



Construction Permit Application

Gas Detection Systems



www.cityofvancouver.us/departments/fire-department

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

Permitting Requirements

A gas detection system is a system or portion of a combination system that utilizes one or more stationary sensors to detect the presence of a specified gas at a specified concentration and initiate one or more responses required by this code, such as notifying a responsible person, activating an alarm signal, or activating or deactivating equipment. A self-contained gas detection and alarm device is not classified as a gas detection system.

A **construction permit** is required for the installation of or modification to gas detection systems in accordance with WSFC Section 105.6.10 and Section 916. Maintenance performed in accordance with this code is not considered a modification and shall not require a permit. Portable CO2 detection/alarms that plug into a standard 110/120 volt outlet, for carbon dioxide beverage dispensing shall not require a construction permit.

Project Information

Site Address				Business Name		
Other						
Contact Name						
Office Phone		Cellular		Email		

Applicant Information

Company Name				Address		
Contact Name						
Office Phone		Cellular		Email		

Contractor

Company Name				Address		
Contact Name						
Office Phone		Cellular				

Building

Fire Sprinklers	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Fire Alarm	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Emergency Power	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Installation by:	<input type="checkbox"/> Contractor		<input type="checkbox"/> Owner		Type of gas:			
Related Permits:	RES _____	CMI _____	DEF _____	MPE _____				

Description of Work

Submittal Checklist

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. One page per upload in plans.

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. Multiple pages allowed per upload in documents.

Stamped:

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

Gas Detection Submittal Checklist

- Completed Fire Construction Permit Application – Gas Detection (this document) Check all *Permit Conditions* checkboxes that are applicable to your project
- Supporting documents listed below (See *Document Details* below)
- Site plan and floor plans (see *Plan Details* below)

Document Details

The following is a list of information required on all document submittals. The applicant is required to submit all this information so an accurate and timely review may be completed:

- Equipment listing documents.
- Equipment manufacturer's instructions and data sheets for all equipment.
- Installer qualifications.
- Safety Data Sheets for each of the gases being monitored. If the system only monitors oxygen levels based on potential displacement by an inert gas, a narrative description may suffice.
- Type of emergency or standby power to be used, where applicable.
- System setting information to include sampling frequency, system activations thresholds. (% of LEL, PPM, etc.)

Plan Details

The following is a list of information required on all plan submittals. The plan shall be drawn to 1/8"= 1'-0" minimum scale. If scale drawings are not possible, all measurements shall be called out in the drawings. The applicant is required to submit all this information so an accurate and timely review may be completed:

- A summary sheet explaining any aspect not clearly illustrated in the plans. List related permits such as compressed gases.
- Emergency access roads and pedestrian access paths and doors, fire protection equipment including fire hydrants, fire hydrants, fire department connections, sprinkler riser room, fire alarm control panel, electrical circuit breakers, electrical generator, and Knox Box if applicable.
- Location and layout diagram of the areas being monitored and the location of the equipment to be installed.
- Sensor or sampling locations and elevations
- Illustration and locations of required signage. Signs shall be provided adjacent to gas detection system alarm signaling devices that advise occupants of the nature of the signals and actions to take in response to the signal.
- Types of gases being monitored and nature of the hazard: Toxic, Asphyxiant, HPM, Flammable, Corrosive, Low oxygen, etc.
- Power connections and type of emergency or standby power, where applicable.
- System activation matrix
- Gas sensors and gas detection systems shall not be connected to fire alarm systems unless approved and connected in accordance with the fire alarm equipment manufacturer's instructions. If connection to the fire alarm system is proposed, add a note stating that "a separate permit is required to connect to a fire alarm system".
- Location of posted maintenance schedule and frequency, including sensor calibration and replacement.
- Inspection and testing of gas detection systems shall be conducted not less than annually. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer.

Permit Conditions

General Requirements:

- The equipment used shall be designed for the type of gas detected and shall be installed and maintained per the manufacturer's instructions.
- The power supply shall be permanently connected to the building electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an approved restraining means that secures the plug to the receptacle.
- Standby or emergency power shall be provided for gas detection systems, **or** the system shall initiate a trouble signal at an approved location if the power supply is interrupted.
Exception: Gas detection systems for hydrogen fuel gas rooms shall be provided with standby/emergency power regardless of signal transmission (See "Flammable Gases" below).
- Sensors shall be installed in approved locations where leaking gases are expected to accumulate.
- Signs shall be provided and maintained adjacent to gas detection system alarms signal devices that advise occupants of the nature of the signals and actions to take in response to the signal.
- Gas sensors and gas detection systems shall not be connected to fire alarm systems unless approved by the fire code official and they are connected in accordance with the fire alarm equipment manufacturer's instructions.
- Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer. Inspection and testing of gas detection systems shall be conducted not less than annually.
- Gas sampling shall be continuous. Analysis shall be processed immediately with the following exceptions:
 - a. Hazardous Production Material (HPM) gas analysis shall be performed at intervals not exceeding 30 minutes.
 - b. Toxic gases that are not HPM, the gas analysis shall be performed at intervals not exceeding 5 minutes, in accordance with WSFC Section 6004.2.2.7.
 - c. Where a less frequent or delayed sampling interval is approved by the fire code official.
- Gas detection alarm shall be initiated where any sensor detector a concentration of gas exceeding the following thresholds:
 - a. For flammable gases, a gas concentration exceeding 25% of the lower flammability limit (LFL)

- b. For nonflammable gases, a gas concentration exceeding one-half of the IDLH (Immediately Dangerous to Life and Health), unless a different threshold is specified by the section of the WSFC code requiring a gas detection system.
- Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the section of this code requiring a gas detection system. Audible and visible alarm signals associated with a gas detection alarm shall be distinct from fire alarm and carbon monoxide alarm signals.

Carbon dioxide gas:

- Gas detection systems for insulated carbon dioxide systems shall have sensors provided within 12 inches of the floor in the area where the gas is expected to accumulate. The gas detection system shall be designed to do the following:
 - a. Activate an audible and visible supervisory alarm at a normally attended location upon detection of a carbon dioxide concentration of 5,000 ppm.
 - b. Activate an audible and visible alarm with the room or immediate area where the gas detection system is installed upon a detection of carbon dioxide concentration of 30,000 ppm.
- Gas detection systems for carbon dioxide enrichment systems shall have sensors provided within 12 inches of the floor in the area where the gas is expected to accumulate, or leaks are most likely to occur. The gas detection system shall be designed to do the following:
 - a. Activate a low-level alarm upon detection of a carbon dioxide concentration of 5,000 ppm. The gas detection system upon a low-level alarm shall automatically:
 - i. Stop the flow of carbon dioxide to the piping system.
 - ii. Activate the mechanical exhaust ventilation system.
 - iii. Activate an audible and visible supervisory alarm signal at an approved location within the building.
 - b. Activate a high-level alarm upon detection of a carbon dioxide concentration of 30,000 ppm. The gas detection system upon a high-level alarm shall automatically:
 - iv. Stop the flow of carbon dioxide to the piping system;
 - v. Activate the mechanical exhaust ventilation system.
 - vi. 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.

Flammable gases:

1. Hydrogen fuel gas rooms with gas detection systems shall have the following occur upon activation:
 - a. Initiation of distinct audible and visible alarm signals both inside and outside of the hydrogen fuel gas room.
 - b. Automatic activation of the mechanical exhaust ventilation system.

Failure of the hydrogen gas detection system shall automatically activate the mechanical exhaust system, stop hydrogen generation, and cause a trouble signal that will sound at an approved location.

Gas detection systems for hydrogen fuel gas rooms shall be connected to a standby power system in accordance with WSFC Section 1203.

2. Stationary fuel cell power systems gas detection systems shall be provided in an approved location in the fuel cell power system enclosure, the exhaust system or the room that encloses the fuel cell power system. A gas detection system activation shall automatically:
 - a. Close valves between the gas supply and the fuel cell power system.
 - b. Shut down the fuel cell power system.
 - c. Initiate a local audible and visible alarm in approved locations.

Highly toxic or toxic gases:

- The gas detection system shall detect the presence of gas at or below the Permissible Exposure Limit (PEL) or ceiling limit of the gas for which detection is provided. The gas detection system shall be capable of monitoring the discharge from the treatment system at or below one-half the Immediately Dangerous to Life and Health (IDLH) limit and shall initiate the responses described below:
 - a. Initiate a local alarm and transmit a signal to a constantly attended control station when a short-term hazard condition is detected. The alarm shall be both audible and visible and shall provide warning both inside and outside the area where gas is detected. The audible alarm shall be distinct from all other alarms. Exception: Signal transmission to a constantly attended control station is not required where not more than one cylinder of highly toxic or toxic gas is stored.
 - b. Automatically close the shut-off valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected, unless:
 - i. Reactors utilized for the production of highly toxic or toxic compressed gases are operated at pressures less than 15 psig.
 - ii. Reactors are constantly attended.
 - iii. Reactors are provided with emergency shutoff valves that have ready access.
- Automatic closure of shutoff valves shall follow the requirements of WSFC Section 6004.2.2.10.3.
- Gas detection system for indoor storage and use of highly toxic and toxic compressed gases shall be provided with Emergency Power

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: _____