

City of Burlington

Hardwired Smoke and Carbon Monoxide Detector Installation Guidelines



This booklet should be used as a guideline only. Smoke and Carbon Monoxide detection system design, installation and placement are subject to the approval of City of Burlington Code Officials

The United States Fire Administration states that properly maintained and operating interconnected smoke alarms and CO detectors are two of the three legs of the fire protection triad. Used in combination with a fire sprinkler system, these devices provide best in life safety/fire protection systems currently available

SMOKE DETECTOR LIMITATIONS

According to the Federal Emergency Management Agency, smoke detectors may not go off or provide adequate warning time in as many as 35% of all fires.

Smoke detectors will not work without power.

Battery operated smoke detectors will not work if there is no power because:

- ◆ the batteries are dead
- ◆ the wrong batteries are installed
- ◆ the batteries are incorrectly installed
- ◆ the batteries have been removed to silence a 'nuisance' alarm

Hardwired (AC) detectors will not work if there is no power because:

- ◆ there is Power company failure (either at a generator or along the power lines)
- ◆ there is an open fuse or circuit breaker in the home
- ◆ a fire in the home has burned wiring before the alarm has sounded

AC Powered Smoke Detectors with Battery Backup are the Safest Alternative

Smoke detectors may not be heard.

All UL listed smoke detectors meet current standards for loudness. However, they may not be heard by occupants in a home when:

- ◆ the detector is located outside the closed bedroom door of a sound sleeper
- ◆ the detector is located outside the closed bedroom door of a sleeper who recently used drugs or has been drinking alcoholic beverages
- ◆ the detectors is located on a different level than bedrooms
- ◆ the occupant is hard of hearing
- ◆ the sound is blocked by distance, closed doors, or ambient noise such as:
 - traffic
 - televisions and stereos
 - air conditioners
 - other appliances and equipment

Smoke Detectors Shall Be Placed Within Every Room Used For Sleeping, Outside Of Sleeping Area, And On Every Level Of Each Dwelling Unit, Including Basements

Smoke detectors will not work when the smoke does not reach the detector.

- ◆ Fires may not trigger an alarm when:
 - A fire starts in a chimney, roof or within a wall
 - The fire starts on the other side of a closed door
 - A detector on the 2nd floor may not sense a fire in the first floor or Basement.

***Smoke Detectors Shall Be Interconnected:
A Fire in the Basement Should Alarm in the Bedroom***

***Only photoelectric type smoke detectors are allowed
for newly installed and replacement smoke detectors.***

Burlington Smoke and Carbon Monoxide Detector Ordinances

City of Burlington Code of Ordinances

Chapter 18: Housing

Sec. 18-99. Smoke detectors.

(a) Each and every dwelling, rooming house, dwelling unit or rooming unit let to another for occupancy shall meet the following requirements for smoke detectors/alarms.

(1) Smoke detectors/alarms shall be installed in the following, areas:

- a. In every sleeping room or area;
- b. Outside every sleeping room or area in the immediate vicinity of the sleeping room or area; and
- c. On all levels of the dwelling, dwelling unit, rooming house, or rooming unit, including basements but excluding crawl spaces and unfinished attics.
- d. Notwithstanding the above installation locations, detectors/alarms shall not be located within kitchens or garages or in other spaces where temperatures can fall below forty (40) degrees F (four (4) degrees C) or exceed one hundred (100) degrees F (thirty-eight (38) degrees C). Detectors/alarms shall not, unless specifically listed for the application, be located closer than three (3) feet (0.9 m) horizontally from:

1. The door to a kitchen.
 2. The door to a bathroom containing a tub or shower.
 3. The supply registers of a forced air heating or cooling system, and outside of the airflow from those registers.
- (2) Smoke detectors/alarms shall receive their operating power from the building electrical system but shall also receive power from a battery when the building electrical system power is interrupted.

(3) Smoke detectors/alarms within each dwelling unit or rooming unit shall be interconnected so that the sensing of smoke by one detector sounds the alarms of all detectors within that dwelling unit or rooming unit.

(4) Smoke detectors/alarms shall be approved or listed by a nationally recognize testing or listing agency for the purposes for which they are intended.

(5) Smoke detectors/alarms shall be properly installed and shall be maintained in good working condition.

(b) All other dwellings, rooming houses, dwelling units or rooming units not covered by (a) shall have a smoke detector/alarm installed adjacent to bedroom areas. Such smoke detectors/alarms shall be approved or listed by a nationally recognized testing or listing agency for the purposes for which they are intended.

Sec. 18-101. Carbon monoxide (CO) detectors.

(a) For rental units, as defined by this chapter, carbon monoxide detectors which are UL 2034 listed or approved by a nationally recognized independent testing laboratory shall be installed in the vicinity of the sleeping areas and on every floor of the dwelling in accordance with the manufacturer's instructions and state law.

(b) Anyone installing smoke detectors pursuant to section 18-99 after the effective date of this section [10-19-2005] shall install either a combination smoke detector/carbon monoxide detector device or a combination system providing smoke and carbon monoxide detection and alarm in the vicinity of the sleeping areas and on every floor of the dwelling in accordance with the manufacturer's instructions and state law.

(c) Owners shall keep the following records relating to the installation and maintenance of CO detectors or systems:

- (1) the model and make and date of installation of each detector or system;
- (2) the power source of the detector or detection system;
- (3) the location where each detector was installed;

(4) maintenance records.

These records must be made available to any city building trades, fire, housing, or health inspector upon request.

(d) Responsibilities. Owners shall provide and maintain the detectors required by subsection (a).

(e) Habitability. A dwelling shall be deemed uninhabitable under the provisions of this chapter if an order to comply with subsections (a) and (b) is issued and not complied with in the time specified, unless a written extension has been granted.

(f) The seller of a residential dwelling transferred by sale or exchange shall certify to the buyer that the dwelling is provided with the carbon monoxide detectors required in subsection (a). This certification shall be signed and dated by the seller and filed in the land records at the time of recording the transfer. If the buyer notifies the seller within ten days by certified mail from the date of conveyance that the dwelling lacks a carbon monoxide detector or that the detector is not operable, the seller shall comply with this section within ten days of notification.

City of Burlington Code of Ordinances

Chapter 13: Fire Protection and Prevention

Sec. 13-4. Carbon monoxide (CO) detectors.

(a) Each and every dwelling, rooming house, dwelling unit or rooming unit **let to another** for occupancy shall meet the following requirements for Carbon Monoxide (CO) detectors/alarms:

Carbon monoxide detectors which are UL 2034 listed or approved by a nationally recognized independent testing laboratory shall be installed in all existing buildings in which people sleep, including where people rent accommodations whether for overnight or for a longer term, condominiums, multiple unit dwelling, and other occupancies in which there are rooms or spaces in which sleeping is permitted. Such installation shall be in the vicinity of the sleeping areas and on every floor of the dwelling, installed in accordance with the manufacturer's instructions and state law. All newly installed carbon monoxide alarms (detectors) in one and two family, dwellings, multiple unit dwellings, lodging or rooming houses, hotels and dormitories, or other buildings in which people sleep, shall be directly wired to a non-dedicated electrical branch circuit for the building and by battery. Carbon monoxide detectors currently installed in existing one-two family dwellings shall be permitted to be powered by any approved source until the end of their service life (5 years from date of installation for CO detectors).

(b) In all existing buildings in which people sleep, including where people rent accommodations whether for overnight or for a longer term, condominiums, or multiple unit dwelling, anyone installing smoke detectors pursuant to section 18-99 of this Code of Ordinances after the effective date of this section shall install either a combination smoke detector/carbon monoxide detector device or a combination system providing smoke and carbon monoxide detection and alarm. Such installation shall be in the vicinity of the sleeping areas and on every floor of the dwelling, installed in accordance with the manufacturer's instructions and state law.

(c) The seller of a residential dwelling transferred by sale or exchange shall certify to the buyer that the dwelling is provided with the carbon monoxide detectors required in subsection (a). This certification shall be signed and dated by the seller and filed in the land records at the time of recording the transfer. If the buyer notifies the seller within ten days by certified mail from the date of conveyance that the dwelling lacks a carbon monoxide detector or that the detector is not operable, the seller shall comply with this section within ten days of notification.

(d) Where interconnected smoke detectors exist, the CO detection shall be interconnected as well, such that a CO alarm will meet current audibility requirements as adopted in NFPA 72 for smoke alarms.

(e) If a smoke detector is disconnected or disabled, that fact shall create a rebuttable presumption that the adult occupants of the dwelling unit were responsible for the act of disconnecting or disabling the smoke alarm.

(f) No requirement of this section shall preclude the application of other more restrictive smoke alarm requirements which may pertain to the property, including, but not limited to, requested time of sales inspections pursuant to state law.

Sec. 13-5. - Smoke detectors.

(a) Each and every dwelling, lodging or rooming house, dwelling unit or rooming unit for occupancy, other than for a single-family owner occupied dwelling, shall meet the following requirements for smoke detectors/alarms.

(1) Smoke detectors/alarms shall be installed in the following, areas:

- a. In every sleeping room or area;
- b. Outside every sleeping room or area in the immediate vicinity of the sleeping room or area; and
- c. On all levels of the dwelling, dwelling unit, rooming house, or rooming unit, including basements but excluding crawl spaces and unfinished attics.
- d. Notwithstanding the above installation locations, detectors/alarms shall not be located within kitchens or garages or in other spaces where temperatures can fall below forty (40) degrees F (four (4) degrees C) or exceed one hundred (100) degrees F (thirty-eight (38) degrees C). Detectors/alarms shall not, unless specifically listed for the application, be located closer than three (3) feet (0.9 m) horizontally from:

(i) The door to a kitchen.

(ii) The door to a bathroom containing a tub or shower.

(iii) The supply registers of a forced air heating or cooling system, and outside of the airflow from those registers.

(2) Smoke detectors/alarms shall receive their operating power from the building electrical system but shall also receive power from a battery when the building electrical system power is interrupted.

(3) Smoke detectors/alarms within each dwelling unit or rooming unit shall be interconnected so that the sensing of smoke by one (1) detector sounds the alarms of all detectors within that dwelling unit or rooming unit.

(4) Smoke detectors/alarms shall be approved or listed by a nationally recognize testing or listing agency for the purposes for which they are intended and conform with the requirements of the Vermont Fire and Building Safety Code.

(5) Smoke detectors/alarms shall be properly installed and shall be maintained in good working condition.

(6) All newly installed smoke alarms shall be the photoelectric-only type

(b) Single-family owner occupied dwellings shall comply with the smoke alarm provisions of the Vermont Fire and Building Safety Code currently in effect.

(c) If a smoke detector is disconnected or disabled, that fact shall create a rebuttable presumption

that the adult occupants of the dwelling unit were responsible for the act of disconnecting or disabling the smoke detector.

- (d) No requirement of this section shall preclude the application of other more restrictive smoke detector requirements which may pertain to the property, including but not limited to, time of sale requirements pursuant to state law.

(Ord. of 10-26-09; Ord. of 12-19-11)

City of Burlington Code of Ordinances

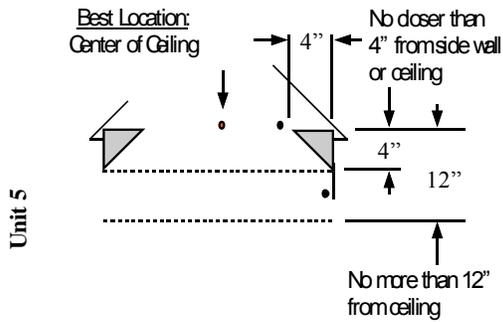
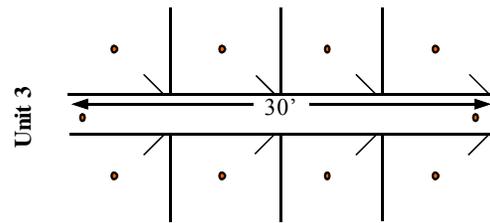
Chapter 8: Building

Sec. 8-2. Building codes adopted

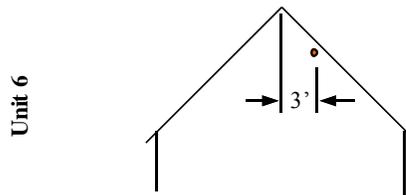
(d) *Carbon Monoxide (CO) Detectors.* Residential dwelling and other occupancies in which there are rooms or spaces in which sleeping is permitted may not be constructed or substantially altered or repaired without the installation in the vicinity of the sleeping areas and on every floor of the dwelling of interconnected, hardwired, battery backup, UL 2034 listed or approved carbon monoxide detectors. In residential occupancies which are compartmentalized and constructed and maintained as if they are separate buildings pursuant to the Vermont Fire and Building Safety Code, carbon monoxide detectors need only be interconnected within the distinct "buildings" as those recognized by the authority having jurisdiction under the Vermont Code. Such detectors shall be installed in accordance with the manufacturer's instructions and state law. For purposes of this provision, "substantially altered or repaired" means that the cost of construction, alteration, or repair is 40% or more of the assessed value of the property as listed by the City Appraisers Office.

SMOKE DETECTOR PLACEMENT

- ◆ A smoke detector shall be placed at each end of a hallway serving bedrooms, if the hallway is in excess of 30' in length, as shown in Unit 3.
- ◆ In an efficiency type apartment, smoke detectors should be placed in the sleeping area, as far away from the kitchen area as possible as shown in Unit 4. *Do not ceiling mount a detector in a room near a kitchen when there is no wall above the passageway that separates the kitchen from that room.* In this instance, mount the detector on a wall furthest from the kitchen (preventing nuisance alarms).
- ◆ Smoke, heat and combustion products rise to the ceiling and spread horizontally. Mounting smoke alarms in the center of the ceiling will provide the earliest warning, and the best possible protection. Ceiling mounted installation is preferred in residential construction
- ◆ If mounting near the center of the ceiling is not practical, a smoke detector may be located on the ceiling no closer than 4" (10cm) from the ceiling / wall junction.
- ◆ (See unit 5.)
- ◆ Smoke detectors may be wall mounted, if they are located at least 4", but not more than 12" from the ceiling, and no closer than 4" from a sidewall. (See unit 5)
- ◆ If the room has a sloped ceiling, mount detector 3' (measured horizontally) from the highest point of the ceiling. (See unit 6)



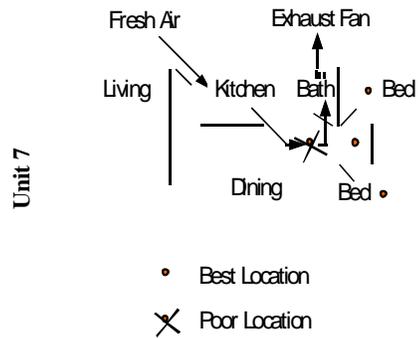
- Best Location
- Acceptable Location



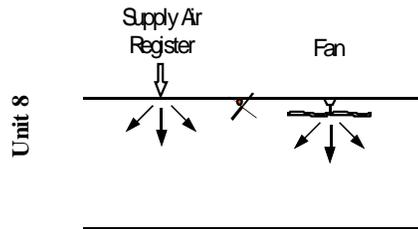
WHERE NOT TO PLACE SMOKE DETECTORS

- ◆ Air Streams Near Kitchens Fresh air often enters apartments around the front door (even if the door opens into a common hallway). When the bathroom exhaust fan operates, the fan exhausts air which may be replaced by fresh air entering through the front door. If the air flow goes through a kitchen, products of combustion (from cooking activities) may enter the air under normal, fire free conditions, causing nuisance alarms.

Place smoke detector so that it is out of the air flow of 'normal' kitchen combustion products.
A more appropriate location for the detector in unit 7 is between the two bedroom doors.



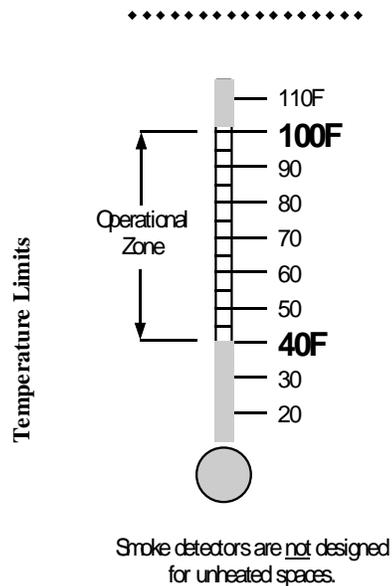
- ◆ Near Bathrooms Excessive steam from a bathroom shower may cause condensation on the detector components, causing a nuisance alarm. See unit 7. (If possible, locate detectors at least 10' away from bathrooms.)



- ◆ Drafty Areas Including areas affected by heating and cooling supply / return registers, ceiling fans, air conditioners, etc. Install detectors only where they will not be bypassed by mechanical ventilation in the room. See Unit 8.

- ◆ Garages Running automobile engines produce products of combustion which may cause nuisance alarms.

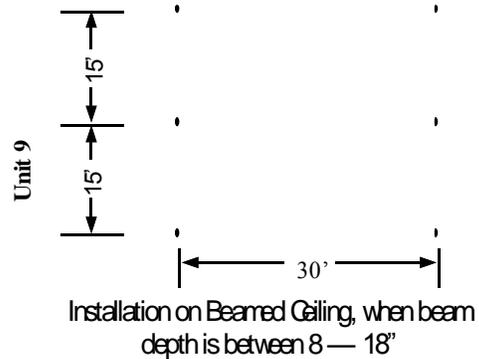
- ◆ Unheated Buildings or Rooms Most smoke detectors will not function properly at temperatures above 100F or below 40F.



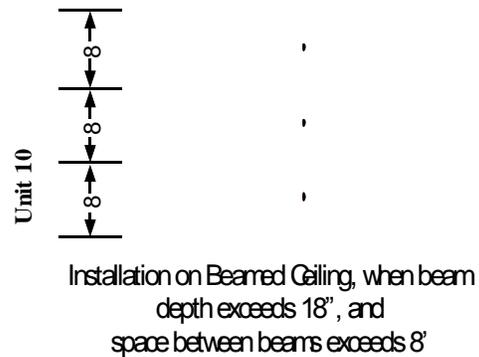
SPECIAL SPACING CONSIDERATIONS

◆ Beamed Ceilings

- If ceiling beams are less than 8” in depth, detectors should be mounted in the center of the room, on the bottom of the beam (not in the channels in between)
- If beams are between 8—18” deep, detectors should be mounted on the bottom of beams, and additional detectors installed. (See unit 9)
- Movement of smoke may be slowed if beam depths exceed 8”. If beam depth exceed 18” and are more than 8’ on center, each bay will require a separate detector. (See unit 10)



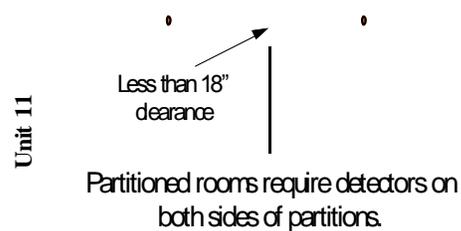
- ◆ Partitions Any room with partitions mounted on the floor and leaving less than 18” of vertical space between the partition top and the ceiling should be considered a sidewall. Each partitioned area should have a detector. (See unit 11)



- ◆ Large Rooms / Long Hallways Under ideal conditions, with normal ceiling heights and no physical obstructions between the property protected and a detector, detectors can be installed on 30’ centers. (See unit 12.)

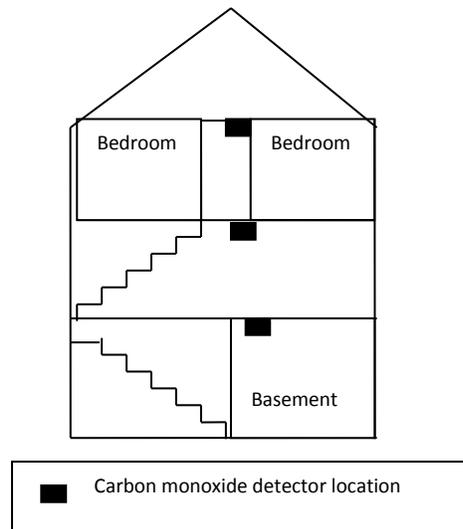


Large Room Spacing



Carbon Monoxide Detectors

- All newly installed carbon monoxide detectors in all new homes built since 2005, all single family rentals, all two family dwellings, multiple unit dwellings, lodging or rooming houses, hotels and dormitories, or other buildings in which people sleep, shall be directly wired to a non-dedicated electrical branch circuit for the building and by battery
- All Carbon Monoxide detectors in a single apartment or dwelling unit must be interconnected.
- A Carbon Monoxide detector must be placed outside each sleeping area and on every level of the dwelling unit.
- An additional carbon monoxide detector shall be installed in each sleeping area that contains a fuel- burning appliance.
- Carbon monoxide detectors must be installed in accordance with the manufacturers' instructions.
- Manufacturers' recommended spacing must be followed when locating Carbon Monoxide detectors in the vicinity of gas fire heating appliances.



Source: Manufacturers' recommendations based on NFPA 101 and NFPA 720

Contacts

Fire Marshall's Office

802-864-5577

Director of Code Enforcement

802-865-7510

Electrical Inspector's Office

802-865-7561

Life Safety & Building Code Official's Office

802-865-7559



Residential Single Station Smoke Detector Summary Table

| Building Type | Power supply | Interconnected | On each level | Inside bedrooms |
|--|--|-----------------|---------------|-----------------|
| Owner Occupied Single-Family (newly rewired or built since 1994)* | Hardwired with battery back-up | Optional | Yes | Optional |
| Existing Owner-occupied Single-Family (built prior to 1994) * | Hardwired <i>Or</i> Battery power | Optional | Yes | Optional |
| All rental dwelling units (new and existing) | Hardwired with battery back-up | Yes | Yes | Yes |
| Owner occupied Condos | Hardwired with battery back-up | Yes | Yes | Yes |

★ **Install all detectors per manufacturers’ installation instructions & replace per manufacturers’ expiration dates.** ★

* Single family homes that are converted to rentals will have to upgrade smoke detectors to include hard wiring, interconnection and detectors in all sleeping areas.

- ▶ ***PHOTOELECTRIC ONLY TYPE DETECTORS ALLOWED FOR NEW AND REPLACED DETECTORS***
- ▶ ***PHOTOELECTRIC ONLY TYPE DETECTORS REQUIRED AT TIME OF SALE OR TRANSFER FOR EXISTING SINGLE FAMILY HOMES***
- ▶ ***SEE CITY OF BURLINGTON GUIDELINES FOR INSTALLATION DETAILS***

Source: Burlington Code of Ordinances, Sections 18-99 & 13-5. VSA Title 9, Chapter 77



Residential Carbon Monoxide Detector Summary Table

All detectors must be listed and meet the standards of UL 2034

| Building Type | Power supply | Interconnected | On each level | Inside bedrooms |
|---|--|-----------------|---------------|---|
| Owner Occupied Single-Family (newly built or newly rewired since 2005) | Hardwired with battery back-up | Yes | Yes | Yes – if sleeping room contains a fuel burning heating appliance |
| Existing Owner-occupied Single-Family (built prior to 2005) | Hardwired <i>Or</i> Battery power | Optional | Yes | Yes – if sleeping room contains a fuel burning heating appliance |
| All rental dwelling units (new and existing) | Hardwired with battery back-up | Yes | Yes | Yes – if sleeping room contains a fuel burning heating appliance |
| Owner occupied Condos | Hardwired with battery back-up | Yes | Yes | Yes – if sleeping room contains a fuel burning heating appliance |

★
Install all detectors per manufacturers' installation instructions & replace per manufacturers' expiration dates.
★
** Single Family homes that are converted to rentals will have to upgrade CO detectors to include hard wiring and interconnection*

- ▶ ***CARBON MONOXIDE DETECTORS ARE REQUIRED AT TIME OF SALE OR TRANSFER FOR EXISTING SINGLE FAMILY HOMES.***
- ▶ ***SEE CITY OF BURLINGTON GUIDELINES FOR INSTALLATION DETAILS.***

Source: Burlington Code of Ordinances, Sections 8-2, 18-101 & 13-4.