

Smoke Alarms: The Basics

Since the introduction of smoke alarms to the residential market in 1971, many advances have been made to the technology, features and effectiveness of these devices. The array of choices now available to consumers can be somewhat confusing and may cause them to turn to their fire department for answers. The following are some of the most commonly asked questions about smoke alarm operation and features.

(For additional questions and answers, refer to: *Smoke Alarm Requirements for Dwelling Units under Section 2.13 of the Fire Code* provided in the *Resources* section.)

Where should I install smoke alarms?

The Ontario Fire Code requires that smoke alarms be installed on every storey and outside all sleeping areas. Because smoke rises, smoke alarms should be installed on the ceiling. If this is not possible, or if frequent nuisance alarms are a concern, install them high up on a wall, according to the manufacturer's instructions. Avoid placing alarms near bathrooms, heating appliances, windows or close to ceiling fans.

What does it mean when my smoke alarm "chirps"?

It's time to install a new battery. Underwriters Laboratories of Canada (ULC) requires that all smoke alarms have a low battery warning device that emits an intermittent signal (often a "chirp") when the battery power is low. The warning signal itself will eventually stop after a few days, so smoke alarms should be tested when occupants return from an extended absence. It should also be noted that many smoke alarms with a pause feature chirp intermittently when in pause mode. The chirping will stop after a few minutes, when the alarm resets itself.

How often should I replace the battery?

Conventional smoke alarm batteries should be replaced annually, and when the low-battery indicator sounds. When replacing batteries, ensure the replacements are compatible with the manufacturer's recommendations.

Smoke alarms are also available with long-life batteries that last up to ten years. When the battery wears out, simply replace the entire smoke alarm unit with a new one.

How do I know if I installed the battery correctly?

Standard 9V batteries used in many smoke alarms require snapping the battery's terminals into tight-fitting connectors. This can sometimes be awkward or difficult. Alarms with spring-metal terminal contacts provide much easier battery installation, but increase the possibility of installing the battery backward. Individuals installing batteries in smoke alarms must ensure the positive and negative terminals are correctly connected. Correct installation can be confirmed by pressing the test button until the alarm sounds.

How often should I test my smoke alarms?

It is recommended that smoke alarms be tested every month. Pressing and holding the test button located on the face of the unit until the alarm sounds will test the alarm feature of most smoke alarms.

Do smoke alarms need to be cleaned?

The inside of battery-operated smoke alarms should be cleaned at least once each year by using the soft brush attachment of the vacuum cleaner. Test the unit when finished. For electrically-connected smoke alarms, shut off the power to the unit and vacuum the outside vents only. Restore power and test the unit when finished. Do not paint any part of a smoke alarm.

What does the pause feature on smoke alarms do?

Pause or 'hush' buttons allow occupants to silence nuisance alarms, such as those caused by burning toast or opening smoky ovens, and not affect the operation of the alarm. Without this feature, many occupants will inappropriately disable the alarm by disconnecting or removing the batteries.

Smoke alarms with the pause feature can be temporarily silenced in the event of a nuisance alarm. The pause will last for approximately seven to ten minutes, after which time the alarm will automatically return to normal operation. Smoke alarms with this feature discourage the dangerous practice of removing batteries or otherwise disabling the units. Whenever possible, fire departments should recommend that residents purchase smoke alarms with pause features, especially if they will be installed near kitchens or bathrooms. It should be noted that many alarms with a pause feature chirp intermittently while in pause mode. The chirping will stop once the alarm resets itself.

How do I know whether to buy photoelectric or ionization alarms?

Smoke alarms commonly use one of two different types of technology in detecting smoke: ionization or photoelectric.

Ionization-type smoke alarms have a small amount of radioactive material that ionizes the air between two electrically charged plates, causing a measurable current to flow between the plates. When smoke enters the chamber, it disrupts the flow of current, which activates the alarm.

Photoelectric-type smoke alarms aim a light source into a sensing chamber at an angle away from the sensor. Smoke entering the chamber reflects light onto the sensor, which triggers the alarm.

Ionization vs. photoelectric: Both ionization and photoelectric alarms are tested to the same product standard (CAN/ULC – S531). Photoelectric alarms respond slightly faster to smouldering type fires; ionization alarms respond slightly faster to flaming type fires. Some manufacturers offer smoke alarms that use both sensor systems, for optimal protection.

It is often recommended that alarms installed near kitchens be photoelectric to minimize the incidence of nuisance alarms.

How can I find out about alarms for the hearing impaired?

Smoke alarms that employ high-decibel alarms and strobe lights are available for the deaf, deafened or the hard-of-hearing. Visit the Canadian Hearing Society's website at www.chs.ca for information about these smoke alarms.

Does my smoke alarm ever need to be replaced?

Like other appliances, smoke alarms wear out and become less effective over time. In addition, new technology and features are continually being integrated. It is recommended all smoke alarms be replaced after ten years to ensure continued protection from fire and to benefit from the latest technology available.

Does my smoke alarm detect carbon monoxide?

Smoke alarms should not be confused with carbon monoxide alarms. Carbon monoxide alarms are designed to detect dangerous levels of carbon monoxide resulting from incomplete combustion from fuel burning appliances, such as gas or oil-fired furnaces or wood burning stoves, or from carbon monoxide gas that may enter a home from an attached garage. Some manufacturers do offer alarms that detect both smoke and carbon monoxide. (An information sheet about carbon monoxide is included in the *Program Resources* section.)

Qs & As

Smoke Alarm Requirements for Dwelling Units Under Section 2.13 of the Fire Code

Q1 What dwelling units are regulated by Section 2.13 of the Fire Code?

Section 2.13 applies to all detached houses, semi-detached houses and row houses where each house is occupied as a dwelling unit. (A dwelling unit is defined by the Fire Code as meaning “a suite operated as a housekeeping unit, used or intended to be used as a domicile by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities”.)

A seasonal home, such as a cabin or cottage, is also considered a dwelling unit for the purpose of this Section. Section 2.13 also captures any other dwelling unit that is not otherwise regulated by Retrofit, Part 9 of the Fire Code. For example, where a building contains a mixed use of occupancies and also contains one or two dwelling units, Section 2.13 would require the dwelling unit(s) to be provided with smoke alarms.

Part 9 regulates houses containing secondary apartment units and most multi-storey, multi-unit residential buildings. Smoke alarm requirements for these buildings are already contained in Part 9 of the Fire Code and Section 2.13 does not apply to these units.

Q2 Does Section 2.13 apply equally to dwelling units that are owner occupied and rental units?

Yes. Each dwelling unit is regulated regardless of the ownership arrangement.

Q3 Where are smoke alarms required to be located in each dwelling unit?

A smoke alarm is required to be installed between each sleeping area and the remainder of the dwelling unit. Where the sleeping areas are served by hallways, the smoke alarms must be installed in the hallways. In addition, at least one smoke alarm is required to be installed on each storey that does not contain a sleeping area.

Q4 When a storey includes two levels, where is the best place to install the smoke alarm?

It is best to install the smoke alarm in the higher ceiling area, as the smoke alarm will react quickest to smoke development in either area in this arrangement. As well, smoke alarms are best installed near the stairs that interconnect the levels or storeys. Always install the smoke alarms on the ceiling or on the upper portion of a wall in accordance with the manufacturer's instructions.

Q5 Many homes have existing smoke alarms that are hardwired to an electrical circuit. Where additional smoke alarms are installed, are these required to be hardwired as well?

No. Any additional smoke alarms required by Section 2.13 of the Fire Code are permitted to be battery powered.

Q6 A dwelling unit has two existing smoke alarms that are hardwired to an electrical circuit and interconnected to each other. When one activates, the second smoke alarm also activates at the same time. If additional smoke alarms are being installed to comply with the Fire Code, do they have to be electrically interconnected to the existing smoke alarms?

No. The additional smoke alarms may be battery powered and need not be interconnected. Additional hardwired smoke alarms would also satisfy the requirements, whether or not they are interconnected. However, interconnected smoke alarms are a good idea for maximum protection.

Q7 Is it permissible to replace existing permanently hardwired individual smoke alarms or electrically interconnected smoke alarms with battery powered smoke alarms?

No. When smoke alarms are being replaced, the installation must not reduce the level of detection required by the Building Code in effect at the time of construction of the dwelling unit, or by municipal by-laws in effect before the Fire Code adopted this requirement. This requirement is contained in Sentence 6.3.3.5.(1) of the Fire Code. In other words, existing permanently wired individual smoke alarms or electrically interconnected smoke alarm installations must be maintained to provide the same level of protection as originally required. Any replacement smoke alarms must be of a type comparable to the original (or better).

Q8

Is a cellar, attic space or crawl space required to have a smoke alarm installed under the changes to Section 2.13 of the Fire Code?

A space without a finished floor is not considered a storey and therefore smoke alarms are not required. “Attic space” is defined in the Fire Code as a space between the roof and the ceiling of the top “storey” (i.e. cavity within the roof space). As such, it is not designated as a “storey” and a smoke alarm is not required. However, an attic or roof space that has a floor and contains a living space or storage is no longer an “attic space” by definition. Such a space is considered a “storey” and a smoke alarm must be installed. A “crawl space” is not defined in the Fire Code but generally refers to a cavity space located beneath the house or a portion of the house and typically has a very low overhead. A crawl space without a finished floor is not a storey and does not require a smoke alarm. Where a crawl space has a finished floor and is used for storage or contains an appliance, it is a storey and requires a smoke alarm. A crawl space that extends out from an adjoining basement does not require a separate smoke alarm since a smoke alarm is already required to protect the basement. “Cellar” is defined in the Fire Code as a basement that is more than 50% below grade. A cellar, like a basement is considered a “storey”. A smoke alarm is required to be installed in a space that falls under the definition of a cellar.

Q9

Is it permissible to install additional smoke alarms beyond the minimum required in Section 2.13?

Yes. The regulation does not prohibit the installation of additional smoke alarms beyond the minimum number that are required. In larger homes, in homes where there are room and ceiling configurations that may interfere with the movement of smoke, or in homes where people sleep with bedroom doors closed, it is recommended to install additional smoke alarms to enhance early detection of smoke and warning of fire.

Managing Nuisance Alarms

Virtually everyone with a smoke alarm in their home has experienced a *nuisance alarm*, which is the accidental activation of the smoke alarm, generally due to cooking activities or steam from the shower. In some homes—depending upon the smoke alarm’s proximity to the bathroom or kitchen and the cooking practices of the occupants—nuisance alarms can be more than an occasional annoyance.

Unfortunately, the occupants’ response to nuisance alarms is often to remove the battery from the alarm, or shut off the circuit breaker. A quick glance at Ontario’s fire loss statistics confirms that this is a very bad idea. A recent ten-year study of smoke alarm operation revealed that approximately half of all homes that experienced a reported fire had no smoke alarm warning. In fatal residential fires, approximately two-thirds had no smoke alarm warning. Clearly, disabling a smoke alarm is a dangerous practice that leaves the occupants extremely vulnerable to fire.

There are alternatives to managing nuisance alarms that do not diminish the fire protection level in the home. Fire departments can increase the number of *working* smoke alarms in homes in their communities by including information about the causes and solutions to nuisance alarms in their smoke alarm programs. A handout addressing nuisance alarms is included in the *Resources* section for this purpose.

Solutions to Nuisance Alarms

The most common cause of nuisance alarms is cooking in the oven, stove or toaster. The first step is to minimize the problem at the source by keeping ovens and burners clean, and by turning down the timer setting on toasters. Using the fan on the range hood when cooking can also help to remove combustion particles from the air. If this fails to produce the desired results, there are other solutions to consider.

Install Smoke Alarms with a Pause Feature

For anyone experiencing nuisance alarms, a smoke alarm with a “pause” or “hush” feature is a must. These alarms have a button which, when pressed, silences the unit for several minutes. The alarm will then re-set itself automatically. It is highly recommended that any new smoke alarms purchased include this feature.

Move the Smoke Alarm

Frequent nuisance alarms can sometimes be avoided by moving the alarm to a different location. If at all possible, residents should avoid having a smoke alarm in the cooking area. Moving an alarm from the kitchen to the hallway could solve the problem of nuisance alarms.

Another solution that can reduce the incidence of nuisance alarms is to move the smoke alarm from the ceiling to the wall. The alarm should be no less than 10 cm and no more than 30 cm from the ceiling and should not be installed near a corner. Refer to the manufacturer's instructions for more information about the correct placement of smoke alarms.

Try Alternative Technology

Smoke alarms commonly use one of two different types of technology to detect smoke: ionization or photoelectric.

Ionization-type smoke alarms have a small amount of radioactive material that ionizes the air between two electrically charged plates, causing a measurable current to flow between the plates. When smoke enters the chamber, it disrupts the flow of current, which activates the alarm. Ionization alarms respond slightly faster to flaming-type fires.

Photoelectric-type smoke alarms aim a light source into a sensing chamber at an angle away from the sensor. Smoke entering the chamber reflects light onto the sensor, which triggers the alarm. Photoelectric alarms respond slightly faster to smoldering-type fires. For smoke alarms located near the kitchen, replacing existing ionization units with photoelectric ones may help to reduce nuisance alarms.