	Ne	Neon	A1	—	—	—
R-728	N <sub>2</sub>	Nitrogen	A1	—	—	—
R-740	Ar	Argon	A1	—	—	—
R-744	CO <sub>2</sub>	Carbon dioxide	A1	5000	40 000	4.5
R-764	SO <sub>2</sub>	Sulfur dioxide	B1	5	100	—
R-1150	CH <sub>2</sub> =CH <sub>2</sub>	Ethene (ethylene)	A3	200	5200	0.38
R-1234yf	CF <sub>3</sub> CF=CH <sub>2</sub>	2, 3, 3, 3-tetrafluoro-1-propene	A2	400	—	4.7
R-1270	CH <sub>3</sub> CH=CH <sub>2</sub>	Propene (propylene)	A3	500	3400	0.1