

Smoke, Heat, and Carbon Monoxide Alarms

This tip sheet reflects code requirements of the 2021 International Residential Code (IRC) with Washington State Amendments and NFPA 72 - 2019.

Definitions

- Smoke alarm:** A device designed to respond when it senses smoke, typically as an indicator of fire.
- Heat alarm:** A device designed to respond when it senses a rise in temperature, typically as an indicator of fire.
- Carbon monoxide alarm:** A device designed to respond when it senses carbon monoxide, a poisonous gas.
- All alarms** shall be UL listed and installed per manufacturer instructions. (R314.1.1, R315.1.1)

New Construction

- Smoke alarms and carbon monoxide alarms shall be installed throughout each dwelling unit in all **required locations**. (R314.2.1, R315.2.1)
- A heat detector shall be provided in each new attached garage. (R314.2.3)
- Smoke alarms, heat alarms, and carbon monoxide alarms shall receive their **primary power** from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. (R314.6, R315.6)
- Where more than one smoke alarm is required to be installed within an individual dwelling unit, the alarm devices shall be **interconnected** in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. (R314.4, R315.5)
- Heat alarms shall be **connected** to a heat alarm or smoke alarm that is installed in the dwelling unit. Alarms that are installed for this purpose shall be located in a hallway, room, or other location that will provide occupant notification. (R314.4.1)
- Physical interconnection of smoke alarms shall not be required where **listed wireless alarms** are installed and all alarms sound upon activation of one alarm. (R314.4, R315.5)

Alterations, Repairs, and Additions

- In a dwelling unit where alterations, repairs or additions occur, smoke alarms and carbon monoxide alarms shall be installed throughout each dwelling unit, in all **required locations**, where not already present. (R314.2.2, R315.2.2)
- Smoke and carbon monoxide alarms can be powered by the building wiring or batteries. (R314.6, R315.6)
- Smoke alarms shall be **interconnected** within an individual dwelling except where such existing smoke alarms are not interconnected or where such new smoke alarm or alarm is not capable of being interconnected to the existing smoke alarms. (R314.4)
- Carbon monoxide alarms shall be **interconnected** except where the permit related work does not provide access to the building wiring (such as removing interior walls or ceiling finishes) and there is no attic, crawlspace, or basement available. (R315.5)

Required Locations

- A **smoke alarm** shall be located in each sleeping room. (R314.3)
- A **smoke alarm** shall be located in each napping area of a family home childcare. (R314.3)
- A **smoke alarm** and a **carbon monoxide alarm** (or combination smoke and carbon monoxide alarm) shall be located outside each sleeping area in the immediate vicinity of the bedroom(s). (R314.3, R315.3)
- At least one **smoke alarm** and one **carbon monoxide alarm** shall be located on each floor level, including basements and habitable attics. (R314.3, R315.3)
- In split level floor plans, at the upper level, provided there is no intervening door between adjacent levels and the lower level is less than a full story below the upper level. (R314.3)
- A **smoke alarm** shall be located in the hallway and in the room open to the hallway in dwelling units where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches or more. (R314.3)
- Within the room to which a loft is open, in the immediate vicinity of the loft. (R314.3)
- A **carbon monoxide alarm** is required in a bedroom when a fuel-burning appliance is installed in the bedroom or its attached bathroom. (R315.3)

- A **combination alarm** (combined smoke and carbon monoxide alarm) is acceptable in any required location. (R314.5, R315.4)
- A **heat alarm** is required in each new attached garage. (R314.2.3)

Alarms and Detectors on Walls and Sloped/Peaked/Coffered Ceilings per NFPA 72 - 2019.

- Alarms and detectors in a **peaked ceiling** must be within 3 feet horizontally and no closer than 4 inches vertically to the peak. Avoid placing alarms in **dead air spaces**; refer to Figure 1. (NFPA 72 29.11.3.1)
- Alarms and detectors mounted on a **sloped ceiling** having a rise greater than 1-foot in 8-feet horizontally (1:8) shall be located within 36-inches of the high side of the ceiling, but not closer than 4-inches from the adjoining wall surface. Refer to Figure 1. (NFPA 72 29.11.3.2)

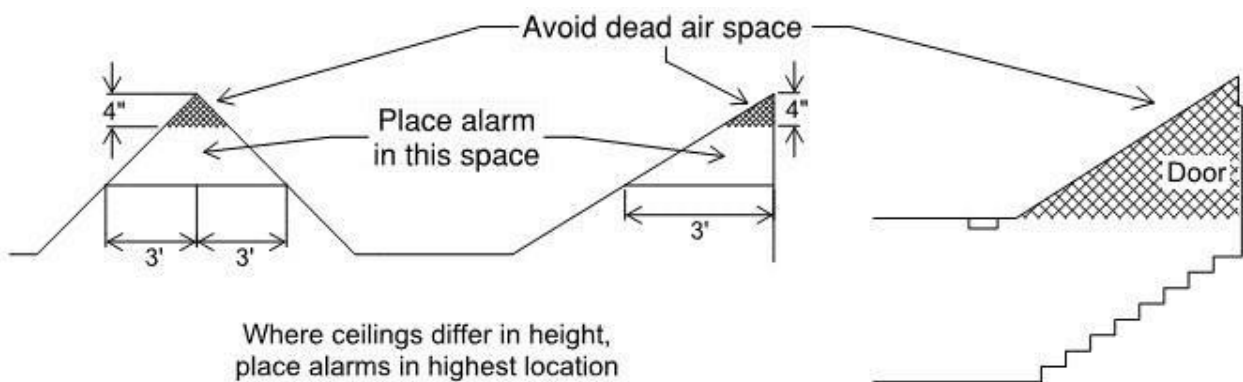


Figure 1: Smoke Alarms and Smoke Detectors in Peaked/Sloped Ceilings

- Where **stairs** lead to other occupiable levels, alarms and detectors shall be located so that smoke rising in the stairway cannot be prevented from reaching the alarm or detector by an intervening door or obstructions. For stairways leading up from a basement, alarms and detectors shall be located on the **basement ceiling** near the entry to the stairs. Refer to Figure 1. (NFPA 72 29.11.3.4 (10), (11))
- Wall mounted** alarms and detectors must be not more than 12 inches from the adjoining ceiling surface. (NFPA 72 29.11.3.3)
- Alarms and detectors installed in rooms with **joists or beams** shall comply with NFPA 72 17.7.3.2.4 and 17.6.3. (NFPA 72 29.11.3.4 (13), (14))

- For **coffered ceilings (and ceilings with soffits)**, alarms and detectors shall be installed on the highest portion of the ceiling or on the sloped portion of the ceiling within 12 inches vertically down from the highest point. Refer to Figure 2. Provide the manufacturer's installation instructions to confirm the maximum horizontal distance from the alarm or detector. (NFPA 72 29.11.3.4 (12))

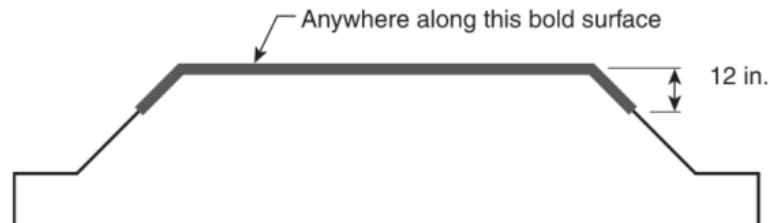


Figure 2: Coffered ceilings or ceilings with soffits.

Specific Location Requirements per NFPA 72

- Do not place alarms in spaces where **temperatures and humidity** may be above or below the alarm's operating temperature range. (NFPA 72 29.11.3.4 (1), (2), (3))
- Avoid placing alarms within 3 feet horizontally from doors or openings to **bathrooms** containing a bathtub or shower unless listed for installation in those locations. (NFPA 72 29.11.3.4 (7))
- Do not place alarms within 3 feet from a **supply register** of a forced air heating or cooling system and it shall be installed outside of the direct airflow from those registers. (NFPA 72 29.8.3.4 (7))
- Do not place alarms within 3 feet of the blades of a **ceiling fan**. (NFPA 72 29.8.3.4 (8))

Carbon Monoxide Alarm Location Limitations

- Do not place alarms directly above or beside fuel-burning appliances.
- Do not place alarms in direct sunlight.
- Do not place alarms in low areas where children can reach. Do not place alarms behind curtains or any structure that might prevent carbon monoxide from reaching the sensor.

Alarms and Detectors Near Cooking Appliances per NFPA 72 Refer to Figure 3:

The following are guidelines for safe installation near a cooking appliance.

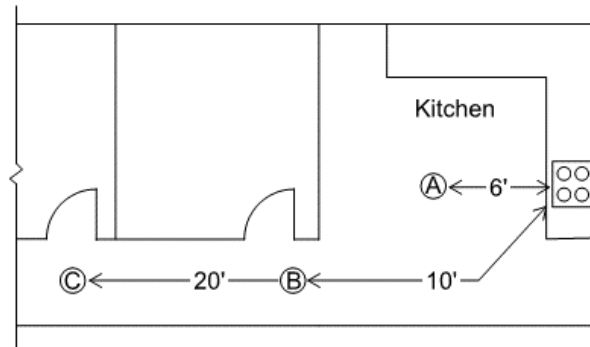


Figure 3: Smoke Alarms and Smoke Detectors Near Cooking Appliances

A. **Photoelectric** smoke alarms shall not be installed less than 6 feet horizontally from a permanently installed cooking appliance. (NFPA 72 29.8.3.4 (4))

Ionization smoke alarms with an alarm-silencing switch must not be less than 10 feet from a permanent cooking appliance. (NFPA 72 29.8.3.4 (4))

A. **Ionization** smoke alarms without an alarm-silencing switch must not be less than 20 feet from a permanent cooking appliance. (NFPA 72 29.8.3.4 (4))

B. Smoke alarms listed and marked “helps reduce cooking nuisance alarms” shall not be installed less than 6 feet horizontally from a permanently installed cooking appliance. (NFPA 72 29.11.3.4 (5))