

Print

Close



**National Fire
Protection Association**

The authority on fire, electrical, and building safety

[Home](#) > [Safety Information](#) > [Safety tips & fact sheets](#) > [Smoke alarms](#) > [Ionization vs. photoelectric](#)

IONIZATION VS. PHOTOELECTRIC

The two most commonly recognized smoke detection technologies are ionization smoke detection and photoelectric smoke detection.

- **Ionization** smoke detection is generally more responsive to flaming fires.
How they work: Ionization-type smoke alarms have a small amount of radioactive material between two electrically charged plates, which ionizes the air and causes current to flow between the plates. When smoke enters the chamber, it disrupts the flow of ions, thus reducing the flow of current and activating the alarm.
- **Photoelectric** smoke detection is generally more responsive to fires that begin with a long period of smoldering (called "smoldering fires").
How they work: Photoelectric-type alarms aim a light source into a sensing chamber at an angle away from the sensor. Smoke enters the chamber, reflecting light onto the light sensor; triggering the alarm.

For each type of smoke alarm, the advantage it provides may be critical to life safety in some fire situations. Home fatal fires, day or night, include a large number of smoldering fires and a large number of flaming fires. You can not predict the type of fire you may have in your home or when it will occur. Any smoke alarm technology, to be acceptable, must perform acceptably for both types of fires in order to provide early warning of fire at all times of the day or night and whether you are asleep or awake.

The best evidence has always indicated that either type of smoke alarm will provide sufficient time for escape for most people for most fires of either smoldering or flaming type. However, research is ongoing, and standards are living documents. If at any time, research points to a different conclusion, then that will lead to proposals for changes in the NFPA standard or the closely related Underwriters Laboratories standard for testing and approving smoke alarms. Both organizations currently have task groups looking at smoke alarm performance in the current home environment.

For best protection, use both types of smoke alarm technologies

For best protection, it is recommended both (ionization and photoelectric) technologies be in homes. In addition to individual ionization and photoelectric alarms, combination alarms that include both technologies in a single device are available.

URL: <http://www.nfpa.org/itemDetail.asp?categoryID=1649&itemID=39909&URL=Safety%20Information/Safety%20tips%20&%20fact%20sheets/Smoke%20alarms/Ionization%20vs.%20photoelectric>

NFPA (National Fire Protection Association)
1 Batterymarch Park, Quincy, MA 02169-7471 USA
Telephone: +1 617 770-3000 Fax: +1 617 770-0700