OSHPD
Office of Statewide Health Planning and Development

HOSPITAL BUILDING SAFETY BOARD

Energy Conservation Committee

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FDD

CMC Mechanical Ventilation Requirements for Hospitals

Hospitals have higher standards for performance than commercial buildings

- Health related philosophy of hospital ventilation systems:
  - Ventilation systems must provide comfortable healing environment
  - Does not facilitate the spread of contagious diseases
  - Does not adversely affect immune suppressed patients

- Fire related philosophy of hospital ventilation systems:
  - Patients may be to ill too evacuate
  - “Defend in Place” by moving patients to adjacent “compartments”

CMC Mechanical Ventilation Requirements for Hospitals

- Located in Title 24, Part 4, California Mechanical Code Chapter 4
- Closely follows the FGI Guidelines/ASHRAE 170
  - Updated every four years, the FGI Guidelines, with a 67 year history, is used in the regulation of health care facility design and construction in more than 42 states and several federal agencies (www.ashe.org)
  - The 2014 Guidelines documents were produced with the participation of more than 200 experts in planning, design and construction, and operation of hospitals … (www.fgiguidelines.org)
  - Joint Commission Online: Managing outside air: The minimum percentage of outside air required is determined by the Centers for Disease Control and Prevention (CDC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). (www.jointcommission.org)
  - Compliance with ASHRAE 170 is required by CMS for participation in Federal reimbursement programs (CDPH)

CMC Mechanical Ventilation Requirements for Hospitals

- Ventilation rates used for non-OSHPD buildings shall be based on CBC 403.2 through 403.8 (ASHRAE 62.1)
- Variable Air Volume systems need only have one automatic modulating damper in the return or exhaust air for **each zone**

Reduction of Mechanical Ventilation Requirements in CBC

- Unoccupied Rooms/Spaces
  - Areas requiring no continuous directional control as identified in Table 4-A, ventilation systems may be shut down when the space is unoccupied and ventilation is not otherwise required
  - Ventilation shall not be reduced in rooms specifically used for airborne infection control:
    - Waiting rooms
    - Triage rooms
    - Corridors
    - Reception areas
    - Areas adjacent waiting areas
    - Airborne infection isolation rooms
    - Negative pressure exam rooms
    - Negative pressure x-ray treatment rooms
    - Protective environment rooms
  - All operating and delivery rooms shall maintain a minimum of six air changes per hour of total air when not in use (a reduction of 6 – 15 ach)

Considerations Regarding Mechanical Ventilation

- Ventilation Rate Changes (ASHRAE Journal)
  - ASHRAE changes to ventilation rates: Change reflects recent research that concluded that 6 ACH is the minimum ventilation rates required to provide satisfactory patient comfort based on computational fluid dynamic (CFD) modeling analysis. Analysis showed that the previous rate of 2 ACH resulted in high volumes of Local Mean Age of Air (LMAA) that would manifest as a “stuffy” room. Furthermore, the previous ventilation rate of 2 ACH was acknowledged to be unrealistic with respect to the capacity to address the thermal load in the room
  - The changes in ventilation recommendations of the Guidelines reflects:
    - The application of new research, e.g. patient rooms
    - New concerns for reducing exposure in high-risk areas of the health-care facility, e.g. waiting areas
    - Consistency with the medical program requirements, e.g. pharmacy, anesthesia gas storage, etc., established on evidence-based clinical research and principles of asepsis
    - These changes are the result of a multidisciplinary review of the ventilation requirements and the ventilation recommendations are based on definitive scientific basis

Considerations Regarding Mechanical Ventilation

- Dilution ventilation helps control infectious particles by introducing air, usually 2 to 5 air changes/hour (ACH), to dilute space air and then exhausting that amount as contaminated air (www.healthcarefacilitiestoday.com)
- Pressurization protects against cross contamination from the infiltration of air from one space to that of another (www.healthcarefacilitiestoday.com)
- Hospital-acquired infections, or nosocomial infections, are one of the leading causes of death in the United States – killing more Americans than AIDS, breast cancer, or automobile accidents… Several studies have identified the type of air filter, direction of airflow and air pressure, air changes per hour in room, humidity, and ventilation system cleaning and maintenance as factors related to air quality and infection rates… in one design study where six patients and one nurse were involved with an outbreak of epidemic methicillin-resistant Staphylococcus aureus (EMRSA-15), an environmental source as suspected, and the ventilation grilles in two patient bays were found to be harboring EMRSA-15. The ventilation system, at that time, was working on an intermittent cycle from 4 p.m. to 8 p.m. Daily shutdown of the system created negative pressure, sucking air in from the ward environment into the ventilation system and contaminating the outlet grilles. The contaminated air blew back into the ward when the ventilation was started (www.healthdesign.org)