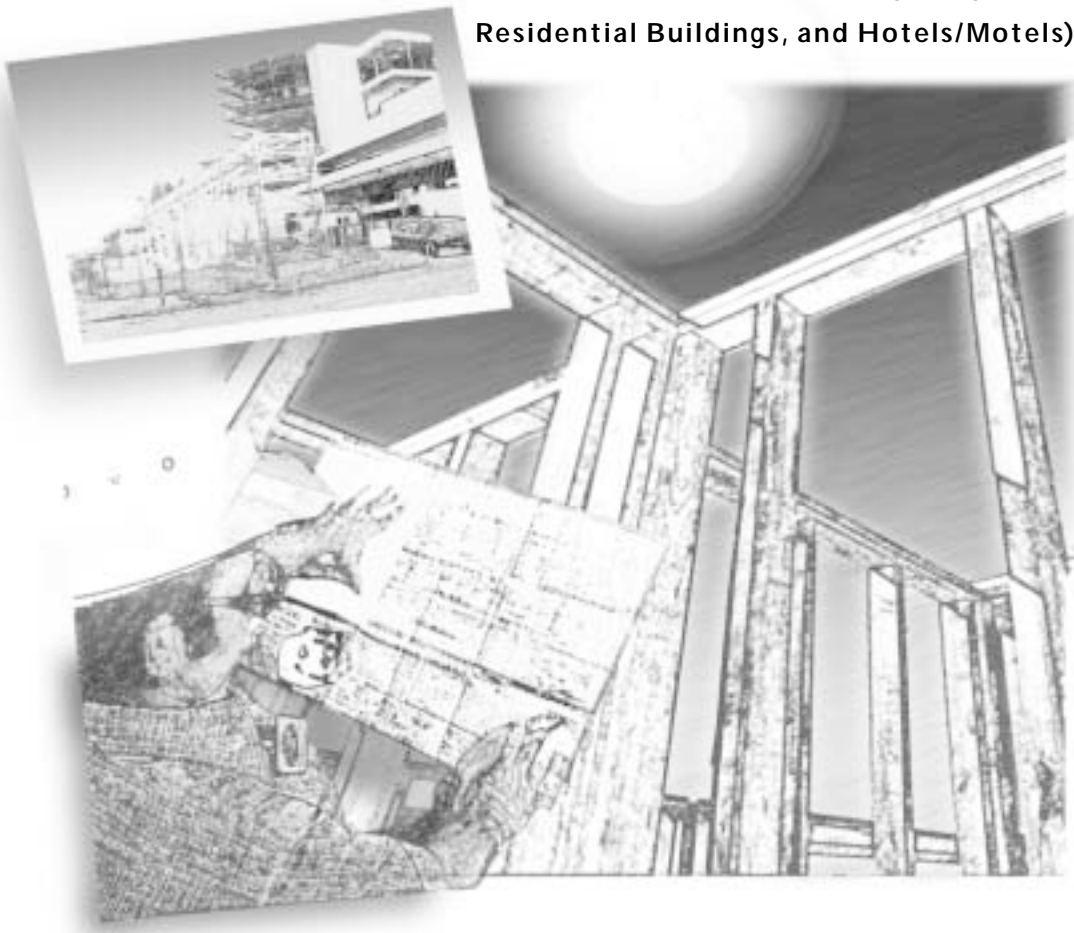


NONRESIDENTIAL MANUAL

for Compliance with the
**2001 ENERGY
Efficiency Standards**

(for Nonresidential Buildings, High-Rise
Residential Buildings, and Hotels/Motels)



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CALIFORNIA
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Gray Davis, Governor

SUBCHAPTER 3

NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES—MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING AND SERVICE WATER-HEATING SYSTEMS

AND EQUIPMENT

SECTION 120 – SPACE-CONDITIONING AND SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT — GENERAL

Sections 121 through 129 establish requirements for the design and installation of space-conditioning and service water-heating systems and equipment in nonresidential, high-rise residential, and hotel/motel buildings subject to Title 24, Part 6. All such buildings shall comply with the applicable provisions of Sections 121 through 129.

SECTION 121 – REQUIREMENTS FOR VENTILATION

(a) **General Requirements.**

1. All enclosed spaces in a building that are normally used by humans shall be ventilated in accordance with the requirements of this section.

NOTE: In addition to meeting the requirements of this section, for those occupancies where unusual contaminants are present or anticipated (such as commercial dry cleaners, coin-operated dry cleaners, bars and cocktail lounges, auto repair workshops, smoking lounges, barber shops, beauty shops), it is recommended to use local exhaust ventilation and enclosure to capture the contaminants and discharge them directly outdoors.

2. The outdoor air-ventilation rate and air-distribution assumptions made in the design of the ventilating system shall be clearly identified on the plans required by Section 10-103 of Title 24, Part 1.

(b) **Design Requirements for Minimum Quantities of Outdoor Air.** Every space in a building shall be designed to have outdoor air ventilation according to Item 1 or 2 below:

1. **Natural ventilation.** Natural ventilation may be provided for spaces that:
 - A. Are within 20 feet of an operable wall or roof opening through which outdoor air flows, which has an openable area more than five percent of the conditioned floor area of the space, and which is readily accessible to occupants of the space at all times when the space is occupied; and

- B. Have a direct outdoor air flow from the operable wall or roof opening, unobstructed by walls or doors.

2. Mechanical ventilation. Each space that is not naturally ventilated under Item 1 above shall be ventilated with a mechanical system capable of providing an outdoor air rate no less than the larger of:

- A. The conditioned floor area of the space times the applicable ventilation rate from Table 1-F; or
- B. 15 cfm per person times the expected number of occupants. For spaces without fixed seating, the expected number of occupants shall be assumed to be no less than one half the maximum occupant load assumed for exiting purposes in Chapter 10 of the UBC. For spaces with fixed seating, the expected number of occupants shall be determined in accordance with Chapter 10 of the UBC.

EXCEPTION to Section 121 (b) 2: Transfer air. The rate of outdoor air required by Section 121 (b) 2 may be provided with air transferred from other ventilated spaces if:

- A. None of the spaces from which air is transferred have any unusual sources of indoor air contaminants; and
- B. Enough outdoor air is supplied to all spaces combined to meet the requirements of Section 121 (b) 2 for each space individually.

TABLE 1-F—MINIMUM VENTILATION RATES

TYPE OF USE	CFM PER SQUARE FOOT OF CONDITIONED FLOOR AREA
Auto repair workshops	1.50
Barber shops	0.40
Bars, cocktail lounges, and casinos	1.50
Beauty shops	0.40
Coin-operated dry cleaning	0.30
Commercial dry cleaning	0.45
High-rise residential	Per UBC Section 1203
Hotel guest rooms (less than 500 sq. ft.)	30 cfm/guest room
Hotel guest rooms (500 sq. ft. or greater)	0.15
Retail stores	0.20
Smoking lounges	1.50
All others	0.15

(c) **Operation and Control Requirements for Minimum Quantities of Outdoor Air.**

1. **Times of occupancy.** The minimum rate of outdoor air required by Section 121 (b) 2 shall be supplied to each space at all times when the space is usually occupied.

EXCEPTION 1 to Section 121 (c) 1: Demand control ventilation. The rate of outdoor air provided to an intermittently occupied space may be reduced to 0.15 cfm per square foot of conditioned floor area if the ventilation system serving the space is controlled by a demand control ventilation device complying with 121 (c) 4, approved by the commission, and:

- ~~A. If the device is a carbon dioxide sensor, it limits the carbon dioxide level to no more than 800 ppm while the space is occupied; and~~
- ~~B. The sensor for the device is located (1) in the space; or (2) in a return air stream from the space with no less than one sensor for every 25,000 square feet of habitable space, or no more space than is recommended by the manufacturer, whichever is less.~~

EXCEPTION 2 to Section 121 (c) 1: Temporary reduction. The rate of outdoor air provided to a space may be reduced below the level required by Section 121 (b) 2 for up to five minutes each hour if the average rate each hour is the required rate.

2. **Pre-occupancy.** The lesser of the minimum rate of outdoor air required by Section 121 (b) 2 or three complete air changes shall be supplied to the entire building during the one-hour period immediately before the building is normally occupied.

3. **Required Demand Control Ventilation.** HVAC systems with the following characteristics shall have demand ventilation controls complying with 121 (c) 4:

- A. That primarily serve areas with fixed seating and occupant densities less than or equal to 10 square foot per person, or identified in Chapter 10 of the UBC as either "Assembly Areas, Concentrated Use (without fixed seats)" or "Auction Rooms." ; and
- B. That have design outdoor air capacities equal to or exceeding 3,000 cfm.

4. Demand Control Ventilation Devices shall:

- A. Allow the rate of outdoor air to be reduced to 0.15 cfm per square foot of conditioned floor area if the demand control ventilation device indicates that the space conditions are acceptable; and
- B. Be approved by the commission; and
- C. If the device is a carbon dioxide sensor, limit the carbon dioxide level to no more than 800 ppm while the space is occupied; and

Note: control to 800 ppm is not required when the ventilation rate is equal to or greater than that required by Section 121 (b) 2.

- D. Include a sensor for the device located (1) in the space; or (2) in a return-air stream from the space with no less than one sensor for every 25,000 square feet of habitable space, or no more space than is recommended by the manufacturer, whichever is less.
- (d) **Ducting for Zonal Heating and Cooling Units.** Where a return plenum is used to distribute outdoor air to a zonal heating or cooling unit which then supplies the air to a space in order to meet the requirements of Section 121 (b) 2, the outdoor air shall be ducted to discharge either:
1. Within five feet of the unit; or
 2. Within 15 feet of the unit, substantially toward the unit, and at a velocity not less than 500 feet per minute.
- (e) **Design and Control Requirements for Quantities of Outdoor Air.** All mechanical ventilation and space-conditioning systems shall be designed with and have installed ductwork, dampers and controls to allow outside air rates to be operated at the larger of (1) the minimum levels specified in Section 121 (b) 2; or (2) the rate required for make-up of exhaust systems that are required for a process, for control of odors, or for the removal of contaminants within the space.
- (f) **Completion and Balancing.** Before an occupancy permit is granted for a new building or space, or a new space-conditioning or ventilating system serving a building or space is operated for normal use, all ventilation systems serving the building or space shall be documented in accordance with Title 8, Section 5142 (b) of the California Safety Code (1987) to be providing the minimum ventilation rate specified in Section 121 (b) 2, as determined using one of the following procedures:
1. **Balancing.** The system shall be balanced in accordance with the National Environmental Balancing Bureau (NEBB) Procedural Standards (1983) or Associated Air Balance Council (AABC) National Standards (1989); or
 2. **Outside air certification.** The system shall provide the minimum outside air as shown on the mechanical drawings, and shall be measured by the installing licensed C-20 mechanical contractor and certified by (1) the design mechanical engineer, (2) the installing licensed C-20 mechanical contractor, or (3) the person with overall responsibility for the design of the ventilation system; or
 3. **Outside air measurement.** The system shall be equipped with a calibrated local or remote device capable of measuring the quantity of outside air on a continuous basis and displaying that quantity on a readily accessible display device; or
 4. Another method approved by the commission.