

Technical Guideline for Non-Public Schools to comply with regulations for Carbon Monoxide Detection in Commercial Buildings (Section 1228.4 of Part 1228 of Title 19 NYCRR).

General: The NYS Department of State enacted new regulations effective June 27, 2015 that require Carbon Monoxide detection in schools. Schools must be in compliance by June 27, 2016. Non-Public schools are subject to the oversight of the local jurisdiction in which they are located. Please confer with your local code enforcement agency regarding compliance with these new requirements.

This document focuses on the requirements under the new regulations for *existing* buildings. The new regulations apply to all, occupiable commercial buildings. Schools are included in the definition of commercial building. The general intent of the regulations is to notify the occupants of the building of carbon monoxide levels in the building at concentrations that pose a potential health hazard to the occupants.

There are two types of systems that may be used to detect carbon monoxide and sound an alarm. They are self-contained (residential style) carbon monoxide alarms, and carbon monoxide detection systems. The use of either type of system or both types of systems, within a building in accordance with regulations is permissible. A school would need to determine for itself which system (or systems) is best to be used in each of their buildings.

Education (school) buildings will require the detection of carbon monoxide in the following areas under the new regulations: all classrooms that contain devices that may emit products of combustion; all classrooms adjacent to garages; areas served by fuel fired heating/ventilating and makeup air units; areas served by heating/ventilating units that pull air from spaces that contain equipment or systems that may emit products of combustion; and non-classroom area(s) that contain devices that may emit products of combustion.

In summary here is the minimum necessary for compliance in an *existing* building:

Residential style carbon monoxide alarms. Alarms will receive their power from either a ten year battery, or be tied into an unswitched, building, power circuit. If tied into the building power supply they will have battery backup. The battery backup does not need to be a ten year battery.

Alarms will be placed in:

- Every classroom containing a carbon monoxide source in the space (See guidelines for examples);
- Every classroom adjacent to a garage;
- Every non-classroom space containing a carbon monoxide source in the space (Alarm generally to be placed between the source equipment and the door (or other opening) providing access between the space and other areas of the building);

- Outside every non-classroom space containing a carbon monoxide source in the space at a location that maximizes detection of and notification of the building occupants.
- Either all spaces served by a carbon monoxide-producing heating/ventilating/air conditioning (HVAC) system (See definition in guidelines.); or alternately two interconnected alarms (one in the first space served by the carbon monoxide-producing HVAC system, and the second located in an approved location). If two interconnected alarms are used, the approved location may be the corridor in the vicinity of the area served by the HVAC system, or a main office area. The intent is to locate the second alarm in an area that would result in the fastest notification of the occupants.

The body of the guidelines contains additional information.

The potential for carbon monoxide concentrations to reach levels of concern is minimized by maintaining building systems in proper working order, and operating ventilation systems in accordance with their original design. In a properly maintained and operated building, carbon monoxide detection equipment should never go into alarm.

If any carbon monoxide detection equipment goes into alarm, it is strongly recommended that school policy dictate that all building occupants evacuate the building. The condition(s) resulting in activation of the equipment must be determined and corrected.

1. New Regulations:

- 1.1. New York State has adopted a rule that amends the Uniform Fire Prevention and Building Code by adding provisions requiring the installation of carbon monoxide detection in all new and existing commercial buildings that have appliances, devices or systems that may emit carbon monoxide, or an attached garage.

- 1.1.1. The emergency rule became effective on June 27, 2015 and has been proposed for adoption as a permanent measure.

- 1.1.2. Transition period:

- 1.1.2.1. The transition period for existing commercial buildings runs from June 27, 2015 to June 27, 2016.

- 1.1.2.2. During the transition period, owners of existing commercial buildings are encouraged to install carbon monoxide detection as quickly as practicable. In addition, during the transition period, the owner of an existing commercial building (Non-Public school) will not be deemed to be in violation of the rule if the owner provides the local code enforcement authority having jurisdiction with a written statement certifying that such owner is attempting in good faith to install carbon monoxide detection that complies with the requirements of the rule in such owner's existing commercial building as quickly as practicable.

2. Required regulations:

- 2.1. Carbon monoxide (CO) detection and alarm is required in school district buildings as part of two sections of regulations.
 - 2.1.1. As part of existing regulations, carbon monoxide detection and alarm is required in education buildings that contain sleeping areas in accordance with the provisions of Section 610 of the Fire Code of NYS.
 - 2.1.2. Under the new regulations for commercial buildings, carbon monoxide detection and alarm is required in all occupiable buildings that have appliances, devices or systems that may emit carbon monoxide, or an attached garage.
 - 2.1.3. The regulations for commercial buildings are somewhat different than for education buildings with sleeping areas. If an education (school) building has a sleeping area, the building will have to comply with applicable provisions of both sets of requirements.
 - 2.1.4. Alarm/detector locations that comply with the requirements of both rules do not need to be duplicated.

3. Buildings impacted:

- 3.1. In general the rule will apply to all occupiable buildings in a Non-Public school that contain equipment, or systems that may emit products of combustion, including exterior fuel fired heating, ventilating equipment. Buildings include, but are not limited to school buildings, administrative buildings, bus maintenance facilities, concession stands, and field houses.
- 3.2. Existing Buildings versus New Buildings:
 - 3.2.1. Existing building is defined as a building where the original construction was completed, or the complete application for a building permit for the construction of the building was filed prior to December 31, 2015.
 - 3.2.2. The minimum requirements for existing buildings are somewhat different than new buildings.
 - 3.2.3. Since it is likely that almost all buildings to receive carbon monoxide detection, prior to June 27, 2016 will be existing buildings and not new buildings, this guidance document will focus on the requirements for existing buildings.
 - 3.2.3.1. Differences between requirements for existing buildings and new buildings include:
 - 3.2.3.1.1. Additional interconnection, notification, and signal transmission provisions required for new buildings.
 - 3.2.3.1.2. Power requirements for new buildings will be provided from the building wiring, where the building is served by a commercial source, and include battery backup.
 - 3.2.4. Additions to existing buildings:
 - 3.2.4.1. An addition to an existing building will be considered new construction in accordance with the “Existing Building Code of New York State”.
- 3.3. Leased buildings:
 - 3.3.1. Buildings leased by a Non-Public school must be provided with Carbon Monoxide detection by the building owner who has an obligation to comply with the regulations for his commercial building.

4. Carbon monoxide alarms and carbon monoxide detection systems:

4.1. Define alarms and detection systems.

- 4.1.1. Carbon monoxide alarms are devices that contain both a sensor to detect the presence of carbon monoxide and an integrated audible (and perhaps a visual) alarm in one unit. Alarm goes off when the sensor detects carbon monoxide at or above a certain concentration over a certain period of time.
- 4.1.2. A carbon monoxide detection system is a system that consists of separate devices (detector, notification device, and control unit). One device to detect the presence of carbon monoxide (carbon monoxide detector), is interconnected with a notification device to sound an audible (and perhaps visual) alarm. The notification device is activated when the detector (sensor) detects carbon monoxide at or above a certain concentration over a certain period of time.

4.2. Use of carbon monoxide alarms or carbon monoxide detection systems:

- 4.2.1. The use of either carbon monoxide alarms or a carbon monoxide detection system in accordance with regulations is permissible. The Non-public school in cooperation with engineering consultants would need to determine which method of compliance with the regulation is best for their buildings. It is possible that alarm(s) may be determined to be the best way to go for some buildings in the district, and a detection system may be the best for other buildings.

5. Carbon monoxide alarms:

5.1. Minimum requirement for existing buildings:

5.1.1. Quality:

- 5.1.1.1. Residential style carbon monoxide alarms that meet the listing labeling requirements of the regulation.

- 5.1.1.1.1. These do not include combination carbon monoxide/smoke alarms.

5.1.2. Interconnection

- 5.1.2.1. No interconnection required with the exception that if one alarm is used to provide coverage for multiple detection zones served by a carbon monoxide-producing HVAC system, then interconnection with at least one other alarm (or some alternate means of automatically transmitting signals from an alarm) is required.

5.1.3. Power sources. Either:

- 5.1.3.1. Alarm powered solely by a ten year battery; or

- 5.1.3.2. Primary power from building supply with backup from a battery when primary power is interrupted. Primary power provided by permanent means from electric panel with no means for disconnect other than overcurrent protective device at panel. Power to building provided from a commercial source (utility).

- 5.1.3.2.1. Battery in the case where primary power is provided from the building supply would not be required to be 10 year battery.

5.1.4. Notification:

- 5.1.4.1. Audible notification is required. Visual notification is not required.

- 5.1.4.1.1. The alarm must be located such that it will be heard by occupants in occupied areas of the building. (See Section 8.2 of this document.)

6. Carbon monoxide detection system:

6.1. Minimum requirement for existing buildings:

6.1.1. General: Comply with NFPA 720.

6.1.2. Quality:

6.1.2.1. Carbon monoxide detectors that meet the listing labeling requirements of the regulation.

6.1.3. Interconnection:

6.1.3.1. As a result of installing a detection system, the detectors, notification devices, and control units are interconnected.

6.1.3.2. In addition, the carbon monoxide detection system shall be interconnected with an off-site premise.

6.1.3.2.1. Off-site premises to comply with NFPA 720.

6.1.3.2.2. Examples of allowable methods of communication with off-site premises may be through a fire alarm system, security system, or a building management system.

6.1.4. Detector locations in accordance with regulations and NFPA 720.

6.1.4.1. Where the regulations are in conflict with NFPA 720, the regulations will apply.

6.1.5. Power sources:

6.1.5.1. Comply with NFPA 720.

6.1.5.1.1. Generally this will involve a connection to primary building power for the system, with backup power from a local battery associated with the system, or on-site building power supply that meets the requirements of NFPA 720.

6.1.6. Notification:

6.1.6.1. In accordance with NFPA 720, or in the areas where detectors are located.

6.1.6.2. Every building with a carbon monoxide source shall have at least one notification appliance.

6.1.6.3. Audible notification is required. Visual notification is required in areas where the audible notification devices cannot be heard due to noisy ambient sound levels.

6.1.6.4. Notification device(s) must be located such that it will be heard by occupants in the occupied areas of the building.

6.1.7. Any carbon monoxide detection system that activates a fire signal at the fire alarm control panel shall be modified such that the carbon monoxide detection system does not activate fire alarm notification devices, nor send a fire signal unless the notification and off-premises signals are distinct from those generated by the activation of a fire alarm.

7. Carbon monoxide sources:

- 7.1. Examples of carbon monoxide sources found in school district buildings include, but are not limited to the following:
 - 7.1.1. Fuel fired heating systems such as: boilers, heating/ventilating units, makeup air units including roof top or ground mounted units;
 - 7.1.2. Emergency or standby electric generation within the building;
 - 7.1.3. Fuel fired kitchen equipment such as: ranges, ovens, steamers, dishwashers, makeup air units serving hoods;
 - 7.1.4. Fuel fired domestic hot water heaters;
 - 7.1.5. Lab/shop equipment such as: gas outlets (science rooms), torches (welding shop or maintenance areas), gas fired kilns (art rooms), and stationary or portable engines (auto shop);
 - 7.1.6. Maintenance and storage areas with fuel fired equipment; and
 - 7.1.7. Garages (It is believed the intent of the Department of State is to define a garage as any space with a door opening to the exterior that is large enough to drive a car into and park, even though the program use of the space is for storage of materials and equipment other than motor vehicles.)

8. Alarm/Detector Locations in Education (School) Buildings :
 - 8.1. Sleeping area requirements – in accordance with “Fire Code of NYS” Section 610 of (2010 version)

 - 8.2. General intent for placement of alarms/detectors in new regulations:
 - 8.2.1. Install alarms/detection system in a building such that they maximize:
 - 8.2.1.1. the detection of carbon monoxide;
 - 8.2.1.2. the notification of occupants in normally occupied areas; and
 - 8.2.1.3. the notification of occupants prior to entering normally unoccupied areas.

 - 8.3. Detection Zones in Education Buildings:
 - 8.3.1. There are two types of detection zones defined for education buildings that contain carbon monoxide sources. They are classroom zones and non-classroom zone(s).
 - 8.3.1.1. Education buildings will have many, independent, classroom zones, and few non-classroom zones.
 - 8.3.2. Classroom zones: Every instructional space that is capable of being occupied by six or more occupants is required to be a separate classroom zone.
 - 8.3.2.1. This includes: general use classrooms, labs, shops, gyms, multipurpose rooms, and pools.
 - 8.3.2.2. Spaces that may be considered classrooms, depending upon whether they are used for instructional purposes, include cafeterias and auditoriums.
 - 8.3.2.3. Each classroom detection zone includes any associated spaces such as toilet rooms, storage rooms, offices, locker rooms, prep rooms, and kiln rooms that open directly into classrooms.

- 8.3.3. Non-classroom zones: All other non-instructional spaces may be part of one or more non-classroom zones.
- 8.3.3.1. These would include: boiler rooms, kitchens, receiving areas, libraries, administrative areas, corridors, spaces such as offices, toilet rooms, storage rooms, and utility (electric) rooms.
- 8.3.3.2. In many education buildings that do not have carbon monoxide-producing HV(AC) systems serving non-classroom spaces, it is anticipated there will be one, non-classroom detection zone. The non-classroom zone may be elongated, and greater than 10,000 square feet in area. (See Section 8.6.)
- 8.3.3.3. A single, non-classroom zone shall not incorporate more than one floor level.

8.4. Zones requiring alarms/detectors:

- 8.4.1. Each classroom zone with a carbon monoxide source shall receive an alarm/detector.
- 8.4.2. Each non-classroom zone with a carbon monoxide source shall receive an alarm/detector
- 8.4.2.1. A non-classroom zone may contain multiple carbon monoxide sources.
- 8.4.3. Each classroom located adjacent to a garage shall receive an alarm/detector.
- 8.4.4. A garage, located adjacent to a non-classroom zone will be considered a carbon monoxide source for that zone.
- 8.4.5. All spaces served by each carbon monoxide-producing HV(AC) system, regardless of program use of space are considered separate zones:
- 8.4.5.1. Carbon monoxide-producing HV(AC) system may be one of the following:
- 8.4.5.1.1. Fuel fired heating/ventilating systems or makeup air units including roof top or ground mounted units.
- 8.4.5.1.2. Non-fuel fired heating/ventilating/air conditioning systems that supply air from a space with a carbon monoxide source to other spaces without a source.
- 8.4.5.1.2.1. An example of this would be an air handling unit that serves both labs with gas outlets and serves science classrooms/labs that do not have gas outlets.
- 8.4.5.2. If the carbon monoxide-producing HV(AC) system serves:
- 8.4.5.2.1. A single space, whether classroom or non-classroom, that space is a single detection zone.
- 8.4.5.2.2. Multiple classrooms, each classroom is an independent detection zone.
- 8.4.5.2.3. Multiple non-classroom spaces located on the same floor level, all spaces are considered one non-classroom zone.
- 8.4.5.2.4. Multiple non-classroom spaces located on different floor levels, spaces on each floor are considered separate non-classroom zones.
- 8.4.5.2.5. A mixture of classroom spaces and non-classroom spaces, all non-classroom spaces are considered single zones by floor, and each classroom is considered a separate zone.
- 8.4.5.3. Minimum requirement for all cases (Either Section 8.4.5.3.1 or Section 8.4.5.3.2) :

8.4.5.3.1. “carbon monoxide alarm/detector is provided in the first room or area served by each main duct leaving the carbon monoxide source in such carbon monoxide-producing HVAC system and (b) the signals from the carbon monoxide alarm/detector in the first room or area served by each such main duct are automatically transmitted to an approved location.”

8.4.5.3.1.1. Approved locations: Space in which alarm/detector is located, and

8.4.5.3.1.1.1. space normally staffed by school personnel during normal school hours, or

8.4.5.3.1.1.2. corridor in area of the spaces served by the carbon monoxide-producing HVAC system.

8.4.5.3.1.1.3. Intent is to provide notification to occupants in spaces served by carbon monoxide-producing HVAC system as quickly as possible.

8.4.5.3.1.1.4. Consider notification (and alarm/detector) for carbon monoxide-producing HVAC system, serving multiple floors.

8.4.5.3.2. Alternate minimum requirement for all cases:

8.4.5.3.2.1. Provide an alarm in each space served by the carbon monoxide-producing HVAC system.

8.5. Classroom zones greater than 10,000 square feet in area.

8.5.1. There may be some single classroom spaces that are greater than 10,000 square feet in area that contain a carbon monoxide source and/or are served by a carbon monoxide-producing HVAC system. However, these are likely to be unusual cases. For those spaces additional alarms/detectors will be required. Alarms/detectors must be placed such that no point in the space (zone) is greater than 100 feet from an alarm/detector. Distance shall be measured, such that solid walls/obstructions provide an impediment to airflow, but doors will not be an impediment.

8.6. Non-classroom zone(s): Location of detectors/alarms in non-classroom zones with carbon monoxide source (fuel fired equipment) that are not carbon monoxide-producing HVAC systems

8.6.1. There will be many non-classroom zones as described above that may be greater than 10,000 square feet. Many of those may extend great distances from carbon monoxide sources. In addition, the non-classroom zone may contain multiple spaces with carbon monoxide sources. An example might be an elementary school building with a boiler room and a kitchen with fuel fired cooking equipment. For those non-classrooms zones that are greater than 10,000 square feet, or the non-classroom zone is not measured, the following will be required as an acceptable alternate to the requirements of the regulation.

- 8.6.1.1. One detector/alarm shall be installed in each space with a carbon monoxide source (source area), and one detector/alarm shall be installed in a location outside of each source area at an approved location. Generally detector/alarm outside the source area will be located between the source and the bulk of the building occupants.
- 8.7. Classrooms with duplicate types of carbon monoxide sources:
 - 8.7.1. There may be situations where spaces with carbon monoxide sources, such as a lab with gas outlets, are also served by a for carbon monoxide-producing HVAC system.
 - 8.7.1.1. An alarm/detector installed in the first space served by a fuel fired HVAC system will not need to be duplicated by a second alarm/detector in the same space where the first space served has its own carbon monoxide source.
 - 8.7.1.2. In the case where a non-fuel fired HVAC system supplies air from a space with a carbon monoxide source to other spaces without a source, the first spaces served should be considered to be: the space(s) containing the carbon monoxide sources. A signal shall be transmitted, as required for carbon monoxide-producing HVAC systems.
9. Additional information:
 - 9.1. Facilities Planning Carbon Monoxide web site:
http://www.p12.nysed.gov/facplan/Carbon_Monoxide/CarbonMonoxideDetectioninSchoolDistrictBuildings.html