

**California Mechanical Code
(Part 4, Title 24, California Code of Regulations)**

September 29, 2003 Supplement

It is suggested that the section number as well as the page number be checked when inserting this material and removing the superseded material. In case of doubt, rely on the section numbers rather than the page numbers since the section numbers must run consecutively.

It is further suggested that the superseded material be retained with this revision record sheet so that the prior wording of any section can be easily ascertained.

Please keep the removed pages with this revision for future reference.

Remove Old White Pages

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Insert Blue Colored Pages

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Insert Blue Colored Pages

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CHAPTER 5 – EXHAUST SYSTEMS

ENFORCING AUTHORITY Adopting Agency	LOCAL BUILDING OFFICIAL					LOCAL FIRE OFFICIAL	LOCAL HEALTH OFFICIAL	STATE AGENCIES											
	CEC	CA	HCD			DSA AC	SFM	DHS	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
			1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X							X							
Adopt entire UMC chapter as amended (amendments listed below)						X	X					X	X	X	X				
Adopt only those sections which are listed below		X																	
501.0 UMC																			
502.0 UMC																			
503.0 UMC																			
504.1 UMC																			
505.1.1 CA												X							
505.12 UMC																			
505.12.1 UMC		X																	
505.7 UMC		X																	
507.7 UMC																			
509.2 UMC													X	X		X			
509.5 CA						X	X												
Table 5-1 UMC																			
Table 5-2 UMC																			
Table 6-7 UMC																			
Table 6-8 UMC																			

DOSH has* not adopted the 2000 edition of the *Uniform Mechanical Code*. The 1995 edition of the *California Mechanical Code* remains effective.

CHAPTER 6 – DUCT SYSTEMS

ENFORCING AUTHORITY Adopting Agency	LOCAL BUILDING OFFICIAL					LOCAL FIRE OFFICIAL	LOCAL HEALTH OFFICIAL	STATE AGENCIES											
	CEC	CA	HCD			DSA AC	SFM	DHS	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
			1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X							X							
Adopt entire UMC chapter as amended (amendments listed below)						X						X	X	X	X	X			
Adopt only those sections which are listed below							X												
602.1 Exceptions 1 & 2 CA													X	X	X	X			
602.3.1 CA													X	X	X	X			
605.0 CA												X	X	X	X				
605.1 CA													X	X	X	X			
605.2 CA													X	X		X			
606.8 CA						X													
607.1.1 CA						X								X	X		X		
607.1.2 CA						X													
609.2 CA						X													
610.1 UMC							X												
610.2 UMC							X												
610.5 UMC							X												
610.6 UMC							X												
610.7 UMC							X												
Table 6-7 UMC							X												
Table 6-8 UMC							X												

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CHAPTER 7 – COMBUSTION AIR

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X		X	X				X	X							
Adopt entire UMC chapter as amended (amendments listed below)													X	X	X	X				
Adopt only those sections which are listed below																				
707.2.1	CA												X	X	X	X				

DOSH has* not adopted the 2000 edition of the *Uniform Mechanical Code*. The 1995 edition of the *California Mechanical Code* remains effective.

CHAPTER 8 – CHIMNEYS AND VENTS

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X		X				X	X	X	X	X	X				
Adopt entire UMC chapter as amended (amendments listed below)																				
Adopt only those sections which are listed below																				

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CHAPTER 9 – SPECIAL FUEL-BURNING AND ENERGY-UTILIZING EQUIPMENT

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments							X				X	X			X					
Adopt entire UMC chapter as amended (amendments listed below)			X		X								X	X		X				
Adopt only those sections which are listed below							X													
904.8	CA														X	X		X		
907.2	UMC			†		†														
912.0	UMC						X													
912.0	CA												X	X		X				
915.6	UMC			†		†														

DOSH has* not adopted the 2000 edition of the *Uniform Mechanical Code*. The 1995 edition of the *California Mechanical Code* remains effective.
State agency adopts the entire chapter except for those sections indicated by the following symbol:†

CHAPTER 10 – STEAM AND HOT WATER BOILERS

ENFORCING AUTHORITY Adopting Agency	LOCAL BUILDING OFFICIAL					LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
			1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X		X	X				X	X	X	X				
Adopt entire UMC chapter as amended (amendments listed below)																			
Adopt only those sections which are listed below																			

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CHAPTER 11 – REFRIGERATION

ENFORCING AUTHORITY Adopting Agency	LOCAL BUILDING OFFICIAL					LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
			1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments			X		X		X	X			X								
Adopt entire UMC chapter as amended (amendments listed below)											X	X	X	X	X				
Adopt only those sections which are listed below																			
1106.2.1 CA											X								
1107.5 CA												X	X	X	X				
1131.1 CA												X	X	X	X				
Table 11-1 CA												X	X		X				
Table 11-2 CA												X	X	X	X				

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CHAPTER 12 – HYDRONICS

ENFORCING AUTHORITY Adopting Agency	LOCAL BUILDING OFFICIAL					LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
			1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments											X		X	X	X	X			
Adopt entire UMC chapter as amended (amendments listed below)											X								
Adopt only those sections which are listed below																			
1201.2.6.3 CA											X								
1201.3.5.2 CA			X		X														

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CHAPTER 13 – FUEL GAS PIPING

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments											X		X	X	X	X				
Adopt entire UMC chapter as amended (amendments listed below)																				
Adopt only those sections which are listed below																				

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CHAPTER 14 – PROCESS PIPING

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments							X				X		X	X	X	X				
Adopt entire UMC chapter as amended (amendments listed below)																				
Adopt only those sections which are listed below																				

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CHAPTER 15 – SOLAR SYSTEMS

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments																				
Adopt entire UMC chapter as amended (amendments listed below)																				
Adopt only those sections which are listed below				X		X														
1500 UMC				X		X														
1501 UMC				X		X														

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CHAPTER 16 – STANDARDS

ENFORCING AUTHORITY	LOCAL BUILDING OFFICIAL						LOCAL FIRE OFFICIAL SFM	LOCAL HEALTH OFFICIAL DHS	STATE AGENCIES											
	Adopting Agency	CEC	CA	HCD					DSA AC	DWR	AGR	BOC	BSC	DSA SS	OSHPD				DOSH	SL
				1	1AC	2									1	2	3	4		
Adopt entire UMC chapter without amendments				X		X	X				X	X	X	X	X	X				
Adopt entire UMC chapter as amended (amendments listed below)																				
Adopt only those sections which are listed below																				

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Note: See health and Safety Code Section 19966 for “approved” as applied to Factory Built Housing as referenced in Section 108.1.1.7 of this code.

APPROVED AGENCY is an established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the Administrative Authority [**For OSHPD 1, 2, 3 & 4, SFM**] or enforcing agency.

ASSEMBLY BUILDING [Not adopted by HCD] is a building or a portion of a building used, [**For SFM**] or intended to be used for the gathering together of fifty (50) or more persons for such purposes as deliberation, education, instruction, worship, entertainment, amusement, drinking, dining or awaiting transportation. [**for SFM**] or education; or structure or portion thereof used or intended to be used for the showing of motion pictures when an admission fee is charged and when such building or structure is open to the public and has a capacity of 10 or more persons.

Exception: [**For HCD 1 & 2**] Refer to the California Building Code, Title 24, Part 2 for use and occupancy classification.

AZEOTROPE is a refrigerant blend comprising multiple components of different volatiles that, when used in refrigeration cycles, do not change volumetric composition or saturation temperature as they evaporate or condense at constant pressure.

204.0

–B–

BOILER, HIGH PRESSURE is a boiler furnishing steam at pressures in excess of fifteen (15) pounds per square inch (103.4 kPa) or hot water at temperatures in excess of 250°F (121°C) or at pressures in excess of 160 pounds per square inch (1102.4 kPa).

BOILER ROOM is any room containing a steam or hot water boiler.

BREECHING is a metal connector for medium- and high-heat appliances.

BRINE is any liquid used for the transmission of heat without a change in its state, having no flash point or a flash point above 150°F (66°C), as determined by the requirements of the Fire Code. (See U.F.C. Standard 2-2 in Appendix A.)

BRINE [For SFM] is a liquid used for the transmission or heat without a change in its state, having no flash point above 150 F (65.5 C), as determined by the requirements of UMC Standard 2-3 or in accordance with Section 5415 (f) Title 8, California Code of Regulations.

Btu/h is the listed maximum capacity of any appliance, absorption unit or burner expressed in British thermal units input per hour, unless otherwise noted.

BUILDING [For HCD 1 & 2] Health and Safety Code Section 17920 (b) is repeated her for clarity and read as follows:

Section 17920(b). “Building means a structure subject to this part.”

BUILDING CODE [Not adopted by HCD 1 & 2] is the building code, which is adopted by this jurisdiction. [**For DSASS, OSHPD 1, 2, 3 & 4, SFM**] For purpose of the California Mechanical Code, “Building Code” shall be the most recent edition of the California Building Code.

Exception: [**For HCD 1 & 2**] Whenever the term “Building Code” is used in this code, it shall mean the California Building Code, Title 24, Part 2.

BUILDING OFFICIAL [Not adopted by HCD 1 & 2]. See Administrative Authority. [**For DSASS, OSHPD 1, 2, 3 & 4**] For the State of California, “Building Official” shall be the “Enforcing Agency” as specified in Section 108.

Exception: [**For HCD 1 & 2**] “Building Official” shall be the “Enforcing Agency” as specified in the appropriate subsections of Section 108.1.1 of this code

BUILDING OFFICIAL [For SFM] is the officer charged with the administration and enforcement of this code, or a regularly deputy. See “Enforcing Agency” For the State of California, “Building Official” shall be the “Enforcing Agency” as specified in Section 108.

205.0

–C–

CAS NUMBER is the Chemical Abstract System Registry Number.

CENTRAL HEATING PLANT or HEATING PLANT is environmental heating equipment installed in a manner to supply heat by means of ducts or pipes to areas other than the room or space in which the equipment is located.

CHIMNEY is a vertical shaft enclosing one or more flues for conveying flue gases to the outside atmosphere.

Factory-Built Chimney is a listed chimney.

Masonry Chimney is a chimney of solid masonry units, bricks, stones, listed masonry units or reinforced concrete, lined with suitable flue liners.

Metal Chimney is a chimney constructed of metal with a minimum thickness not less than 0.127 inch (3.23 mm) (No. 10 manufacturer’s standard gage) steel sheet.

CHIMNEY CLASSIFICATIONS:

Chimney, Residential Appliance-Type is a factory-built or masonry chimney suitable for removing products of combustion from

315.1.4 Rooms with similar exposure, function and requirements may have humidity control with zone humidifier where designs are specifically approved by the enforcing agency.

315.1.5 Heating systems shall have heating capacity to provide the minimum temperatures and humidities in Table 315, in all areas occupied by patients or personnel under normal conditions of hospital operation.

315.1.6 For all other occupied areas, heating systems shall be designed to provide 70°F to 75°F (21.1°C to 23.9°C) temperatures under winter design conditions. The systems shall be thermostatically controlled with appropriate zoning to achieve the above conditions.

315.1.7 In all patient-occupied areas cooling systems shall be designed to provide 75°F (23.9°C) maximum based on the 0.5 percent summer design dry bulb temperatures shown by the 1982, ASHRAE Climate Data for Region X. The heating and cooling system should be thermostatically controlled with appropriate zoning to achieve the above conditions.

315.2 Requirements for Skilled Nursing, Intermediate Care Facilities and Basic Services Provided in Correctional Treatment Centers. [For OSHPD 2 & 4]

315.2.1 Systems shall accommodate the provisions of Sections 315.1.6 through 315.1.7.

315.2.2 Where air conditioning is provided, the system shall be thermostatically controlled in one or more zones.

315.3 Requirements for Outpatient Facilities and Licensed Clinics. [For OSHPD 3]

315.3.1 The system shall be designed to provide the temperature and humidities for sensitive areas or rooms shown in Table 315.

¹Thermostats and humidistat shall be either locally resettable and of the non-locking type or remotely resettable and of the locking type.

²Where temperature ranges are indicated, the system shall be capable of maintaining the rooms at any point within the range. A single figure indicates a heating or cooling capacity of at least the indicated temperature. Temperatures different than those shown will be allowed when approved by the authority having jurisdiction.

³The ranges listed are the minimum and maximum limits where control is specifically needed.

SECTION 316.0 - ESSENTIAL MECHANICAL PROVISIONS [FOR OSHPD 1, 2 & 4]

During periods of power outages emergency electrical power shall be provided for the following equipment:

316.1 All heating equipment necessary to maintain a minimum temperature of 60°F (15.6°C) in patient areas which are not specified in Table 315.

316.2 All heating equipment necessary to maintain the minimum temperatures for sensitive areas as specified in Table 315.

316.3 Equipment necessary for humidification of the areas listed in Table 315.

316.4 All supply, return and exhaust fans required to maintain the positive and negative air balances as required in Table 4-A.

316.5 All control components and control systems necessary for the normal operation of equipment required to have emergency electrical power.

TABLE 315 – HEATING AND COOLING

AREA OR ROOM DESIGNATION	TEMPERATURE RANGE ^{1,2}	RELATIVE HUMIDITY ^{1,3}
	°F	Percent
Operating room	68-73	30-60
Cystoscopy	68-73	30-60
Cardiac cath lab	70-75	30-60
Delivery room	68-73	30-60
Recovery room	70	30-60
Newborn nursery	75	30-60
Intensive-care newborn nursery	75-80	30-60
Intensive care	70-75	30-60

triage rooms, corridors, reception areas, areas adjacent to waiting areas, negative pressure isolation rooms, negative pressure exam room, negative pressure x-ray treatment rooms, and positive pressure isolation rooms. All operating and delivery rooms shall maintain a minimum of six air changes per hour when not in use.

407.1.2 Fans serving exhaust systems shall be located at the discharge end of the system. The ventilation rates shown in Table 4-A shall be considered as minimum acceptable rates and shall not be construed as precluding the use of higher ventilation rates if they are required to meet design conditions.

407.1.3 Services/Systems and Utilities. See Section 313.2.

407.2 Outdoor Air Intakes and Exhaust Outlets.

407.2.1 Outdoor Air Intakes. Outdoor air intakes shall be located at least 25 feet (7.62 m) from exhaust outlets of ventilating systems, combustion equipment stacks, medical-surgical vacuum systems, cooling towers and areas that may collect vehicular exhaust or other noxious fumes. The bottom of outdoor air intakes shall be located as high as practicable, but not less than 10 feet (3048 mm), above ground level. If installed above the roof, they shall be located 18 inches (457 mm) above roof level or 3 feet (914 mm) above a flat roof where heavy snowfall is anticipated.

Exceptions: 1. These dimensions may be reduced if it is demonstrated by the submission of details and calculations that location of intakes with respect to exhausts and their orientation, or the use of special filters, provides equal performance.

2. The requirements regarding the bottom of outdoor air intakes and installation through the roof do not apply to skilled nursing facilities, intermediate-care facilities or nonsensitive areas in correctional treatment centers.

407.2.2 Exhaust Outlets. Exhaust outlets shall be located a minimum of 10 feet (3048 mm) above adjoining grade and 10 feet (3048 mm) from doors, occupied areas and operable windows.

Exception: Negative-pressure isolation rooms shall comply with Section 414.1.

407.2.3 Relief Air Discharge. Building relief air discharge shall discharge at least 10 feet (3048 mm) from any outside air intake.

407.3 Air Balance.

407.3.1 The ventilation systems shall be designed and balanced to provide the general air balance relationship to adjacent areas shown in Table 4-A. The ventilation systems shall be balanced in accordance with the latest edition of standards published by the Associated Air Balance Council

(AABC) or the National Environmental Balancing Bureau (NEBB).

407.3.2 Where the variation in static pressure drop across filters is a significant portion of the total pressure drop, static pressure or pressure differential controls or constant volume devices may be required to ensure the maintenance of air balance relationships shown in Table 4-A regardless of filter loading.

Exception: This section does not pertain to skilled nursing facilities, intermediate-care facilities and nonsensitive areas in correctional treatment centers, except for negative-pressure isolation rooms and positive-pressure isolation rooms.

407.4 Air Circulation.

407.4.1 Air shall be introduced at the cleanest areas and removed at the dirtiest areas in order to reduce chances of airborne cross infection as follows:

407.4.1.1 Air supplied to operating rooms, cardiac catheterization labs, cystoscopy rooms, delivery rooms and nurseries, shall be delivered at or near the ceiling of the area served, and all air removed from the area shall be removed near floor level. At least two exhaust or recirculation air inlets shall be used in all operating and delivery rooms and shall be located not less than 3 inches (76 mm) nor more than 8 inches (203 mm) above the finished floor.

Exception: For negative-pressure isolation rooms and positive-pressure isolation rooms, see Sections 414.0 and 415.0.

407.4.1.2 Room supply air outlets and room recirculation and exhaust air inlets installed in nonsensitive areas shall be located not less than 3 inches (76 mm) above the floor.

Exception: For negative-pressure isolation rooms and positive-pressure isolation rooms, see Sections 414.0 and 415.0.

407.4.1.3 Corridors shall not be used to convey supply, return or exhaust air to or from any room.

Exception 1: Small rooms [30 square feet (2.79m²) or less] which are mechanically exhausted, such as bathrooms, toilet rooms and janitors' closets opening directly on corridors.

Exception 2: Air transfer caused by pressure differentials in rooms required to have a positive or negative air balance by Table 4-A or Table 4-C.

407.4.1.4 No space above a ceiling may be utilized as an outside-air, supply-air, exhaust-air or return-air plenum.

Exception: Designs specifically approved by the enforcing agency.

407.4.1.5 Air from a patient room, exam room, or treatment room shall not be transferred to another similar room without first having passed through air filters as required by Table 4-B.

shall comply with Table 4-C.

408.3.3 Negative-pressure isolation rooms, positive-pressure isolation rooms and sensitive areas in correctional treatment centers shall comply with Section 408.2.

408.4 Filters for Outpatient Facilities.

408.4.1 The air ventilation systems shall comply with code requirements of this section for outpatient facilities and shall have filter bank efficiencies as listed in Table 4-B.

408.4.2 Noncentral air systems serving individual rooms shall comply with Table 4-B.

Section 409.0 - Ducts [For OSHPD 1, 2, 3 & 4]

409.1 Ducts which penetrate construction, intended for X-ray or other radiation protection, shall not impair the effectiveness of the protection.

409.2 Duct linings and their use shall meet the requirements of Chapter 6, California Mechanical Code.

409.3 Cold-air ducts shall be insulated wherever necessary or to prevent condensation problems.

409.4 The anchorage and supporting structural elements for airducts shall be designed to withstand the lateral forces as required by the California Building Code, Title 24, Part 2.

Section 410.0 - Laboratories [For OSHPD 1, 2, 3 & 4]

410.1 The minimum amount of outdoor air in laboratories shall be provided in accordance with Table 4-A. A filter with 90 percent average efficiency shall be installed in the air-supply system at its entrance to the media transfer room.

410.2 Laboratory hoods for general use shall have a minimum average face velocity of 75 feet per minute (380 m/s). Hoods in which infectious or highly radioactive materials are processed shall have a face velocity of 100 feet per minute (510 m/s). Bacteriological safety cabinets used for processing infectious materials shall have an average face velocity of 50 to 70 feet per minute (255 m/s to 355m/s) and shall be equipped with a means for disinfection.

410.3 Laboratory hoods shall not be connected to the general building exhaust system. Hoods in which infectious, incompatible or highly radioactive materials are processed each shall have an independent exhaust system with the fan installed at the discharge point of the system. Duct systems serving laboratory hoods shall be constructed of stainless steel of a type which will resist corrosion by materials normally handled. Duct systems serving

laboratory hoods used for purposes other than those needed for routine diagnostic laboratory procedures and in which highly radioactive materials or a significant volume of highly oxidizing agents are used shall be constructed of USS 18-8 stainless steel or the equivalent for a minimum distance of 10 feet (3048 mm) from the hood. Such ducts shall be equipped with wash down facilities and shall be consistent with fire safety requirements. Fire dampers and smoke dampers shall not be installed in laboratory hood exhaust systems.

410.4 The exhaust from all laboratory hoods in which infectious or radioactive materials are processed shall be equipped with filters having a 99 percent efficiency based on the DOP (dioctylphthalate) test method. Filter frames shall be durable and carefully dimensioned, and shall provide an airtight fit with the enclosing duct work. All joints between filter segments and the enclosing duct work shall be gasketed or sealed to provide a positive seal against air leakage.

Section 411.0 - Kitchen and Dining Areas [For OSHPD 1, 2, 3 & 4]

411.1 The air from dining areas may be used to ventilate the food preparation areas only after it has passed through a filter with at least an 80 percent average efficiency.

Exception: For skilled nursing facilities, intermediate care facilities and correctional treatment centers, the air from dining areas may be used to ventilate food preparation areas only after it has passed through a filter with a 50 percent average efficiency.

Section 412.0 - Boiler, Mechanical and Electrical Rooms [For OSHPD 1, 2, 3 & 4]

412.1 Boiler, heater and electrical equipment rooms shall be provided with outdoor air so as to maintain combustion rates of equipment and temperatures in the rooms and in adjoining areas as rated in this chapter.

412.2 Floor surfaces in occupied spaces above such rooms should not exceed a temperature of 85°F (29.4°C), and suitable insulation may be required.

Section 413.0 - Odorous Rooms [For OSHPD 1, 2, 3 & 4]

413.1 Rooms in areas where excessive heat or moisture is generated, where objectional odors or dust are present, or where flammable or toxic gases may accumulate, which are used by health facility personnel or patients, shall be provided with exhaust ventilation to change the air a minimum of ten times per hour.

413.2 *Kitchens, morgues and laundries located inside a hospital building or skilled nursing facility in which patients are accommodated, or treated, shall be ventilated with exhaust systems which will provide a minimum of ten air changes per hour and prevent odors from entering patient areas.*

Section 414.0 - Negative-Pressure Isolation Rooms [For OSHPD 1, 2, 3 & 4]

414.1 Exhaust Systems. *A separate, dedicated exhaust system shall be provided for negative-pressure isolation rooms. The dedicated system may serve more than one negative-pressure isolation room, adjoining toilet room and anteroom. The exhaust ducts shall be identified by appropriate labeling with the words "Caution Negative-Pressure Isolation Room Exhaust" or similar terminology. Such labeling shall be in a manner which is not readily removable and shall appear on the exhaust duct at intervals of not more than 20 feet (6096 mm) and at least once near each room and each story traversed by the exhaust system. Exhaust fans shall comply with Section 407.1.2. The discharge from exhaust fans shall be located above the roof and shall be located a minimum of 25 feet (7620 mm) from areas that may be occupied, doors, operable windows, outdoor air intakes, or other openings into the building. The exhaust fan discharge shall be labeled in a manner which readily identifies the precautions which should be observed. To ensure that the airborne contaminants do not reenter the building, one of the following shall be provided:*

414.1.1 *Exhaust discharge from fan shall extend at least 7 feet (2134 mm) above the roof and discharge vertically upward. Self-draining stacks or equivalent shall be used for rain protection. Rain caps which divert the exhaust toward the roof shall be prohibited; or*

414.1.2 *Exhaust shall discharge above roof level and through an accessible HEPA filter. The HEPA filter shall be located upstream of the exhaust fan and have a minimum efficiency of 99.97 percent based on the DOP method in accordance with Mil-Std. 282. Filter gage shall be installed across the filter. For maintenance of air balance relationship, see Section 407.3.2. The 25-foot (7620 mm) dimension required by Section 414.1 may be reduced when a 99.97 percent HEPA filter is used and the reduced dimension is specifically approved by the enforcing agency.*

414.2 Air Distribution. *The supply outlets and exhaust inlets shall be located to provide airflow patterns that prevent stagnation of the air and eliminate short circuiting of the supply to the exhaust, and minimize exposure of health care workers to airborne infectious particles. Supply-air*

outlets shall be located at or near the ceiling and at the end of the negative-pressure isolation room which is opposite the head of the bed. Exhaust registers shall be located on the wall behind the patient's head, or as close to that wall as practical and shall be located not less than 3 inches (76 mm) nor more than 24 inches (610 mm) above the finished floor.

Exception: *For correctional treatment centers, the location and design of the supply outlets and the exhaust inlets shall not compromise the safety, security and protection of staff, inmates and property.*

Section 415.0 - Positive-Pressure Isolation Rooms [For OSHPD 1, 2, 3 & 4]

415.1 Air Distribution. *The supply outlets and exhaust and return inlets shall be located to provide airflow patterns that prevent stagnation of the air and eliminate short circuiting of the supply to the exhaust or return. Supply air shall be delivered at or near the ceiling and near the patient's bed. All exhaust or return registers shall be located near the entrance to the positive-pressure isolation room and not less than 3 inches (76 mm) nor more than 8 inches (203 mm) above the finished floor.*

Exception: *For correctional treatment centers, the location and design of the supply outlets and exhaust or return inlets shall not compromise the safety, security and protection of staff, inmates and property.*

Section 416.0 - Alarms - Negative - Pressure Isolation Rooms and Positive - Pressure Isolation Rooms [For OSHPD 1, 2, 3 & 4]

416.1 *An alarm system which is based on static pressure control, volumetric control, or directional flow measurement shall be provided for each isolation room. The alarm system shall consist of a display monitor located on the corridor wall near the door to the room and a visual and audible alarm which annunciates at the room and at a nurses' station or other suitable location that will provide responsible surveillance. A time delay shall be provided to allow for routine openings of doors. The alarm shall annunciate when the supply, return, or exhaust fans are interrupted and when one of the following conditions is not being met during closed door conditions:*

1. *When the minimum air quantity difference of 75 cfm (35.4 L/s) required by Table 4-A is not being maintained; or*
2. *When a minimum pressure differential of 0.001 inch (0.003 kPa) of water and a minimum inward (outward for positive pressure isolation*

rooms) air velocity of 100 feet per minute (0.508 m/s) is not being maintained at the air transfer opening required by Table 4-A.

416.2 Other acceptable alarm systems will be allowed when designs are specifically approved by the enforcing agency.

416.3 [For OSHPD 4] For correctional treatment centers, the alarm system shall not create false alarms or security hazards.

416.4 Prior to acceptance of the rooms, the alarm system shall be tested and operated to demonstrate to the owner or designated representative that the installation and performance of the system conforms to design intent.

Section 417.0 - Testing - Negative - Pressure Isolation Rooms and Positive - Pressure Isolation Rooms [For OSHPD 1, 2, 3 & 4]

Prior to acceptance of the rooms, all mechanical systems shall be tested, balanced and operated to demonstrate to the owner or designated representative that the installation and performance of the systems conform to design intent. All testing and balancing shall be performed by a qualified independent agency certified by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB). Test results shall be documented for maintenance files.

Section 418.0 - Design Requirements for Ethylene Oxide (ETO) Sterilization Areas [For OSHPD 1, 2, 3 & 4]

418.1 Air Changes. The ETO sterilization equipment room shall be provided with minimum air changes per hour per Table 4-A and be maintained at a negative air balance.

418.2 Exhaust Requirements.

418.2.1 All air from the ETO sterilizer equipment room shall be exhausted to the outside by a dedicated system or other approved method.

418.2.2 The exhaust fan for the dedicated system shall be located at the discharge point of the system and identified as ETO Equipment Room Exhaust.

418.3 Discharge Point. The discharge point shall be a minimum of 25 feet (7620 mm) away from any outside intake, operable window or personnel passage.

418.4 Ventilation Requirements.

418.4.1 Aeration units. The aeration units shall be ventilated through a nonrecirculating dedicated ventilation exhaust system.

418.4.2 Capture box. When the drain is not located in the ETO sterilizer equipment room, ventilation is

required by a capture box.

418.4.3 Cylinder change. When not located in the ETO sterilizer equipment room, exhaust during cylinder change is required by installing a hood that is part of a dedicated ventilation exhaust system, positioned no more than 1 foot (305 mm) above or behind the point where the change of cylinders takes place.

418.4.4 Sterilizer relief valve. The ventilation of sterilizer relief valve is required through a pipe connected to the outlet of the relief valve exhausted directly to the outdoors at a point high enough to be away from passers-by, and not near any windows that open, nor near any air-conditioning or ventilation air intakes.

CHAPTER 6

DUCT SYSTEMS

601.0 Scope

601.1 Ducts and plenums which are portions of a heating, cooling, absorption or evaporative cooling or product conveying system shall comply with the requirements of this chapter.

601.2 Sizing Requirements. Duct systems used with blower-type equipment which are portions of a heating, cooling, absorption, evaporative cooling or outdoor air ventilation system shall be sized in accordance with Chapter 16, Part II Referenced Standards or by other approved methods.

602.0 Material

602.1 General. Supply air, return air and outside air for heating, cooling or evaporative cooling systems shall be conducted through duct systems constructed of metal as set forth in Tables 6-1, 6-2 and 6-3 or metal ducts complying with U.M.C. Standard No. 6-2 or the referenced HVAC Duct Construction Standard in Chapter 16, Part II with prior approval. Ducts, plenums and fittings may be constructed of asbestos cement, concrete, clay or ceramics when installed in the ground or in a concrete slab, provided the joints are tightly sealed.

Corridors shall not be used to convey air to or from rooms if the corridor is required to be of fire-resistive construction per the Building Code.

Exception 1: [For OSHPD 1, 2, 3 & 4]: *In health facilities, air from corridors may be used as makeup air to ventilate small rooms of 30 square feet (2.79 m²) or less which are mechanically exhausted, such as bathrooms, toilet rooms, janitor closets, and electrical or telephone closets opening directly on corridors.*

Exception 2: [For OSHPD 1, 2, 3 & 4]: *Air transfer caused by pressure differentials in rooms required to have a positive or negative air balance by Table 4-A.*

Concealed building spaces or independent construction within buildings may be used as ducts or plenums.

When gypsum products are exposed in ducts or plenums, the air temperature shall be restricted to a range from 50°F (10°C) to 125°F (52°C) and moisture content shall be controlled so that the material is not adversely affected. For the purpose of this section, gypsum products shall not be exposed in ducts serving as supply from evaporative coolers, and in other air-handling systems regulated by this chapter

when the temperature of the gypsum product will be below the dew point temperature.

See Chapter 8 for limitations on combustion products venting systems extending into or through ducts or plenums.

See Chapter 5 for limitations on environmental air systems exhaust ducts extending into or through ducts or plenums.

Exhaust ducts under positive pressure and venting systems shall not extend into or pass through ducts or plenums. For appliance vents and chimneys, see Chapter 8.

602.2 Combustibles within Ducts or Plenums.

Materials exposed within ducts or plenums shall have a flame-spread index of not more than 25 and a smoke-developed rating of not more than 50 when tested in accordance with the test for surface burning characteristics of building materials. (See the building code standards based on ASTM E-84-91a and ANSI/UL 723-86.)

Exceptions:

1. Return-air and outside-air ducts, plenums or concealed spaces which serve a dwelling unit may be of combustible construction.
2. Air filters meeting the requirements of Sections 312.0 and 503.3.
3. Water evaporation media in an evaporative cooler.
4. Charcoal filters when protected with an approved fire suppression system.
5. Electrical wiring in plenums shall comply with the Electrical Code. Flame propagation and smoke production characteristics of exposed electric cables installed in concealed space used as air plenums shall:
 - A. Exhibit a flame travel of five (5) feet (1524 mm) or less, and
 - B. Produce smoke having an average optical density not greater than 0.15 and having a peak optical density of 0.5 or less when tested in accordance with U.M.C. Standard No. 6-3.
 - C. Wiring meeting these requirements shall be listed and labeled as plenum cable as required by the Electrical Code.
6. Nonmetallic fire sprinkler piping in plenums shall be listed and shall meet the following requirements:

C
A
C
A
C
A
C
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C
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C
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C
A
C
A
C

- A. Exhibit flame travel of five (5) feet (1524 mm) or less, and
- B. Produce smoke having an average optical density not greater than 0.15 and having a peak optical density of 0.5 or less when tested in accordance with U.M.C. Standard No. 6-3.

602.3 Factory-Made Air Ducts. Factory-made air ducts shall be approved for the use intended or shall conform to the requirements of the referenced standard for air ducts in Chapter 16, Part II. Each portion of a factory-made air duct system shall be identified by the manufacturer with a label or other suitable identification indicating compliance with the referenced standard for air ducts in Chapter 16, Part II and its class designation. These ducts shall be listed and shall be installed in accordance with the terms of their listing, and the requirements of U.M.C. Standard No. 6-5. Flexible air connectors are not permitted.

602.3.1 Flexible Ducts. [For OSHPD 1, 2, 3 & 4] *In hospital building projects and all other health-care facilities, including clinics and correctional treatment centers, flexible ducts of not more than 10 feet (3048 mm) in length may be used to connect supply, return or exhaust-air terminal devices to rigid duct systems. Where constant volume, variable volume or mixing boxes are utilized, flexible duct of not more than 10 feet (3048 mm), may be used on the inlet side for alignment. An internal impervious liner shall be provided to isolate insulation material from conditioned air.*

602.4 Joints and Seams of Ducts. Joints of duct systems shall be made substantially airtight by means of tapes, mastics, gasketing or other means.

Crimp joints for residential round ducts shall have a contact lap of at least 1-1/2 inch (38 mm) and shall be mechanically fastened by means of at least three sheet-metal screws equally spaced around the joint, or an equivalent fastening method.

Joints and seams for 0.016 inch (0.41 mm) (No. 28 gage) and 0.013 inch (0.33 mm) (No. 30 gage) residential rectangular ducts shall be as specified in Table 6-1 for 0.019 inch (0.48 mm) (No. 26 gage) material.

Joints and seams for rectangular duct systems shall be as specified in Table 6-1.

Joints and seams for flat oval ducts and round ducts in other than single dwelling units shall be as specified in Table 6-2.

Joints and seams and all reinforcements for factory-made air ducts and plenums shall meet with the conditions of prior approval in accordance with the installation instructions that shall accompany the product. Closure systems for rigid Class 1 air ducts and plenums, and flexible Class 1 air ducts shall conform to the referenced standards for air ducts in closure systems in Chapter 16, Part II.

602.5 Metal. Every duct, plenum or fitting of metal shall comply with Table 6-1 or 6-2.

Exceptions:

1. Ducts, plenums and fittings for systems serving single dwelling units may comply with Table 6-3.
2. Duct systems complying with U.M.C. Standard No. 6-1.
3. Duct systems complying the U.M.C. Standard 6-2 or the referenced HVAC Duct Construction Standard in Chapter 16, Part II with prior approval.

602.6 Tin. Existing tin ducts may be used when cooling coils are added to a heating system, provided the first ten (10) feet (3048 mm) of the duct or plenum measured from the cooling coil discharge are constructed of metal of the gage thickness set forth in Table 6-1, 6-2 or 6-3 of this chapter or are of approved material and construction. Tin ducts completely enclosed in inaccessible concealed areas need not be replaced. All accessible ducts shall be insulated to comply with Table 6-4 of this chapter. For the purpose of this subsection, ducts shall be considered accessible where the access space is thirty (30) inches (762 mm) or greater in height.

602.7 Vibration Isolators. Vibration isolators installed between mechanical equipment and metal ducts (or casings) shall be made of an approved material and shall not exceed ten (10) inches (254 mm) in length.

603.0 Quality of Material

Galvanized steel shall be of lock-forming quality with a minimum coating of 1.25 ounces of zinc per square foot (0.04 kg/m³) conforming to the requirements of U.M.C. Standard No. 2-2.

604.0 Installation of Ducts

604.1 Metal Ducts. Ducts shall be securely fastened in place at each change of direction and as set forth in Table 6-5. Vertical rectangular ducts and vertical round ducts shall be supported as set forth in Table 6-5, Part I. Riser ducts shall be held in place by means of metal straps or angles and channels to secure the riser to the structure.

Metal ducts shall be installed with at least four (4) inches (102 mm) separation from earth. Metal ducts when installed in or under concrete slab shall be encased in at least two (2) inches (51 mm) of concrete.

Ducts shall be installed in a building with adequate clearance so as to permit retaining the full thickness of fireproofing on structural members.

Supports for rectangular ducts as set forth in Table 6-5, when suspended from above, shall be installed on two opposite sides of each duct and shall be riveted, bolted or metal screwed to each side of

TABLE 11-4
Field Leak Test Pressures in psig (kPa)

Refrigerant Number	High Side Water Cooled	High Side Air Cooled	Low Side
11	15	35	15
12	140	220	140
22	230	360	230
113	15	15	15
114	40	80	40
115	275	340	275
123	15	30	15
134a	150	250	150
152a	130	220	130
500	165	265	165
502	250	385	250
717	235	390	235
744*	N/A	N/A	N/A

(psi x 6.89476 = kPa)

*Special design required; test pressures typically exceed 1000 psig (6890 kPa).

N/A—Not applicable.

Part II – Cooling Towers

1126.0 General

Cooling towers, evaporative condensers and fluid coolers shall be readily accessible. When located on roofs, such equipment, having combustible exterior surfaces, shall be protected with an approved automatic fire-extinguishing system.

1127.0 Support and Anchorage

Cooling towers, evaporative condensers and fluid coolers shall be supported on noncombustible grillage designed in accordance with the Building Code. Seismic restraints shall be as required by the Building Code.

1128.0 Water Supply

Water supplies and backflow protection shall be as required by the Uniform Plumbing Code.

1129.0 Drainage

Drains, overflows and blow-down provisions shall have indirect connection to an approved disposal location. Discharge of chemical waste shall be as approved by the appropriate regulatory authority.

1130.0 Chemical Treatment Systems

Chemical treatment systems shall comply with the

Fire Code. When chemicals used present a contact hazard to personnel, approved emergency eye-wash and shower facilities shall be installed.

1131.0 Location

Cooling towers, evaporative condensers and fluid coolers shall be located such that their plumes cannot enter occupied spaces. Plume discharges shall be at least five (5) feet (1524 mm) above or twenty (20) feet (6096 mm) away from any ventilation inlet to a building. Location on the property shall be as required for buildings by the Building Code.

1131.1 [For OSHPD 1, 2, 3 & 4] Plume discharge shall be at least twenty-five (25) feet (7620 mm) from any ventilation inlet to a building.

1132.0 Electrical

Electrical systems shall be in accordance with the Electrical Code. Equipment shall be provided with a vibration switch to shut off fans operating with excessive vibration. In climates commonly subject to electrical storms, lightening protection shall be provided on roof-mounted equipment.

1133.0 Refrigerants and Hazardous Fluids

Equipment containing refrigerants as a part of a closed-cycle refrigeration system shall comply with Part I of this chapter. Equipment containing other fluids which are flammable, combustible or hazardous shall comply with the Fire Code.

119.0, Section 120.0, Section 121.0, Section 121.1 and Section 121.2 add the margin tape "L" for local enforcement.

Page 25: Under Approved [For HCD 1 & HCD 2] revise "Health and Safety Code Section 17920(a)..." to "Health and Safety Code Section 17920(a) ..."

Page 26: For the balance of APPROVED AGENCY, for ASSEMBLY BUILDING and its Exception: and for BRINE [For SFM] add the margin tape "L" for local enforcement. In BRINE [For SFM] revise the second line to read "transmission of heat without ...". In BUILDING OFFICIAL revise the title to read "[Not adopted by HCD] See ADMINISTRATIVE AUTHORITY ...". In BUILDING OFFICIAL [For SFM] in the third line after the words "... this code, or a regularly ..." insert the word "authorized".

Page 30: Under LISTED [For HCD1 & HCD 2] in the indented paragraph bold the heading "Section 17920(h)" Under LISTING AGENCY [For HCD 1 & HCD 2] in the second line revise "Section 17920(I)" to "Section 17920(i)"

Page 31: Under OCCUAPNCY CLASSIFICATON NOTE: revise "[For HCD 1 & 2]" to "[For HCD 1 & HCD 2]".

Page 35: Under PLUMBING CODE Exception: revise "[For HCD 1 & 2]" to "[For HCD 1 & HCD 2]".

Page 51: In Section 401.0 for the sixth line add margin double bars for change. For the two lines of the title for Part III add margin double bars for change

Page 53: In Section 408.2 add "[For OSHPD 1]" to the title. In Section 408.3 add "[For OSHPD 2 & 4]" to the title. In Section 408.4 add "[For OSHPD 3]" to the title

Page 54: For the last three lines of Section 410.3 add margin double bars for change.

Page 92: In Section 813.1 after the words "... reinforced as required in " add the words "Chapters 16, 18 and 31 of".

Page 93: Insert the following: "Section 814.1.2.1 Design. Metal chimneys shall have a minimum thickness of 0.127 inch (3.23 mm) (No. 10 manufacturer's standard gage) steel and shall be designed and constructed as specified in this chapter and Chapters 16 and 22 of the Uniform Building code."

Page 125: For the third and fourth lines of Section 1107.5 add margin double bars for change.

Page 133: In the Table title after "Quantities3" add "14". Under the column Pounds per 1000 cf of Space8, for the row R-123 revise 1.60 to 0.4 and add margin double bars for change, and for the row R-500/73.8%/26.2% revise 16.00 to 12.00 and add margin double bars for change. For footnote number 14 add margin double bars for change.

Page 134: At [For OSHPD 1, 2, 3 & 4] I-1.1 and [For OSHPD 1, 2, 3 & 4] I-3 add margin double bars for change.

Page 141: At Section 1201.3 et seq. remove the italics and the CA margin tape.

Page 142: Remove all italics from this page except for in Section 1201.3.5.2 the words "[For HCD 1 & HCD 2] Structural modifications shall be made in compliance with the California Building Code, Title 24, Part 2." and add margin "CA" for those 4 lines. Add margin double bars for change for both columns for the entire page.

Page 151: In Section 1501.0 under Section 801.5 Paragraph (b) in the last line revise it to read "... include, at a minimum, all of the following:"

Page 251: In Table 13-13 change Length of Tube, feet, "175" to "200" and "200" to "250" and delete bottom "250". Immediately below row "150", insert a new row for "| 175 | 47 | 97 | 198 | 346 | 491 | 1050 | 1890 |". In Table 13-14, in the row for 50 of Length of Tube, feet, revise the right had column for 1-3/8 to read "7747".

July 8, 2003 Errata

Page 52: In Section 407.4 renumber "406.4.1" to "407.4.1". Filed 7/14/03. Issuing Agency: OSHPD, Effective date: 11/1/02.

Page 73: In Section 605.1 revise "[For OSHPD 1, 2, &4]" to "[OSHPD 1, 2, 3 & 4]". In Section 605.2 renumber "407.2.1" to "408.2.1". Filed 7/14/03. Issuing Agency: OSHPD, Effective date: 11/1/02.

Page xvii:

Duct Systems Matrix Adoption Table - Add "X" to Section 605.1 in Chapter 6. Filed 7/14/03. Issuing Agency: OSHPD, effective date: 11/1/02.

2001 California Mechanical Code Supplements

1. (OSHPD 2/02) 2001 California Mechanical Code Standards – Chapters, 2, 3, 4, 6 and 11, Various sections. Chapter 2, Definitions, section 203A, Chapter 3, General Requirements, section 316.0, Essential Mechanical Provisions, Chapter 4, Ventilation Air Supply, section 407.2, Outdoor air intakes and exhaust outlets, section 407.4 Air circulation, section 410.0, Laboratories, Chapter 6, Duct Systems, section 602.1, General, Chapter 11, Refrigeration, section 1131.1, Sub-item 12-8, Table 4-A, Pressure Relationship and Ventilation Requirements or Table 4-C Filter Efficiencies for Central Ventilation and Air-Conditioning Systems in Skilled Nursing Facilities and Intermediate Care Facilities and Correctional Treatment Centers (including OSHPD's additional changes to Part 2 to eliminate conflict with the mechanical code). Approved by the Building Standards Commission on May 14, 2003 and effective 180 days after publication.