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# CARBON MONOXIDE DETECTION REQUIREMENTS FOR GROUP E CLASSROOMS AND GROUP I-4 OCCUPANCIES

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**Disciplines:** Fire and Life Safety

**History:** Issued 07/27/21

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Division of the State Architect (DSA) documents referenced within this publication are available on the [DSA Forms](#) or [DSA Publications](#) webpages.

## **PURPOSE**

This Interpretation of Regulations (IR) provides direction on requirements for installation of carbon monoxide (CO) detection in Group I-4 occupancies and classrooms of Group E occupancies as required by Section 915 of the California Building Standards Code, California Code of Regulations (CCR) Title 24, Parts 2 and 9.

## **BACKGROUND**

CO is a colorless and odorless gas that is slightly denser than air formed by incomplete combustion of carbon that is toxic at concentrations above 35 parts-per-million (ppm). In high enough concentrations it poses a significant hazard to life safety, and according to the American Medical Association (AMA), is the leading cause of accidental poisoning deaths in the United States. To address this life safety hazard Assembly Bill 56 (2013-2014 Session) was approved, amending Section 32000 of the California Education Code.

As directed by Section 32081, the Office of the State Fire Marshal (OSFM) proposed and adopted the standards contained in the International Building Code and International Fire Code published by the International Code Council (ICC). The direction therein pertains to the installation of CO devices in private and public-school buildings serving kindergarten through twelfth grade (K–12) used for educational purposes, beginning with those constructed pursuant to the 2016 California Building Code (CBC).

### **1. GROUP I-4 DAY CARE OCCUPANCY REQUIREMENTS**

CO detection shall be provided in Group I-4 occupancies that contain or are served by fuel-burning appliances, fuel-burning fireplaces, or fuel-burning forced-air furnaces [for DSA purposes, this includes rooftop mounted fuel-burning heating, ventilation, and air conditioning (HVAC) equipment] as outlined in CBC Sections 915.1.2 through 915.1.4.

### **2. GROUP E OCCUPANCY REQUIREMENTS**

#### **2.1 New Buildings**

CO detectors shall be installed in classrooms of Group E occupancies where classrooms contain or are served by fuel-burning appliances, fuel-burning fireplaces, or fuel-burning forced-air furnaces [for DSA purposes, this includes rooms served by rooftop mounted fuel-burning HVAC equipment] as outlined in Sections 915.1.2 through 915.1.4 of the CBC.

#### **2.2 Existing Buildings**

Where an alteration adds any of the conditions identified in California Fire Code (CFC) Sections 915.1.2 through 915.1.6, new carbon monoxide detection shall be installed.

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**CARBON MONOXIDE DETECTION REQUIREMENTS FOR GROUP E CLASSROOMS AND GROUP I-4 OCCUPANCIES****2.2.1 Exceptions per the California Existing Building Code (CEBC)**

**2.2.1.1** The alteration replaces an existing fossil-fuel burning appliance, fireplace, or forced-air furnace, or any of the conditions identified in Sections 915.1.2 through 915.1.6 are already present.

**2.2.1.2** The Group E building was constructed before adoption of the 2016 California Building Standards Code.

**2.3 Fuel-Burning Appliances Outside of Classrooms**

Classrooms in buildings that are served by fuel-burning appliances located outside the classroom shall be provided with carbon monoxide detection.

**Exceptions**

1. When there are no communicating openings between the fuel-burning appliance or fireplace and the classroom, or
2. When CO detection is provided in an approved location between the fuel-burning appliance or fireplace and the classroom, or
3. CO detection is provided on the ceiling of the room containing the fuel-burning appliance or fireplace.

**3. CO ALARM TRANSMISSION**

For classrooms with occupant loads greater than 30, CO alarm signals shall be transmitted to an on-site location staffed by school personnel. For purposes of compliance DSA defines this as the on-site campus administrative office.

**3.1 Method of Detection Required**

Carbon monoxide detection shall be by means of a CO detection system incorporating carbon monoxide detectors listed by a nationally recognized testing laboratory.

**3.2 Alternate Method of Detection**

As an alternate to a dedicated CO detection system designed and installed per National Fire Protection Association (NFPA) 720, required CO detection may be incorporated with the building automatic fire alarm and detection system that shall be installed per NFPA Standard 72, *National Fire Alarm and Signaling Code* as amended in CBC Chapter 35.

**4. PLANS**

Plans shall reflect the method of carbon monoxide detection to be provided. The design professional (DP) shall clearly indicate on the floor plans those classrooms that do not contain, or are not supplied by, fuel-burning appliances. Additionally, the DP shall include a statement on the drawings indicating they have verified that no fuel-burning appliance, fuel-burning furnace, equipment, or fuel-burning fireplace, inclusive of rooftop fuel-burning HVAC systems, will serve or be used in the classroom.

**5. SYSTEM DESIGN**

CO detection for Group E and Group I-4 occupancies shall be accomplished as outlined in subsections 5.1 or 5.2 below.

**5.1** Installation of a dedicated, stand-alone carbon monoxide detection system designed to NFPA 720.

**5.1.1** CO detectors shall be listed per UL 2075, and alarm notification appliances must have a distinct alarm signal from the fire alarm signal.

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**5.1.2** Power supplies to include one primary and one secondary.

**5.1.3** Branch circuit must be dedicated and not supply any other loads.

**5.2** Connection to an existing or new automatic fire alarm system.

The CBC does not require connection to, or incorporation with, an automatic fire alarm system. CO detection incorporated into a fire alarm system shall be designed as follows:

**5.2.1** The design shall comply with NFPA Standards 72 and NFPA 720.

**5.2.2** Alarm notification appliances within the room(s) must be provided for both Fire and CO alarm conditions. This may be achieved by installation of separate notification appliances one each for fire and one for CO, or an approved combination type notification appliance equipped with a visual strobe for each condition.

**5.2.3** The required secondary power for the fire alarm system must be capable of also operating the CO detection system under quiescent load for a minimum of 24 hours, and at the end of the period be capable of operating the CO detection system and all notification appliances for 12 hours, five minutes if monitored by a listed supervising station.

### **5.3 Device listing**

**5.3.1** All detection devices shall be listed by the OSFM.

**5.3.2** Carbon monoxide detectors shall be listed to ANSI/UL 2075. Where multi-criteria carbon monoxide/smoke detectors are installed in CO detection systems, the detectors shall be listed per UL 2075 and UL 268 and must meet the sensitivity threshold standards of ANSI/UL 2034.

### **5.4 Occupant Notification**

**5.4.1** Occupant notification shall be provided throughout the protected building.

**5.4.2** Notification shall be both audible and visual, with visual notification appliances listed per UL 1971.

**5.4.3** Audible occupant notification signals for CO alarm shall produce a four-pulse, temporal pattern.

**5.4.4** Visual notification appliances installed as part of a dedicated CO detection system shall consist of a clear (white) lens.

**5.4.5** Visual notification appliances installed as part of an automatic fire alarm system may be utilized for CO alarm purposes. In such instances the notification appliance must not reflect the word FIRE or have any fire symbol thereon. Where combination system designs incorporate a separate visual notification appliance for the fire and CO alarm component, each lens shall be identified as to the appropriate alarm condition.

### **5.5 Building Evacuation**

Upon device initiation, the notification appliances within the building shall activate and occupants shall evacuate to an area of safety as outlined in the campus emergency preparedness plan. Total campus evacuation is permitted at the discretion of the school district.

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**REFERENCES:**

California Education Code, Section 32081(a)(b)  
2019 California Building Standards Code, Title 24, Parts 2 and 9, Section 915  
2019 California Existing Building Code, Title 24, Part 10, Section 503.15.1  
Title 19, Public Safety, California Code of Regulations (CCR)  
NFPA 720 (2015), Standard for the Installation of CO Detection & Warning Equipment  
NFPA 72 (2016), National Fire Alarm and Signaling Code

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This IR is intended for use by DSA staff and by design professionals to promote statewide consistency for review and approval of plans and specifications as well as construction oversight of projects within the jurisdiction of DSA, which includes State of California public schools (K–12), community colleges and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is subject to revision at any time. Please check DSA's website for currently effective IRs. Only IRs listed on the webpage at [www.dgs.ca.gov/dsa/publications](http://www.dgs.ca.gov/dsa/publications) at the time of project application submittal to DSA are considered applicable.

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**GLOSSARY**

**Approved**

As applied herein means acceptable to the DSA.

**Carbon Monoxide Detector**

A device with an integral sensor to detect CO gas and transmit an alarm signal to a connected alarm control unit.

**Carbon Monoxide Detection System**

A system or portion of a combination system that consists of a control unit, components, and circuits arranged to monitor and annunciate the status of CO alarm initiating devices and to initiate the appropriate response to those signals.

**Classroom**

For the purposes of this IR, DSA defines a classroom as any area where students congregate for an extended period, where fuel-burning equipment serves the room or space and is present within the room or space.

**Listed**

Materials or products included in a list published by an organization acceptable to the code official that meets identified standards or has been tested and deemed suitable for a specified purpose, and that have been accepted by the state fire marshal as conforming to the provisions of the State Fire Marshal's regulations and which are included in a list published by the State Fire Marshal.

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**CARBON MONOXIDE DETECTION REQUIREMENTS FOR GROUP E CLASSROOMS AND GROUP I-4 OCCUPANCIES****Frequently Asked Questions (FAQs)**

- (Q). CBC/CFC section 915.3 states that CO detection may be achieved by installation of CO alarms, or a CO detection system. Does this mean that single-station or multiple-station CO alarms may be installed in classrooms of Group E occupancies?
- (A). No. Section 915.2.3 requires CO detectors be installed in classrooms of Group E occupancies. The definition of a CO detector does not include stand-alone single or multiple station devices.
- (Q). Classrooms within an existing Group E building are undergoing alteration, and the existing forced air HVAC unit is fueled by natural gas. Is CO detection required in the classrooms?
- (A). Yes. If an alteration adds any of the conditions indicated in CFC Sections 915.1.2 through 915.1.6, 2019 CEBC Section 503.15.1 requires CO detection be installed.
- (Q). An alteration project at a school serving grades K–12 is replacing existing in-room wall furnaces with newer more efficient wall furnaces. As these are fuel burning appliances, is CO detection required in the classrooms as part of the project?
- (A). No. Per 2019 CEBC Section 503.15.1 exception number one, as the wall furnaces already existed CO detection is not required. However, in keeping with the intent of 2019 CFC Section 1103.9.1, DSA encourages the installation of CO detection as it is a life safety issue.
- (Q). A building is undergoing modernization and the classrooms are served by HVAC units fueled by natural gas. If the project scope does not include work to the existing HVAC equipment is CO detection required?
- (A). No. Per exception number one to 2019 CEBC Section 503.15.1 as the HVAC units already existed. However, in keeping with the intent of 2019 CFC Section 1103.9.1, DSA encourages the installation of CO detection as it is a life safety issue.
- (Q). A project proposes an addition to an existing classroom building. Is CO detection required to be provided in all classrooms of the building?
- (A). No. CO detection would only be required within those classrooms located in the addition and that are served by fuel-burning equipment.
- (Q). The fire alarm system in an existing classroom building is being replaced. Is CO detection required to be included?
- (A). No. Replacement of an automatic fire alarm system does not trigger CO detection, however DSA recommends that the new control panel be capable of expansion to accept future CO signal inputs and generate a four-pulse temporal alarm pattern.
- (Q). What is required by the design professional for projects where classroom spaces do not contain or are not served by fuel-burning equipment?
- (A). The design professional in general responsible charge shall provide a statement on the plans stating that they have verified that classrooms in the project scope of work do not contain and are not served by fuel-burning fireplaces, appliances, or equipment.