



Carbon Monoxide Detectors in New and Existing Buildings

Referenced Codes and Standards: OAC § 1301:7-7-9(O); OFC §915
OAC § 1301:7-7-11(A)(1); OFC § 1101.1
OAC § 1301:7-7-11(C)(9); OFC § 1103.9
OAC § 4101:1-4-06(5)-(6); OBC § 406.5 and 406.6
NFPA 720 (2015)
UL 217 (2015)
UL 268 (2016)
UL 2034 (2008)
UL 2075 (2013)

The 2017 Ohio Fire Code (OFC) became effective on December 15, 2017. New language added at section 915, titled “Carbon Monoxide Detection,” affects carbon monoxide (CO) detection in **new buildings**. New language has also been added at section 1103.9 that affects carbon monoxide detection in **existing buildings**. This bulletin is intended to provide general guidance regarding these new requirements and to educate those affected by the new provisions as to when (and where) CO detection will be required.

I. NEW AND EXISTING BUILDINGS

New OFC provisions state that CO detection is now required in Group I-1, I-2, I-4, and R occupancies and in classrooms in Group E occupancies if certain conditions exist. (OFC 915.1.1.) The relevant conditions are discussed in Section II, below.

Although new OFC provisions are generally not applied to buildings that are already in existence when the code becomes effective (absent a distinct hazard), in some instances new provisions are applied retroactively. Such is the case here. The requirements for CO detection in the occupancy categories listed above **do** apply to both new and existing occupancies. Therefore, any of the relevant occupancies containing one of the four conditions discussed below that is in a **new building** must be built with the required CO detection. Likewise, any of the relevant occupancies containing one of the four conditions discussed below that is in an **existing building** must be equipped with the required CO detection. (OFC 1101.1.1, Exception 2; OFC 1103.9.)

If a new or existing building is required to have CO detection, detection must be provided by either a CO alarm or a CO detection system. (See **Section III**.) For **new buildings**, of course, the CO detection must be installed during the construction process and the CO detection must receive power from the building’s wiring if power is commercially available. If power is not commercially available in a new building, battery powered CO detection will be acceptable.

Existing buildings that are required to provide CO detection must provide the detection on or before January 1, 2019. (OFC 1103.9.) CO detection in existing buildings can be solely battery operated regardless of whether or not commercial power is available for the building. This allowance for battery operation

does not apply to new buildings unless commercial power is not available. This language was added for existing buildings to avoid any costly upgrade or retrofit of an already existing system.

II. CONDITIONS REQUIRING CO DETECTION

In determining whether CO detection is required, an interested party must first determine whether they have one of the relevant occupancies (I-1, I-2, I-4, R or Classroom in E). If yes, the next question becomes whether any sleeping unit, dwelling unit, or classroom has any of the following relevant conditions which now require CO detection.

1. First, CO detection is now required in any dwelling unit, sleeping unit, or classroom that contains a fuel burning appliance or a fuel-burning fireplace. (See OFC § 915.1.2.)
2. Second, CO detection is now required in any dwelling unit, sleeping unit or classroom that is served by a fuel-burning, forced-air furnace. (See OFC § 915.1.3.) However, an exception exists for any dwelling unit, sleeping unit, or classroom that is served by a fuel-burning, forced-air furnace where the first room or area served by each main duct leaving the furnace has CO detection AND the CO alarm signals are automatically transmitted to an approved location. Where the first room or area served has CO detection and the alarm automatically transmits, CO detection is NOT required in the dwelling unit, sleeping unit or classroom also served by that same fuel-burning, forced-air furnace. If, however, the first room or area served does not have CO detection or the alarm does not automatically transmit, CO detection IS required in any dwelling unit, sleeping unit or classroom also served by that same fuel-burning, forced-air furnace.
3. The third condition where CO detection is now required states that CO detection must be provided in any dwelling unit, sleeping unit or classroom that is located in a building that contains a fuel-burning appliance or fuel-burning fireplace. (See OFC § 915.1.4.) There are two exceptions to this general rule. The first exception states that if a building contains a fuel-burning appliance or fireplace, but there are no communicating openings between the appliance or fireplace and the dwelling unit, sleeping unit, or classroom, then the dwelling unit, sleeping unit, or classroom does not have to have CO detection. The second exception states that CO detection is not required in dwelling units, sleeping units, or classrooms that are in a building that contains a fuel-burning appliance or fuel-burning fireplace IF CO detection is provided in one of two locations: a) an approved location between the appliance or fireplace and the affected unit or room, or b) on the ceiling of the room containing the appliance or fireplace.
4. Finally, the fourth condition where CO detection is now required, states that CO detection must be provided in any dwelling unit, sleeping unit, or classroom that is located in a building with an attached private garage.¹ (See OFC § 915.1.5.) This requirement, however, also has exceptions. A dwelling unit, sleeping unit, or classroom that is located in a building with an attached private garage is not required to have CO detection if any of the following apply: a) there are no communicating openings between the private garage and the dwelling unit, sleeping unit or classroom; b) the dwelling unit, sleeping unit, or classroom is located more than one story above or below the private garage; c) the private garage connects to the building through an open-ended

¹ **Please note:** for the purposes of this rule “attached private garage” does NOT mean an open parking garage complying with section 406.5 of the Ohio Building Code or an enclosed parking garage complying with section 406.6 of the Ohio Building Code.

corridor; or d) CO detection is provided in an approved location between openings to the private garage and the dwelling unit, sleeping unit or classroom.

If any of the affected occupancies have any of the 4 conditions listed above, and none of the exceptions apply, CO detection is now required in the affected dwelling units, sleeping units and classrooms. Please see **Section IV. Locations**, for a discussion regarding where the detectors have to be placed.

III. TYPES OF DETECTION REQUIRED

If carbon monoxide detection is required, it must be provided by either a CO alarm or a CO detection system. (See OFC § 915.3.) The new code provisions set forth specific parameters that each must meet.

If CO alarms are utilized (see OFC § 915.4), the alarms must be listed in accordance with UL 2034 (2008) and must receive their primary power from the building wiring if the wiring is served from a commercial source. In the event of an interruption of primary power, the alarms must receive backup power from a battery. Wiring for the alarms must be permanent and cannot have a disconnecting switch other than what might be required for overcurrent protection.

If a building does not have commercial power (or if the building was an existing building before December 15, 2017), a battery powered CO alarm is acceptable.

Combination CO/smoke alarms are also an acceptable alternative to alarms that are solely CO alarms. Combination alarms must be listed in accordance with UL 2034 (2008) and UL 217 (2015). If the combination alarm is not so listed, it is not acceptable.

If CO detection systems are utilized (see OFC § 915.5), the systems must comply with NFPA 720 (2015) and must be listed in accordance with UL 2075 (2013). However, in the event of a conflict, CO detectors shall be installed in locations specified in this rule (as discussed below), rather than as set forth in NFPA 720 (2015).

Combination CO/smoke detectors are acceptable for installation in CO detection systems IF they are listed in accordance with UL 2075 (2013) and UL 268 (2016). If a combination alarm is not so listed, it is not acceptable.

IV. LOCATIONS WHERE CO DETECTION MUST BE INSTALLED

If CO detection is required, the new OFC provisions require the detection to be installed in specified locations, as follows:

Dwelling Units (See OFC § 915.2.1.)

If a dwelling unit is required to have CO detection, the detection has to be installed in the dwelling unit outside of each separate sleeping area in the immediate vicinity of the bedrooms.

If a fuel-burning appliance is located within a bedroom or its attached bathroom, the detection must be installed within the bedroom.

Sleeping Units (See OFC § 915.2.2.)

If a sleeping unit is required to have CO detection the detection must be installed in the sleeping unit.

The only exception to this provision is where the sleeping unit or its attached bathroom does not contain a fuel-burning appliance and is not served by a forced air furnace. If the sleeping unit or its attached bathroom does not contain a fuel-burning appliance and are not served by a forced air furnace the CO detection can be installed outside of each separate sleeping area in the immediate vicinity of the sleeping unit. If the sleeping unit or an attached bathroom does contain a fuel-burning appliance or is served by a forced air furnace, the CO detection will have to be located in the sleeping unit.

Classrooms in Group E (See OFC § 915.2.3.)

If a classroom is required to have CO detection, the detection must be installed in the classroom. Unless the occupant load is 30 or less, alarm signals must be automatically transmitted to an on-site location that is staffed by school personnel. If the occupant load is 30 or less, the signal does not have to automatically transmitted. If the occupant load is over 30, automatic transmission is required.

V. MAINTENANCE

CO alarms and CO detection systems must be maintained in accordance with NFPA 720 (2015). If an alarm or a detector becomes inoperable or begins producing end-of-life signals, it must be replaced. (See OFC § 915.6.)

DETERMINING IF CO DETECTION IS REQUIRED

Question 1: Am I in a relevant occupancy (I-1, I-2, I-4, R occupancy or in a Classroom in an E occupancy)?

If "NO" - CO detection requirements are not applicable

If "YES" - Go to Question 2

Question 2: Are any of the following relevant conditions present?

- A dwelling unit, sleeping unit or classroom contains a fuel-burning appliance/fireplace
- A dwelling unit, sleeping unit or classroom is served by a fuel-burning forced air furnace
- A dwelling unit, sleeping unit or classroom is in a building that contains a fuel-burning appliance/fireplace
- A dwelling unit, sleeping unit or classroom is in a building that contains an attached private garage

If "NO" - CO detection requirements are not applicable

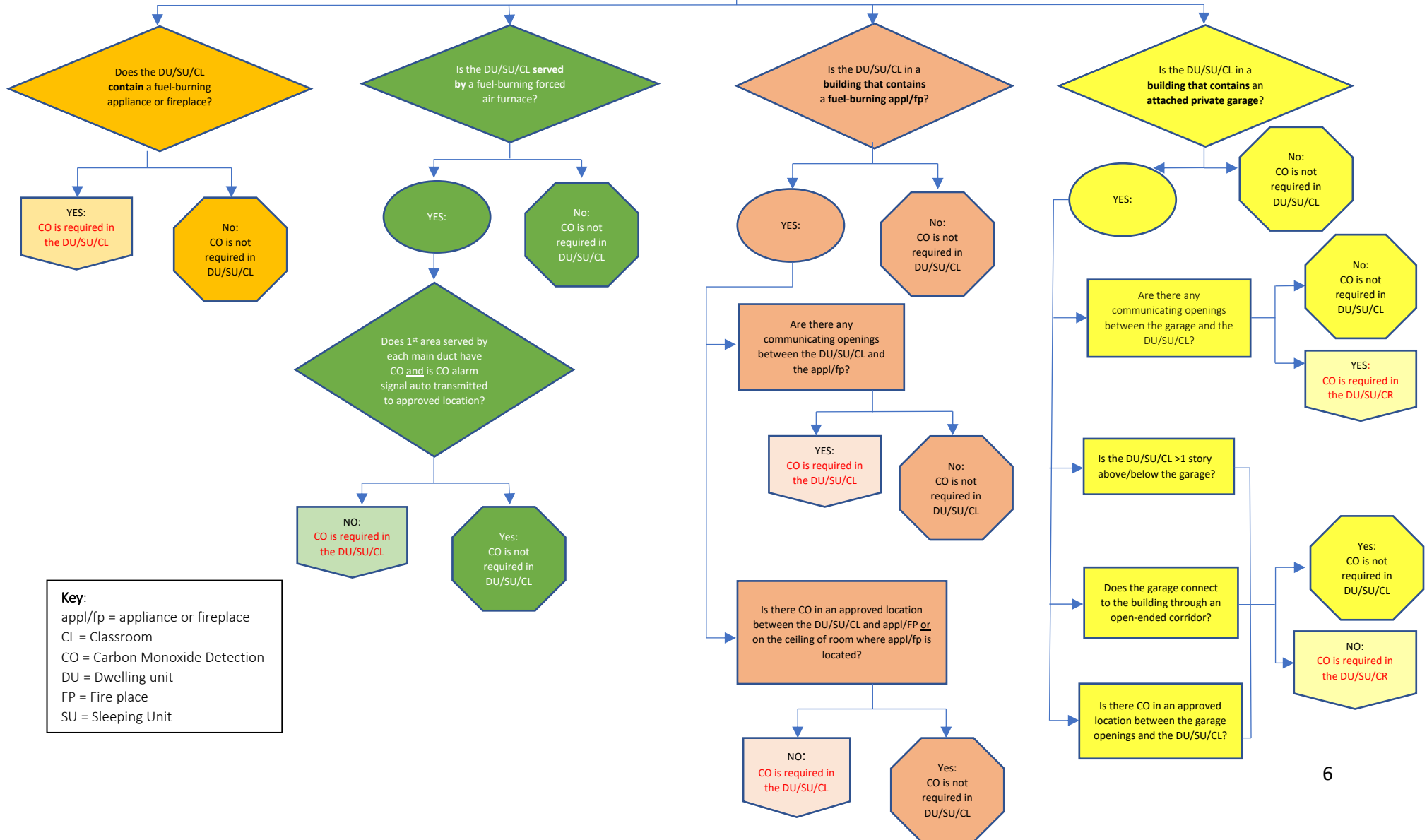
If "YES" - Go to Question 3

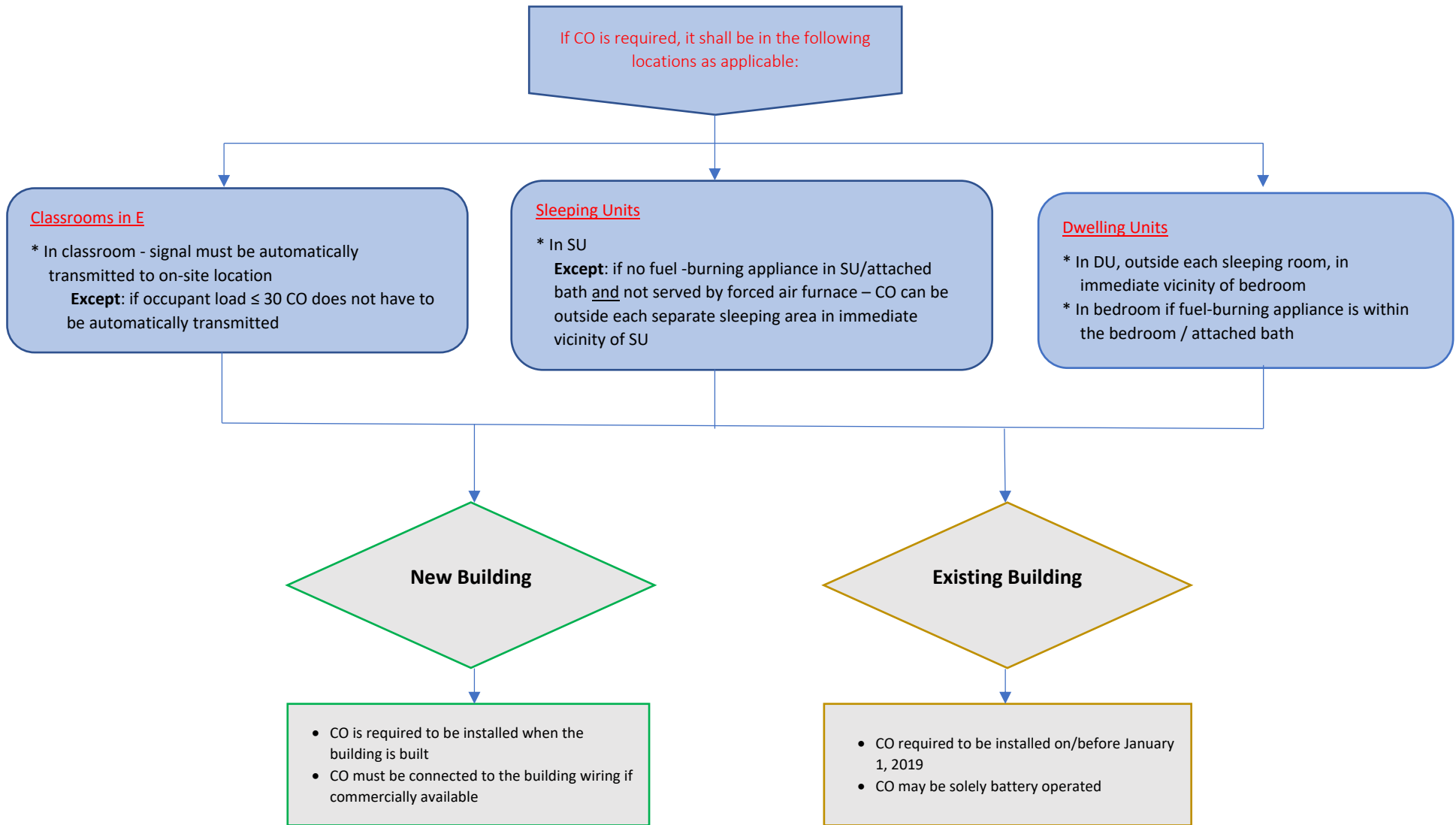
Question 3: Is there an applicable exception?

- For a unit or room that contains a fuel-burning appliance/fireplace:
 - There are no exceptions; CO is required
- For a unit or room that is served by a fuel-burning forced air furnace:
 - Does the first area served by each main duct have CO detection and is detection automatically transmitted to an approved location?
 - If "NO" - CO is required
 - If "YES" - CO is not required
- For a unit or room that is in a building that contains a fuel-burning appliance/fireplace:
 - Are there any communicating openings between the unit or room and the appliance or fireplace?
 - If "NO" - CO is not required
 - If "YES" - CO is required
 - Is there CO detection in an approved location between the room or unit and the appliance or fireplace, OR is there CO detection on the ceiling of the room where the appliance or fireplace is located?
 - If "NO" - CO is required
 - If "YES" - CO is not required
- For a unit or room that is in a building that contains an attached private garage:
 - Are there any communicating openings between the appliance/fireplace and the unit or room?
 - If "NO" - CO is not required
 - If "YES" - CO is required
 - Is the unit or room more than one-story above or below the garage?
 - If "NO" - CO is required
 - If "YES" - CO is not required
 - Is the garage connected to the building through an open-ended corridor?
 - If "NO" - CO is required
 - If "YES" - CO is not required
 - Is there CO detection in an approved location between garage openings and the unit or room?
 - If "NO" - CO is required
 - If "YES" - CO is not required

REQUIRED CARBON MONOXIDE DETECTION UNDER 2017 OFC §§ 320, 1103.9

Is inspector in a relevant occupancy (I-1, I-2, I-4, R occupancy or in a classroom in an E occupancy)? **If yes**, CO will be required if any one or more of the following **four relevant conditions** is present and none of the exceptions apply





NOTE: This flow chart only outlines CO requirements pursuant to OFC sections 915 and 1103.9; CO may be required under other OFC provisions / when other conditions are present. In addition, even if CO is not required under these provisions, CO can be installed.

NOTE: Compliance with the above CO requirements does not ensure building safety; all applicable OFC/OBC rules must be complied with.

1301:7-7-09 Fire protection systems.

(O) Section 915 Carbon monoxide detection

(1) **915.1 General.** Carbon monoxide detection shall be installed in new buildings in accordance with *paragraphs (O)(1)(a)(915.1.1) to (O)(6)(915.6) of this rule*. Carbon monoxide detection shall be installed in existing buildings in accordance with *paragraph (C)(9)(1103.9) of rule 1301:7-7-11 of the Administrative Code*.

(a) **915.1.1 Where required.** Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in *paragraph (O)(2)(915.2) of this rule* where any of the conditions in *paragraphs (O)(1)(b)(915.1.2) to (O)(1)(f)(915.1.6) of this rule* exist.

(b) **915.1.2 Fuel-burning appliances and fuel-burning fireplaces.** Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms that contain a fuel-burning appliance or a fuel-burning fireplace.

(c) **915.1.3 Forced-air furnaces.** Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms served by a fuel-burning, forced-air furnace.

Exception: Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms where carbon monoxide detection is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

(d) **915.1.4 Fuel-burning appliances outside of dwelling units, sleeping units and classrooms.** Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms located in buildings that contain fuel burning appliance or fuel-burning fireplaces.

Exceptions:

1. Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms where there are no

communicating openings between the fuel-burning appliance or fuel-burning fireplace and the dwelling unit, sleeping unit or classroom.

2. Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms where carbon monoxide detection is provided in one of the following locations:

2.1. In an approved location between the fuel-burning appliance or fuel-burning fireplace and the dwelling unit, sleeping unit or classroom.

2.2. On the ceiling of the room containing the fuel-burning appliance or fuel-burning fireplace.

(e) **915.1.5 Private garages.** Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms in buildings with attached private garages.

Exceptions:

1. Carbon monoxide detection shall not be required where there are no communicating openings between the private garage and the dwelling unit, sleeping unit or classroom.

2. Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms located more than one story above or below a private garage.

3. Carbon monoxide detection shall not be required where the private garage connects to the building through an open-ended corridor.

4. Where carbon monoxide detection is provided in an approved location between openings to a private garage and dwelling units, sleeping units or classrooms, carbon monoxide detection shall not be required in the dwelling units, sleeping units or classrooms.

(f) **915.1.6 Exempt garages.** For determining compliance with *paragraph (O)(1)(e)(915.1.5) of this rule*, an open parking garage complying with

Section 406.5 of the *building code as listed in rule 1301:7-7-80 of the Administrative Code* or an enclosed parking garage complying with Section 406.6 of the *building code as listed in rule 1301:7-7-80 of the Administrative Code* shall not be considered a private garage.

(2) **915.2 Locations.** Where required by *paragraph (O)(1)(a)(915.1.1) of this rule*, carbon monoxide detection shall be installed in the locations specified in *paragraphs (O)(2)(a)(915.2.1) to (O)(2)(c)(915.2.3) of this rule*.

(a) **915.2.1 Dwelling units.** Carbon monoxide detection shall be installed in dwelling units outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.

(b) **915.2.2 Sleeping units.** Carbon monoxide detection shall be installed in sleeping units.

Exception: Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the sleeping unit where the sleeping unit or its attached bathroom does not contain a fuel burning appliance and is not served by a forced air furnace.

(c) **915.2.3 Group E occupancies.** Carbon monoxide detection shall be installed in classrooms in Group E occupancies. Carbon monoxide alarm signals shall be automatically transmitted to an on -site location that is staffed by school personnel.

Exception: Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on -site location that is staffed by school personnel in Group E occupancies with an occupant load of 30 or less.

(3) **915.3 Detection equipment.** Carbon monoxide detection required by *paragraphs (O)(1)(915.1) to (O)(2)(c)(915.2.3) of this rule* shall be provided by carbon monoxide alarms complying with *paragraph (O)(4)(915.4) of this rule* or carbon monoxide

detection systems complying with *paragraph (O)(5)(915.5) of this rule*.

(4) **915.4 Carbon monoxide alarms.** Carbon monoxide alarms shall comply with *paragraphs (O)(4)(a)(915.4.1) to (O)(4)(c)(915.4.3) of this rule*.

(a) **915.4.1 Power source.** Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.

(b) **915.4.2 Listings.** Carbon monoxide alarms shall be listed in accordance with UL 2034 *as listed in rule 1301:7-7-80 of the Administrative Code*.

(c) **915.4.3 Combination alarms.** Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217 *as listed in rule 1301:7-7-80 of the Administrative Code*.

(5) **915.5 Carbon monoxide detection systems.** Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with *paragraphs (O)(5)(a)(915.5.1) to (O)(5)(c)(915.5.3) of this rule*.

(a) **915.5.1 General.** Carbon monoxide detection systems shall comply with NFPA 720 *as listed in rule 1301:7-7-80 of the Administrative Code*. Carbon monoxide detectors shall be listed in accordance with UL 2075 *as listed in rule 1301:7-7-80 of the Administrative Code*.

(b) **915.5.2 Locations.** Carbon monoxide detectors shall be installed in the locations specified in *paragraph (O)(2)(915.2) of this rule*. These locations supersede the locations specified

in NFPA 720 as listed in rule 1301:7-7-80 of the Administrative Code.

(c) **915.5.3 Combination detectors.** Combination carbon monoxide/smoke detectors installed in carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide detectors, provided they are listed in accordance with UL 2075 and UL 268 as listed in rule 1301:7-7-80 of the Administrative Code.

(6) **915.6 Maintenance.** Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with NFPA 720 as listed in rule 1301:7-7-80 of the Administrative Code. Carbon monoxide alarms and carbon monoxide detectors that become inoperable or begin producing end-of-life signals shall be replaced.

1301:7-7-11 Construction requirements for existing buildings.

(A) Section 1101 General

(1) **1101.1 Scope.** The provisions of this rule shall apply to existing buildings constructed prior to the adoption of this code in accordance with paragraph (B)(1)(c)(102.1) of rule 1301:7-7-01 of the Administrative Code. The provisions of this rule shall not apply to existing buildings unless the conditions at the building constitute a distinct hazard to life or property in the opinion of the fire code official in accordance with paragraph (B)(1)(c)(102.1) of rule 1301:7-7-01 of the Administrative Code.

Exceptions:

1. The provisions of paragraph (D)(1104) of this rule shall apply to all existing buildings.

2. The provisions of paragraph (C)(9)(1103.9) of this rule shall apply to all existing occupancies identified in paragraph (C)(9)(1103.9) of this rule.

(C) Section 1103 Fire safety requirements for existing buildings.

(9) **1103.9 Carbon monoxide alarms.** On or before January 1, 2019, existing Group I-1, I-2, I-4, R and E occupancies shall be equipped with carbon monoxide alarms in accordance with paragraph (O)(915) of rule 1301:7-7-09 of the Administrative Code, except that the carbon monoxide alarms shall be allowed to be solely battery operated.