Types of Smoke Alarms and Detectors – Quick Tips

Smoke alarms are essential in all businesses and industrial facilities. In the event of a fire, the alarm will sound and alert all to the danger and providing an early warning. There are a number of different types of smoke alarms, so choosing the proper one for your facilities can get confusing.

NFPA provides the following guidelines for smoke alarms:

- Choose smoke alarms that have the label of a recognized testing laboratory.
- Smoke alarms should be installed at least 10 feet (three meters) from a cooking appliance to minimize false alarms when cooking.
- Mount smoke alarms high on walls or ceilings (remember, smoke rises). Wall-mounted alarms should be installed not more than 12 inches away from the ceiling (to the top of the alarm).
- If you have ceilings that are pitched, install the alarm within three feet of the peak but not within the apex of the peak (four inches down from the peak). .
- Don’t install smoke alarms near windows, doors, or ducts where drafts might interfere with their operation.
- Never paint smoke alarms. Paint, stickers, or other decorations could keep the alarms from working.
- For the best protection, interconnect all smoke alarms. When one smoke alarm sounds they all sound. Interconnection can be done using hard-wiring or wireless technology.
- When interconnected smoke alarms are installed, it is important that all of the alarms are from the same manufacturer. If the alarms are not compatible, they may not sound.

As always, make sure to follow manufacturer’s installation instructions and verify all codes and compliance with your authority having jurisdiction (AHJ). That could include your building inspector, fire marshal or insurance bureau.

Smoke Detector Types

There are currently three types of smoke alarms on the market: ionization, photoelectric and combination ionization/photoelectric.

An **ionization** smoke alarm contains a small amount of radioactive material. The radiation passes through an ionization chamber which is an air-filled space between two electrodes and permits a small, constant current between the electrodes. Any smoke that enters the chamber absorbs the alpha particles, which reduces the ionization and interrupts the current, setting off the alarm. This type of alarm is generally more responsive to flaming fires.

Photoelectric smoke alarms operate using a light source, a light beam collimating system and a photoelectric sensor. When smoke enters the optical chamber and crosses the path of the light beam, some light is scattered by the smoke particles, directing it at the sensor and thus activating the alarm. This type of alarm is generally more responsive to fires that begin with a long period of smoldering.

Combination smoke alarms feature both ionization and photoelectric technologies. Ionization smoke alarms respond faster to high energy fires, whereas photoelectric detectors respond better to low energy smoldering fires. The best overall protection is provided by using combination smoke alarms.

Smoke Alarm Power Sources

Smoke alarms also vary in how they are powered. Nine volt battery powered smoke alarms are very popular due to their low cost; however, care must be taken to replace the battery on a regular basis.

Smoke alarms are also available in 120 volt and long life 10 year rated lithium battery options. Many local or state building codes may require 120 volt interconnected smoke alarms with a battery back-up in case of power outages. The interconnected feature allows all smoke alarms to be linked together. This is especially important in multi-levels homes or in apartment buildings. Smoke alarms with high intensity strobe lights are also available for the hearing impaired.

Regardless of the type of alarm selected, proper placement and maintenance of the device is crucial. Follow all manufactures instructions for placement, testing and maintenance. The NFPA suggests battery replacement at least once a year on battery equipped units and a monthly test to verify the alarm function. Many users utilize daylight saving time in the spring and the fall as a reminder to change batteries.

Commonly Asked Questions

Q: How often should I change my smoke alarm?

A: The NFPA suggests changing your smoke alarms every 10 years.

Q: Are there options for the hearing impaired?

A: Yes. There are smoke alarms that use visual and audible warnings. These use a bright flashing strobe light in conjunction with the horn to warn of danger.

Q: Why is my smoke alarm chirping (or beeping)?

A: This is usually an indication that the battery is dying and needs to be replaced.

Q: Are there distance or square footage requirements for smoke alarm installation?

A: NFPA 72: National Fire Alarm and Signaling Code – 2019 Edition paragraph 29.8.1.provides installation guidelines for single and multiple-station smoke alarms. It is best to always check with the AHJ for code requirements and also the insurance carrier for the facility.

Sources

National Fire Protection Association (NFPA): Report on Smoke Alarms in U.S. Home Fires – 2019

National Fire Protection Association (NFPA): Installing and Maintaining Smoke Alarms

National Fire Protection Association (NFPA): NFPA 72: National Fire Alarm and Signaling Code – 2019

National Fire Protection Association (NFPA): Ionization vs. Photoelectric – 2014

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- Quick Tips #108 Employee Emergency and Fire Prevention Plans
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