

## **SMOKE DETECTOR INSTALLATION PROGRAM**

### **The Burlington Ordinance Perspective**

The **National Fire Alarm Code, NFPA 72**, sets the minimum requirements of performance, selection, use and location of automatic detection devices. This information may be found in the chapters dedicated to Initiating Devices and Fire Warning Equipment for Dwelling Units.

**Remember: Smoke detectors are an early warning device.** They are placed to sense smoke in the escape paths and sleeping rooms so that the occupants have the 1-2 minutes of warning to make good their practiced escape plan and survive the fire.

#### **AC/DC Interconnected Smoke Detector Ordinance**

- Shall be applied to all **rented rooms or dwelling units** in the City of Burlington.

A dwelling unit is defined as a single unit, providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

- One and two family, owner occupied homes constructed prior to January 1, 1994 are exempt.

Remember: In the case of a duplex homestead, both dwelling units must be wholly owned in order to qualify for the exemption.

#### **Installers**

- Smoke detectors shall be installed by persons who have obtained a license from the VT Electrician's Licensing Board.
- An individual holding a VT Master Electrician's or a Type S-Fire Alarm license is considered a qualified person.

#### **Installation**

- The installer is **required to obtain a permit** from the Electrical Inspector at

the Department of Public Works.

- Smoke detectors shall be listed and approved by a nationally recognized testing agency.  
For example: U.L.- Underwriter's Laboratories  
FM - Factory Mutual
- All devices shall be installed, tested and maintained to the manufacturer's recommendations. The installer is responsible for providing the owner of the property with copies of these instructions, recommendations and instructions.
- Your electrical contractor should evaluate a dwelling before installing smoke detectors. There are six criteria he/she should look at:
  1. Ceiling shape and surface;
  2. Ceiling height;
  3. Configuration of contents of the dwelling
  4. Burn characteristics of the combustible present;
  5. Ventilation (air ducts, ceiling fans); and
  6. Ambient environment (e.g. radiant heat in the ceiling).
- Smoke detectors shall not be installed where:
  - temperatures fall below 40° F
  - temperatures rise above 100°F
  - relative humidity  $\geq 93\%$  (bathrooms)
  - air velocity  $\geq 300$  feet/min (under ceiling fans)
  - the detector is within 3' of an air diffuser
  - within 3' of a kitchen door
  - within 3' of a bathroom door
  - within 6' of a fluorescent fixture
- Make an effort to install the detector in areas to prevent nuisance alarms or improper operation. When in a smoker's room or close to the kitchen (20'), consider installing a listed and approved smoke detector with a "hush" feature and/or use a photoelectric smoke detector.

## **Special Installation**

- Smoke detectors installed in mobile homes built before 1996 shall have the detectors mounted on interior walls.
- Modular homes built before 7/01/01 are in conflict with HUD and NFPA Rules. Once the home is purchased and rented NFPA rules shall apply.

## **Maintenance**

- Detectors do require routine maintenance:
  - follow all manufacturer's cleaning and maintenance instructions
  - monthly: clean with vacuum brush gently around screens then press test button
  - yearly: change battery if alkaline unit

## **Smoke Detector Placement**

- The preferred location of a smoke detector is on the ceiling in the middle of a ceiling space.
- Wall mounting a detector is acceptable, but one must be mindful of obstructions that may effect audibility.
- Must follow the "4/12" rule.
- Detectors shall be placed inside and outside of each sleeping room. If the sleeping rooms are close together they may share a single detector in the common hallway.
- Other detectors may be required to detect fire in other areas of the dwelling unit to facilitate early notification and escape.
- Smoke detector spacing is 30' between detectors.
- Basement detectors shall be interconnected to the dwelling unit(s) immediately above the basement area.
- Any detector shall be interconnected to all other detectors within a dwelling

unit.

- A smoke detector may be placed closer to a likely hazard so that the detector will intercept the smoke sooner.

One of the advantages of interconnected detectors is that in the event of one detector activating all the detectors in that dwelling unit will sound.

- Sloped/shed ceilings:
  - place detector on the high side of slope
  - ceiling beams running towards the peak - use flat ceiling criteria
  - ceiling height over 12' - use tables in NFPA 72 Chapter 2 (spacing reductions)
- Peaked ceiling: place the device within 3' of peak
- Partitions - when extending to within 18' of the ceiling, effect of smoke travel shall be evaluated. Typically this situation will require the detectors to be closer together.

### **AC/DC Power Requirements**

- Each smoke detector shall receive its primary power from the house electrical system (AC). This shall not be a dedicated circuit.
- Additionally, each smoke detector shall receive its secondary power from a battery (DC).

### **A/C Power Requirements**

- Primary power shall be connected in accordance with the National Electric Code (NEC).
- Per NEC, conductors shielded in a metallic cover shall not use the cover as a conductor.
- Smoke detectors shall not be connected to switched circuits or circuits servicing major appliances.
- It is recommended that the detectors be connected to an electrical circuit that services a continually habitable space such as a living or family room.

### **D/C Power Requirements**

- Secondary power supply allows the detector to operate in the event of a power failure.
- Common secondary power devices:
  - Alkaline 9 volt DC battery
    - inexpensive
    - readily available
    - easily changed
  - Disadvantages:
    - battery security is an issue
    - battery needs to be replaced annually
  - Lithium battery
    - lasts for 10 years (life of the detector)
    - better battery security (sealed unit)
  - Disadvantages:
    - more expensive
    - recycling unit may be difficult

### **Types of Smoke Detectors**

- There are two types of smoke detectors generally used in a residential setting:

- Ionization detector  
Have two parallel electrically charged plates separated by an air gap. A small level, low dose radioactive source causes the air in the gap to become ionized and creates a small electrical charge flowing between the plates.

When smoke enters the chamber it disrupts the electrical charge and activates the alarm.

Ionization detectors work better on fast “flaming,” high-heat fires that produce small smoke particles, such as a paper fire.

- Photoelectric detector  
Generates a light beam between a sending unit and a receiving unit.

When smoke enters the detector chamber it breaks the light beam and activates the alarm.

Photoelectric detectors work better on slow smouldering, low-heat fires that produce large smoke particles, such as a kitchen fire.

- Both types of detectors are now manufactured with an option of a “hush” button. This features allows the listed and approved detector to be shut off by depressing a special button on the face of the detector. The detector will remain “OFF” for 10 minutes then automatically turn itself back on.
- **Combination Smoke/Heat**
  - Monitor light flashes to indicate that there is power to the detector.
  - Monitor light steady = alarm
  - Monitor light not illuminated = an “open” faulted circuit prior to detector. Needs repair immediately
  - Has a fixed temp heat
  - Note test button
  - To remove detector, push tab in on base, and twist detector

### **Smoke Detector dBA Levels**

- Smoke detectors have a minimum rating of 85 dBA at a distance of 10 feet.
- Smoke detectors must be a minimum of 15 dBA above ambient background noise (e.g. a noisy air conditioner or street noise)
- At least 70 dBA of sound to the sleeping person’s pillow.
- Detectors lose 6 dBA of sound pressure when the distance from the device to the listener doubles.
  - 10' to 20' to 40' = loss of 12 dBA

### **Smoke detectors of Hearing Impaired**

- Follows ADA requirements.
- Requires interconnected devices that have a strobe light in addition to an audible device.
- In a bedroom the strobe must be within 16' of the sleeping person’s pillow

## **FREQUENTLY ASKED QUESTIONS:**

### **Can I use a heat detector in the place of a smoke detector?**

No. But you may install a heat detector in places unsuitable for smoke detectors, such as attics, kitchens and bathrooms.

### **Does having a sprinkler system abate the smoke detector requirement?**

No. Remember that a sprinkler system relies upon heat from a fire to activate and suppress the fire. Fire victims are typically killed by smoke.

### **Are there different spacing requirements for a high ceiling or ceilings with exposed beams?**

Yes. Refer to NFPA 72 (1996) Appendix A & B or (1999), Chapter 2, Section 3 for the specific criteria.

### **Can combination heat/smoke detectors be installed?**

Yes, if they are installed in locations where smoke detectors are required. A combination unit does not enhance the devices performance as an early warning device.

### **Can smoke detectors be installed in lieu of a required fire alarm system?**

No. Manual fire alarm systems are required in Apartment Buildings more than 3 stores in height (BOCA-5602) or more than 11 dwelling units.

### **Are smoke detectors required in a basement?**

Yes. And it needs to be interconnected to the smoke detectors of the first floor apartment(s) that are immediately above the basement.

### **Do smoke detectors wear out or break?**

Yes. Some detectors may get damaged and will need to be replaced. Typically, smoke detectors need to be replaced every 10 years, as they get dirty and will not operate correctly. The wiring to the device can be serviceable for years.

### **Which is easier to install, a heat detector or a smoke detector?**

Physically both are easy to install. However, heat detectors have a very strict installation and spacing criteria.

**In a long hallway, is it necessary to install two or more smoke detectors?**

Typically spacing requirements on a smooth ceiling require a detector 30' on center in a hallway or open in open spaces.

**What can I do if my tenant keeps tampering with the smoke detectors?**

1. Warning ticket issued.
2. Citation issued.
3. State fine issued through Fire Marshal's Office.

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