CITY OF CANANDAIGUA
FIRE DEPARTMENT

Fire Chief Frank Magnera
335 South Main Street
Canandaigua, NY 14424-2118
Phone (585) 396-5052 Fax (585) 394-2706

CARBON DIOXIDE (CO_2) SYSTEMS USED IN BEVERAGE DISPENSING APPLICATIONS

Dear Business Owner,

The City of Canandaigua - Office of the Fire Marshal wishes to inform you of the fire code requirements that are impacting your business. In particular, the installation and maintenance of liquid or gaseous carbon dioxide systems (CO_2) that are used for your beverage dispensing system.

Carbon dioxide is an invisible, odorless gas that is present in the air you breathe. Ordinarily, carbon dioxide is not poisonous. However, breathing high concentrations of carbon dioxide would put one at risk for carbon dioxide poisoning or even death by suffocation.

Recently, emergencies both locally and around the nation caused by CO_2 systems leaking are on the increase. One incident involved the death of a restaurant worker who was suffocated by the gas. Another incident caused two of four emergency responders at a medical emergency to be overcome while trying to render emergency first aid. Numerous others have not been so fortunate.

New York State has recently adopted the 2015 International Fire Code with amendments. Simply stated, new carbon dioxide system having a capacity over 100 lbs. (liquid) or 6000 cubic feet (compressed gas), are required to submit plans and obtain a fire code operational permit for said installation.

Any existing carbon monoxide beverage dispensing systems installed prior to the adoption of the 2015 Fire Code of New York, shall still be required to comply with minimum codes and standards.

Beginning January 1, 2019 during regular fire inspections the Office of the Fire Marshal will include CO_2 storage, dispensing, permitting, and detection as part of their inspections. Attached you will find a detailed description of these new requirements so you can achieve a better understanding of how to comply with these minimum standards.

We understand that complying with these requirements will take some time and money. Rest assured we are here to assist you in achieving a code compliant carbon dioxide beverage dispensing system that are safe for your customers and employees.

Please feel free to contact our office at (585) 396-5050 with any questions or concerns. Thank you for your anticipated cooperation.

Respectfully,

Frank Magnera

Fire Chief & Fire Marshal
City of Canandaigua Fire Department
335 South Main Street
Canandaigua, NY 14424
(585)337-2124 Office
(585)396-5052 Fire Station # 1
(502)316-2200 Cell

City of Canandaigua Fire Department
Office of the Fire Marshal

Carbon Dioxide Requirements and Declaration Form

In accordance with the Code of the City of Canandaigua and the New York State Fire Prevention and Building Code, a fire code operational permit is required to maintain, replace and or install a Carbon Dioxide Systems for Beverage Dispensing which includes one or more containers of 100 pounds to 1,000 pounds.

Property Information	Business Name				
	Address	Suite	City	State	Zip Code
	Telephone	Work Telephone	Email Address		
Primary Contact	Name				
	Address		City	State	Zip Code
	Telephone	Mobile Telephone	Work Telephone		
	Email Address foe				

Do You Have Carbon Dioxide for Beverage Dispensing or Other Use?	NO	YES
Is Your Carbon Dioxide Storage Outdoor – Outside the Building? *Please refer to Carbon Dioxide Outside Storage Requirements*	NO	YES
Is Your Carbon Dioxide Storage Indoor – Within the Building?	NO	YES

IF YES TO INDOOR / INSIDE STORAGE

Enclosed Room		Above Grade		Below Grade	
List the number of containers					
What is the size of each container (pounds)					
What is the Total Quantity of Storage / Use (pounds)					

If your indoor carbon dioxide system includes one or more containers of 100 pounds to 1,000 pounds, then ONE of the following options is required.

	Demonstrate that an existing ventilation system meets ventilation requirements in accordance with the 2015 New York State Mechanical Code.
	Provide a new or re-design of an existing ventilation system for review that complies with 2015 New York State Mechanical Code.
	Install a listed CO_2 Emergency Alarm System in accordance with the 2015 Fire Code of New York State

I understand that the City of Canandaigua – Office of the Fire Marshal personnel will conduct a fire safety site inspection to verify compliance with the 2015 Fire Code of New York State for Carbon Dioxide Use for Beverage Dispensing Operations.

Applicant Signature	Applicant Name (Print)	Date

Permit Number	Issue Date	New Expiration Date	Fee Paid	Check #	Receipt Number	Evacuation Plan Received

CARBON DIOXIDE SYSTEMS FOR BEVERAGE DISPENSING PERMIT REQUIREMENTS

City of Canandaigua
Office of the Fire Marshal

Carbon Dioxide Systems for Beverage Dispensing

Scope

The intent of this guideline is to provide the information necessary to ensure that the design and installation of compressed gas containers, cylinders, tanks, and systems will comply with the applicable provisions of the 2015 Fire Code of New York State Chapters 50 & 53 and NFPA 55, material specific provisions, and permit requirements, as specified by the 2015 Fire Code of New York State.

Purpose

Carbon Dioxide, CO_2, is a colorless odorless gas that asphyxiates by displacing oxygen in the air. Several fatal carbon dioxide incidents have occurred in restaurants where CO_2 leaked from large storage tanks serving carbonated beverage dispensers. These incidents led to the additional permitting and detection requirements for large CO_2 storage tanks being added to the 2015 Fire Code of New York State.

Definitions

Asphyxiation: to lose consciousness by impairing normal breathing, to suffocate or smother

Dewar: a vacuum flask that holds a cryogenic or liquefied gas

Carbon Dioxide (CO_2) Detector: a device to measure the concentration of CO_2 in the air

Carbon Dioxide (CO_2): Rooms or areas sheltered from the weather with a roof and enclosed on two or more sides with a solid wall. Subject to review by the code official, rooms or areas without a roof and with solid walls and doors on all sides, may be considered an indoor installation.

Liquid Carbon Dioxide (CO_2) Systems: An assembly of equipment consisting of one or more carbon dioxide supply containers, interconnecting piping, pressure regulators, and pressure relief devices

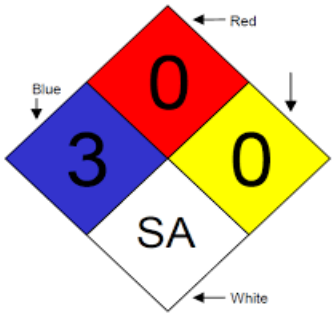
PEL: Permissible Exposure Limit for CO_2 gas is 5,000 PPM (0.5%) Time Weighted Average (TWA) @ 8 hours a day, 40 hours per week

STEL: Short-Term Exposure Limit for CO_2 is 30,000 PPM (3.0%) for less than 15 minutes

IDLH: Immediately Dangerous to Life & Health for CO_2 is 40,000 PPM (4.0%)

Carbon Dioxide Conversion Tables / Hazard Characteristics

Product Name	Cubic Feet/Pound	Pounds/Gallon	Cubic Feet/Gallon
Carbon Dioxide (CO_2) CAS: 124-38-9	8.74	8.46	73.94



Reporting Conditions

1. An operational permit is required for carbon dioxide systems used in beverage dispensing applications having more than 100 pounds of carbon dioxide. The 100 lbs refers to the total CO_2 in use and stored within a building. Systems with more than 100 lbs total in use and stored within the building shall require a permit, protection from damage, and detection or ventilation

   For purposes of inspection and enforcement the following interpretations of the requirements will be applied:

   - Any tank(s) in-use or stored within a building **will** count towards the 100 lb threshold.
   - Any tank(s) in-use outside the building **will** contribute towards the 100 lb threshold.
   - If one 100 lb CO_2 tank is located inside the building and connected to the system and in use, but two more 100 lb CO_2 tanks are stored inside, in the same or other location, a permit and ventilation or alarms are required

2. Carbon dioxide systems shall be installed so the storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations.

3. Where carbon dioxide supply tanks, cylinders, piping, and equipment are located indoors, rooms or areas containing carbon dioxide supply tanks, cylinders, piping and fittings and other areas where a leak of a carbon dioxide system can collect, shall be provided with either ventilation **OR** an emergency alarm system as follows:

   3.1 **Ventilation**. Mechanical ventilation shall be in accordance with the International Mechanical Code and shall comply with all of the following:

   a. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cubic foot per minute per square foot.

   b. Exhaust shall be taken from a point within 12 inches of the floor.

   c. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area.

   d. Ventilation shall run continuously or be activated by a sensor or detector to maintain an atmosphere of less than 5,000 ppm.

   3.2 **Emergency alarm system**. An emergency alarm system shall comply with all of the following:

   a. If emergency alarms are chosen as the method of protection and compliance, continuous CO_2 detection is required in areas where CO_2 can accumulate.

   b. The threshold for activation of an alarm shall not exceed 5,000 parts per million.

   c. Activation of the emergency alarm system shall initiate a local audible alarm within the room or area in which the system is installed.

   d. Gas detection equipment shall be installed, calibrated, maintained and replaced in accordance with the manufactures instructions. The manufactures instructions together with calibration and maintenance records shall be posted in the immediate vicinity of the gas detection equipment.

4. Pressure relief devices shall be piped to the outdoors where the discharge will not impinge on the structure, personnel, or means of egress and will not create a hazardous concentration of carbon dioxide.

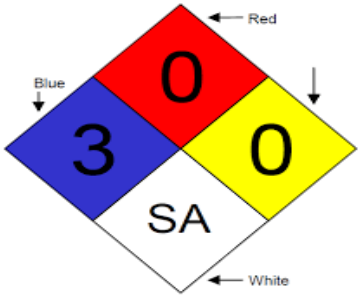
   Vent piping systems serving pressure relief devices shall be protected from water intrusion to prevent moisture or solid carbon dioxide from collecting and freezing and interfering with the operation of the pressure relief device.

   Carbon dioxide can form dry ice, which can accumulate and block the vent line. Chances of this can be enhanced if a pressure relief device is located too close to the container.

Signage

A warning sign shall be posted at the entrance to the building, room, enclosure, or confined area where the container is located.

The warning sign shall be at least 8 inches wide and 6 inches high and state the following:



Provide a graphic floor plan map of the area protected by the CO_2 emergency alarm system that is permanently mounted adjacent to the Carbon Dioxide (CO_2) Emergency Alarm.

Plans shall be of durable construction, easily readable in normal lighting, protected by a smooth, transparent, plastic surface and shall indicate the location of supply tank, points of use, and CO_2 detectors. The graphic map shall state “You Are Here” and be properly oriented to assist the responding fire fighters.

Rooms equipped with carbon dioxide sensors/alarms, must display signage at the entrance to the room that warns occupants not to enter when alarms are activated.

Exterior signs to be located adjacent to rear/side maintenance door. CO_2 letters to be mounted on exterior tank fill connection protective door. CO_2 Letters to be 3-inches in size (Subscript size for number 2 is optional). Letters shall contrast with background.

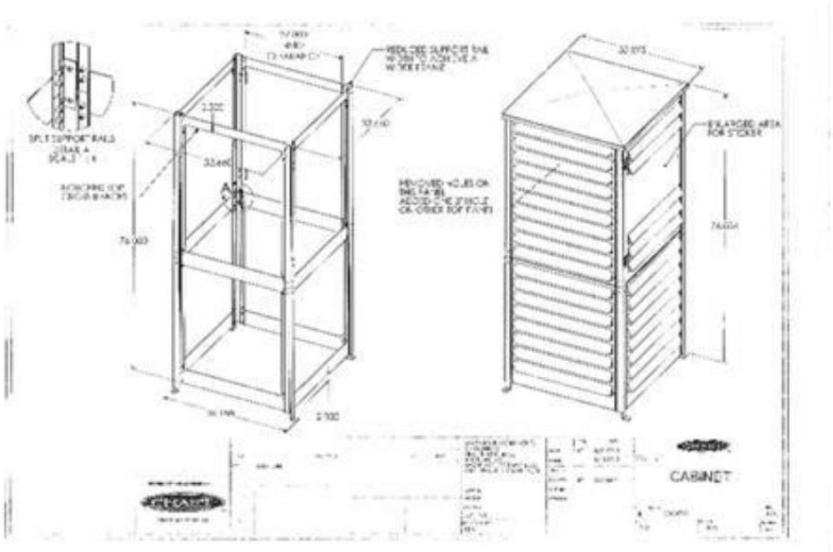
Training

All employees shall receive annual training in hazard identification, physical properties, inspection, and emergency procedures. Training records shall be maintained on site and be available to fire inspectors upon request. (FCNYS – Section 5307.8)

CARBON DIOXIDE (CO_2) OUTDOOR STORAGE

For Exterior Carbon Dioxide Systems of One or More Containers of 100 to 1,000 Pounds

- Shall be above grade.
- Shall not be obstructed by more than three sides of the perimeter with supports and walls.
- Shall not be installed within 10 feet of elevators, unprotected platform ledges or other areas where falling would result; shall not be installed on roofs, shall not be installed with 36 in of electrical panels.
- Shall be safely supported; vessel foundation must be capable of supporting the full system weight.
- Supply line shall be UV resistant or protected conduit or appropriate covering.
- Shall be equipped with isolation valves installed on the fill line and tank discharge or gas supply line. They shall be designed/marked to indicate open or closed, shall be accessible, clearly marked or identified, and capable of being locked or tagged in closed position for servicing.
- When extreme temperatures prevail, overhead covers shall be provided. Compressed gas containers, cylinders and tanks, whether full or partially full, shall not be exposed to artificially created high temperatures exceeding 125°F or sub-ambient (low) temperatures unless designed for use under the exposed conditions.
- Areas used for the storage, use and handling of compressed gas containers, cylinders, tanks and systems shall be secured against unauthorized entry and safeguarded in an approved manner. (i.e. fence, expanded metal cage or cabinet).
- Guard posts or other approved means shall be provided to protect compressed gas containers, cylinders, tanks and systems indoors and out-doors from vehicular damage and shall comply with 2015 Fire Code of New York State - Section 312.
- Labeling - An NFPA 704 compliant Hazard Placard is required. This requirement is subject to verification at the time of the fire safety Inspection prior to issuance of an operational permit. Additional hazard warning signage specific to the material is required.



Containers employed for storage or use of cryogenic fluids shall comply with Sections 5503.1.1 through 5503.1.3.2 and Chapter 50.

Piping and Fittings

Piping systems shall be identified in accordance with ASME A13.1.

Identification. Markings for carbon dioxide (CO_2) piping systems shall consist of the content's name (carbon dioxide or CO_2) and direction -of-flow arrow. Markings shall be provided at each valve; at wall, floor, or ceiling penetrations; at each change of direction; and at not less than every 20 feet or fraction thereof throughout the piping run.

Piping, tubing, pressure regulators, valves, and other apparatus shall be kept gastight to prevent leakage.

A soap test of all joints will be conducted at the time of inspection by the building owner or contractor and witnessed by the Office of the Fire Marshal.

Pressure Relief Valves

Containers, cylinders, and tanks shall be provided with a pressure gauge and a level gauge or device for indicating the quantity of liquid carbon dioxide.

These devices shall be designed for the temperatures and pressures associated with liquid carbon dioxide service.

Where containers, cylinders, and tanks are in locations remote from the filling connection, a means to determine when the containers have been filled to their design capacity shall be provided and shall be verifiable from the filling connection.

Emergency Shut Off

Emergency shutoffs shall be located at the point of use and at the tank, cylinder, or bulk source. These shutoffs shall be clearly marked. When hazardous materials are stored outside of buildings in stationary above-ground tanks or pressure vessels and are piped into a building, an emergency shutoff valve shall be installed at an approved location outside of the building. (NFPA 55, 7.1.11.1 and 7.1.11.2).

Securing of Containers

Stationary containers shall be secured to foundations in accordance with the 2015 Building Code of New York State. Portable containers subject to shifting or upset shall be secured. Nesting shall be an acceptable means of securing containers.

Lighting

When required, lighting, including emergency lighting, shall be provided for fire appliances and operating facilities such as walkways, control valves and gates ancillary to stationary containers.

Construction Drawings Requirements for New Carbon Dioxide for Beverage Dispensing Systems

Construction drawings and specifications shall be complete and of sufficient clarity to indicate the entire work proposed and show in detail that the Carbon Dioxide (CO_2) system conforms to the provisions of the Fire and Building Codes and relevant laws, ordinances, rules, and regulations. Each set of drawings and specifications shall, at a minimum, contain the following information, architectural, structural, mechanical, electrical drawings, specifications, and analysis:

- Floor plan of the building showing where gas is to be installed, distributed, or stored.
- Identification of the type of gas, the quantity in cubic feet, and the type of storage containers.
- Adequate separation of incompatible products.
- The location of the storage containers, both full and empty.
- The piping design plan identifying routing of pipe and labeling of piping.
- Location of shut off valves and discharge points.
- Location and type of alarm system(s).
- Any gas cylinder storage room, including construction type, doors, and ventilation Method of securing cylinders from accidental dislodgment or unauthorized access.
- Location of warning signs. Details for warning signs such as text, size, color and attachment method.