



# Construction/Operational Permit Application



## Compressed Gas

[www.cityofvancouver.us/departments/fire-department](http://www.cityofvancouver.us/departments/fire-department)

International Fire Code as adopted by VMC 16.04 (Washington State Fire Code)

### Permitting Requirements

An **operational permit** is required for the storage, use or handling of compressed gases in excess of the amounts listed in Table 105.5.9 as measured at normal temperature and pressure (NTP). (included below). This excludes vehicles equipped for and using compressed gas as a fuel for propelling the vehicle. Where the thresholds of Table 105.5.9 are exceeded, a **construction permit** is required to install, repair damage to, abandon, remove, place temporarily out of service, or close or substantially modify a compressed gas system. Routine maintenance is exempt from this requirement. For repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

### Project Information

Site Address		Owner Name	
Other			

### Applicant Information

Company Name		Address		
Contact Name				
Office Phone		Cellular		Email

### Contractor

Company Name		Address		
Contact Name				
Office Phone		Cellular		

### Description of Work


TABLE 105.5.9  
PERMIT AMOUNTS FOR COMPRESSED GASES

TYPE OF GAS	AMOUNT (cubic feet at NTP)
Carbon dioxide used in carbon dioxide enrichment systems	875 (100 lb)
Carbon dioxide used in insulated liquid carbon dioxide beverage dispensing applications	875 (100 lb)
Corrosive	200
Flammable (except cryogenic fluids and liquefied petroleum gases)	200
Highly toxic	Any Amount
Inert and simple asphyxiant	6,000
Oxidizing (including oxygen)	504
Pyrophoric	Any Amount
Toxic	Any Amount

For SI: 1 cubic foot = 0.02832 m<sup>3</sup>.

Application Type:

- Installation  
  Operational  
  Both Installation and Operational

## Quantities (volumes in cubic feet at normal temperature and pressure)

Gas	CF	Gas	CF	Gas	CF

## Electronic Plan Standards

### File Naming Standards:

Electronic plans and documents shall be named as specified in the City of Vancouver [ePLANS](https://www.cityofvancouver.us/business/permits-licenses-and-inspections/eplans/) system:  
<https://www.cityofvancouver.us/business/permits-licenses-and-inspections/eplans/>



### Acceptable File Types:

Plans, calculations, specifications and supporting documents shall be uploaded as a PDF file.

### Plan Sheet Standards:

All plans shall be drawn to scale, as identified in the checklist, and each sheet shall state the scale and show a measurable scale on the page for measurement calibrations.

### Document Orientation:

All plans must be uploaded in "Landscape" format in the horizontal position with a north indicator. All other documents can be in "Portrait" format.

### Stamped:

Where documentation contains a code analysis or engineering calculations, such documents shall be stamped by the design professional.

## Minimum Submittal Checklist for Upload to ePLANS

- Completed Fire Construction/Operational Permit Application - Compressed Gases (this document) Check all checkboxes that are applicable to your project
- Completed Hazardous Materials Inventory Statement (HMIS) and Hazardous Materials Management Plan (HMMP).
- Supporting documents listed below (See *Document Details* below)
- Site plans and floor plans (see *Plan Details* below)

## Document Details

- Cut sheets of any containers, equipment, or devices.
- Safety Data Sheets for all compressed gases
- Manufacturer's specifications and pressure rating, including cut sheets, of all piping and tubing to be used
- Additional documents for Compressed Gases not otherwise regulated (see *Compressed Gases not otherwise regulated* below).

## Plan Details

The following is a list of information required on all plan submittals for review of a Compressed Gas permit. Plans shall be drawn to 1/8" = 1'-0" minimum scale. The applicant is required to submit all this information so an accurate and timely review may be done:

- Site plan indicating the location and size of proposed containers, tanks, and piping systems.
- Design pressure, maximum operating pressure, and test pressure of vessels and associated piping.
- Details to show proper construction of the foundation supporting stationary tanks.
- Location and type of protection against physical damage, where applicable.
- Details of means of attachment of containers, cylinders, and tanks to prevent falling.
- If provided, details of container venting, including vent line size, material, and termination location.

## Permit Conditions

### General Requirements:

- Pressure relief devices shall be arranged to discharge upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container, adjacent structures, or personnel.  
*Exception:* DOTn specification containers having an internal volume of 30 cubic feet or less (WSFC 5303.3.4)
- Stationary compressed gas containers, cylinders, and tanks shall be marked with the name of the gas and in accordance with WSFC 5003.4. Markings shall be viable from any direction of approach.
- Piping systems shall be marked in accordance with ASME A13.1. Markings used for piping systems shall consist of the content's name and include a direction of flow arrow. Markings shall be provided for each valve; at wall, floor, or ceiling penetrations; at each change of direction; and at not less than every 20 feet throughout the piping run.  
*Exceptions:*
  1. Piping that is designed or intended to carry more than one gas at various times shall have appropriate signs or markings posted at the manifold, along the piping, and at each point of use to provide clear identification and warning.
  2. Piping within gas manufacturing plants, gas processing plants, refineries and similar occupancies shall be marked in an approved manner.
- Compressed gas containers, cylinders, tanks, and systems that could be exposed to physical damage shall be protected. Guard posts or other approved means shall be provided to protect against compressed gas containers, cylinders, tanks, and systems from vehicular damage and shall comply with WSFC 312.
- Compressed gas containers, cylinders, and tanks shall be secured to prevent falling caused by contact, vibration, or seismic activity. Securing of compressed gas containers, cylinders, and tanks shall be by one of the following:
  - a. Securing containers, cylinders, and tanks to a fixed objects and one or more restraints.
  - b. Securing containers, cylinders, and tanks on a cart or other mobile device designed for the movement of compressed gas containers, cylinders, or tanks.
  - c. Nesting of compressed gas containers, cylinders, and tanks at container filling or servicing facilities or in seller' warehouses that are not open to the public. Nesting shall be allowed provided that the nested containers, cylinders, or tanks, if dislodged, do not obstruct the required means of egress.
  - d. Securing of compressed gas containers, cylinders, and tanks to or within a rack, framework, cabinet, or similar assembly designed for such use.*Exception:* Compressed gas containers, cylinders, and tanks in the process of examination, filling, or servicing.

### Storage:

- Compressed gas containers, cylinders, and tanks, except those designed for use in a horizontal position, and all Compressed gas containers, cylinders, and tanks containing non-liquefied gases, shall be stored in an upright position with the valve end up. An upright position shall include conditions where the container, cylinder, or tank axis is inclined as much as 45 degrees (.80 rad) from the vertical.  
*Exceptions:*
  - a. Compressed gas containers with a water volume less than 1.3 gallons (5 L) are allowed to be stored horizontally.
  - b. Cylinders, Containers, and tanks containing non-flammable gases, or cylinders, containers, or tanks containing non-liquefied flammable gases that have been secured to a pallet for transportation purposes.

### Use and Handling:

- Venting of gases shall be directed to an approved location. Venting shall comply with the International Mechanical Code.
- Compressed gas containers, cylinders, and tanks, except those designed for use in a horizontal position, and all compressed gas containers, cylinders, and tanks containing non-liquified gases, shall be used in an upright position with the valve end up.

An upright position shall include conditions where the container, cylinder, or tank axis is included as much as 45 degrees (.80 rad) from the vertical.

Exceptions:

1. Use of nonflammable liquified gases in the inverted position where the liquified phase is used shall not be prohibited provided that the container, cylinder, or tank is properly secured, and the dispensing apparatus is designed for liquefied gas use.
  2. Compressed gas containers, cylinders, or tanks with a water volume less than 1.3 gallons (5 L) are allowed to be used in a horizontal position.
- Piping, including tubing, valves, fittings, and pressure regulators, shall comply with WSFC 5305 and Chapter 50. Piping, tubing, pressure regulators, valves, and other apparatus shall be kept tight to prevent leakage.
  - In addition to the requirements listed here, indoor, and outdoor storage of compressed gases shall comply with the material-specific provisions of Chapters 54, 58, and 60 through 67. Compressed gases not otherwise regulated shall comply with WSFC 5307.

**Medical Gases:**

- Compressed gases at hospitals and similar facilities intended for inhalation and sedation including, but not limited to, analgesia systems for dentistry, podiatry, veterinary, and similar uses shall comply with Sections 5306.2 through 5306.4 in addition to other requirements of Chapter 53.  
Exception: *All new distribution piping, supply manifolds, connections, regulators, valves, alarms, sensors, and associated equipment shall be in accordance with the Plumbing Code.*
- Medical gases shall be located in areas dedicated to the storage of such gases without other storage or uses. Where containers of gases in quantities greater than the permit amount are located inside buildings, they shall be in a 1-hour exterior room, a 1-hour interior room or a gas cabinet in accordance with Section 5306.2.1, 5306.2.2, or 5306.2.3, respectively. Rooms or areas where medical gases are stored or used in quantities exceeding the maximum allowable quantity per control area as set forth in WSFC 5003.1 shall be in accordance with the International Building Code for high-hazard Group H occupancies.
  - a. One-Hour Exterior Rooms - A 1-hour exterior room shall be a room or enclosure separated from the remainder of the building by fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with Section 711 of the International Building Code, or both, with a fire-resistance rating of not less than 1-hour. Rooms shall have not less than one exterior wall that is provided with not less than two vents. Each vent shall have a minimum free opening area of 36 square inches (232 cm<sup>2</sup>) for each 1,000 cubic feet (28 m<sup>3</sup>) at normal temperature and pressure (NTP) of gas stored in the room and shall be not less than 72 square inches (465 cm<sup>2</sup>) in aggregate free opening area. One vent shall be within 6 inches (152 mm) of the floor and one vent shall be within 6 inches (152 mm) of the ceiling. Rooms shall be provided with not less than one automatic sprinkler to provide container cooling in case of fire.
  - b. One-Hour Interior Room - Where an exterior wall cannot be provided for the room, a 1-hour interior room shall be provided and shall be a room or enclosure separated from the remainder of the building by fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with section 711 of the International Building Code, or both, with a fire resistance rating of not less than 1 hour. Openings between the room or enclosure and interior spaces shall be self-closing, smoke and draft-control assemblies having a fire protection rating of not less than 1 hour. An automatic sprinkler system shall be installed within the room. The room shall be exhausted through a duct to the exterior. Supply and exhaust ducts shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. Approved mechanical ventilation shall comply with the International Mechanical Code and be provided at a minimum rate of 1 cfm per square foot of the area of room.
  - c. Gas Cabinets - Gas cabinets shall be constructed in accordance with WSFC 5003.8.6 and shall comply with the following:

- i Exhausted to the exterior through dedicated exhaust duct system installed in accordance with Chapter 5 of the International Mechanical Code.
  - ii Supply and exhaust ducts shall be enclosed in a 1-hour fire-resistance-rated shaft enclosure from the cabinet to the exterior. The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02m/s) with not less than 150 feet per minute (0.76 m/s) at any point of the access point or window.
  - iii Provided with an automatic sprinkler system internal to the cabinet.
- Oxidizer medical gas systems located on the exterior of a building with quantities greater than the permit amount shall be located in accordance with WSFC 6304.2.1.
  - Transfilling areas and operations shall comply with NFPA 99.
  - The maintenance and testing of medical gas systems including, but not limited to, distribution piping, supply manifolds, connections, pressure regulators and relief devices and valves, shall comply with the maintenance and testing requirements of NFPA 99 and the general provisions of WSFC Chapter 63.

**Compressed Gases Not Otherwise Regulated:**

- Compressed gases in storage or use not regulated by the material-specific provisions of WSFC Chapters 6, 54, 55, and 60 through 67, including asphyxiant, irritant and radioactive gases, shall comply with this WSFC 5307.
- Indoor storage and use areas and storage buildings shall be provided with ventilation in accordance with WSFC 5004.3. Where mechanical ventilation is provided, the systems shall be operational during such time as the building or space is occupied.

Exceptions:

1. A gas detection system complying with WSFC 5307.2.1 shall be permitted in lieu of mechanical ventilation.
2. Areas containing insulated liquid carbon dioxide systems used in beverage dispensing applications shall comply with WSFC 5307.3

**Insulated Liquid Carbon Dioxide Systems Used in Beverage Dispensing Applications:**

- Insulated liquid carbon dioxide systems with more than 100 pounds (45.4 kg) of carbon dioxide used in beverage dispensing applications shall comply with WSFC 5307.3.
  - a. Where insulated liquid carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing storage tanks, cylinders, piping and equipment, and other areas where a leak of carbon dioxide is expected to accumulate, shall be provided with mechanical ventilation in accordance with WSFC 5004.3 and designed to maintain the room containing carbon dioxide at a negative pressure in relation to the surrounding area.
 

Exception: A gas detection system complying with WSFC 5307.3.2 shall be permitted in lieu of mechanical ventilation.
  - b. Where ventilation is not provided in accordance with WSFC 5307.3.1, a gas detection system shall be provided in rooms or indoor areas and in below-grade outdoor locations with insulated carbon dioxide systems. The system shall comply with the requirements of IFC.

**Carbon Dioxide Enrichment Systems:**

- The design, installation, and maintenance of carbon dioxide enrichment systems with more than 100 pounds (45.4 kg) of carbon dioxide, and carbon dioxide enrichment systems with any quantity of carbon dioxide having a remote fill connection, shall comply with Sections 5307.4.1 through 5307.4.7. The following information shall be provided with the application for permit:
  - Total aggregate quantity of liquid carbon dioxide in pounds or cubic feet at normal temperature and pressure.
  - Location and total volume of the room where the carbon dioxide enrichment operation will be conducted. Identify whether the room is at grade or below grade.
  - Location of containers relative to equipment, building openings, and means of egress.
  - Manufacturer's specifications and pressure ratings, including cut sheets, of all piping and tubing to be used.

- A piping and instrumentation diagram that shows piping support and remote fill connections.
- Details of container venting, including but not limited to vent line size, material, and termination location.
- Seismic support for containers.
- Pressure relief, vent piping, fill indicators, fill connections, vent terminations, piping systems and the storage, use and handling of the carbon dioxide shall be in accordance with Chapter 53 and NFPA 55
- A gas detection system complying with WSFC 916 shall be provided in rooms or indoor areas in which the carbon dioxide enrichment process is located, in rooms or indoor areas in which container systems are located, and in other areas where carbon dioxide is expected to accumulate. Carbon dioxide sensors shall be provided within 12 inches (305 mm) of the floor in the area where the gas is expected to accumulate, or leaks are most likely to occur. The system shall be designed as follows:
  - a. Activates a low-level alarm upon detection of a carbon dioxide concentration of 5,000 ppm (9000 mg/m<sup>3</sup>).
  - b. Activates a high-level alarm upon detection of a carbon dioxide concentration of 30,000 ppm (54 000 mg/m<sup>3</sup>).
- Activation of the low-level gas detection system alarm shall automatically:
  - a. Stop the flow of carbon dioxide to the piping system.
  - b. Activate the mechanical exhaust ventilation system.
  - c. Activate an audible and visible supervisory alarm signal at an approved location within the building.
- Activation of the high-level gas detection system alarm shall automatically:
  - a. Stop the flow of carbon dioxide to the piping system.
  - b. Activate the mechanical exhaust ventilation system.
  - c. Activate an audible and visible evacuation alarm both inside and outside of the carbon dioxide enrichment area, and the area in which the carbon dioxide containers are located.
- Rooms or indoor areas in which carbon dioxide enrichment is provided shall be maintained at a negative pressure in relation to the surrounding areas in the building. A mechanical ventilation system shall be provided in accordance with the International Mechanical Code that complies with all of the following:
  - a. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cfm per square foot.
  - b. When activated by the gas detection system, the mechanical ventilation system shall remain on until manually reset.
  - c. The exhaust system intakes shall be taken from points within 12 inches (305 mm) of the floor.
  - d. The ventilation system shall discharge to the outdoors in an approved location (5307.4.5 )
  - e. Hazard identification signs shall be posted at the entrance to the room and indoor areas where the carbon dioxide enrichment process is located, and at the entrance to the room or indoor area where the carbon dioxide containers are located. The sign shall be not less than 8 inches (200 mm) in width and 6 inches (150 mm) in height and indicate:

**CAUTION – CARBON DIOXIDE GAS  
VENTILATE THE AREA BEFORE ENTERING.  
A HIGH CARBON DIOXIDE (CO<sub>2</sub>)  
GAS CONCENTRATION  
IN THIS AREA  
CAN CAUSE ASPHYXIATION**

- f. Where required, NFPA 704 warning signage shall be posted at or near doors leading to the gas.



**NOTE:** This is not intended to be an all-inclusive list. The WSFC requirements listed are intended to ensure that we have adequate information to begin a review of the application. Additional information may be required.

**I understand that all applicable codes apply and that other regulatory codes may also apply. Errors and/or omissions on the plans and corrections from field inspections are the responsibility of the owner/contractor. All work is subject to compliance with City of Vancouver ordinances and laws of the State of Washington.**

APPLICANT NAME: \_\_\_\_\_ APPLICATION DATE: \_\_\_\_\_

APPLICANT SIGNATURE: \_\_\_\_\_