FIRE PREVENTION AND
COMMUNITY RISK REDUCTION
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CARBON DIOXIDE ENRICHMENT SYSTEMS
PERMIT SUBMITTAL CHECKLIST

Submittal Process: The Following items are required for a Carbon Dioxide (CO_2) Enrichment Systems Plan Review submittal. Failure to provide the following may require a Review Denial or Resubmittal. Not all listed below will be required for every project, please provide all that apply per project. *

Drawings Requirements:
Electronic plans in .pdf format. Please submit files in an unlocked and unsecured state for plan review.
International Fire Code requires a Construction Permit for the installation or modification of CO_2 Enrichment System utilizing more than 100 pounds of CO_2. An Operational Permit is required therefore after.

CONTRACTOR INFO
- ✓ Qualified Individual – Individuals or companies shall have a current certificate from the manufacturer for the brands in which they are designing and/or installing. Note that this training needs to demonstrate knowledge, skills, and abilities for sensor calibration for the detection equipment installed and the specific hazards present.

CODE ANALYSIS
- ✓ 2024 International Fire Code (Sections 916, 3905, & 5307.4)
- ✓ National Fire Protection Association (NFPA) 70 2023 edition
- ✓ National Fire Protection Association (NFPA) 55 2023 edition
- ✓ Written job description-scope of operations

PLANS
- ✓ Floor plan and area identification
- ✓ Location(s) of all means of egress (exit)
- ✓ Emergency Plan per 2024 IFC Chapter 4 and NFPA 55 Chapter 4
- ✓ Full equipment list
- ✓ Extraction, post-processing and winterization equipment layout, including locations of solvent containers.
- ✓ Inventory of all hazardous materials to be stored/used on site and their quantities.
- ✓ Location of all equipment that is being monitored by the gas detection system
- ✓ Location of the container(s)
- ✓ Container(s) size
- ✓ Hose line routing
- ✓ Detector's locations
- ✓ Fill locations
- ✓ All gas detection systems 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 will secure the plug to the receptacle.
- ✓ Emergency and standby power. Standby or emergency power shall be provided, or the gas detection system shall initiate a trouble signal at an approved location if the power supply is interrupted.

- ✓ Where flammable or combustible liquids are boiled, distilled, or evaporated, the process shall take place under a listed hazardous exhaust fume hood that has been installed and approved by the appropriate Building Department.
- ✓ Systems and equipment used for extraction shall be approved for specific use. Approval shall be documented in the form of a UL 1389 listing document, per section 3904.2 of IFC or a technical report prepared by an approved registered design professional per section 104.8.2 of IFC.
- ✓ Extraction processes utilizing gaseous hydrocarbon-based solvents shall be provided with emergency shutoff systems in accordance with Section 5803.1.3.

OPERATION - ACTIVIATION

- ✓ Initiation of distinct audible and visual alarm signals in the extraction room.
- ✓ Deactivation of all heating systems located in the extraction room.
- ✓ Activation of the mechanical ventilation system, where the system is interlocked with gas detection.
- ✓ De-energize all light switches and electrical outlets.

Failure of the *gas detection system* shall result in the deactivation of the heating system; activation of the mechanical ventilation system where the system is interlocked with the *gas detection system*; and initiation of a trouble signal to sound in an *approved* location.

A gas detection system 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. CO_2 detection sensors shall be provided within 12 inches of the floor where gas is expected to accumulate, or leaks will most likely occur.

- ✓ Activates a low-level alarm upon detection of a CO2 concentration of 5,000 ppm.
  - Stop the flow of CO_2 to the piping system
  - Activate the mechanical exhaust ventilation system.
  - Ventilation shall remain on until manually reset
  - Activate as audible and visible supervisory alarm at an approved location within the building.

- ✓ Activates a high-level alarm upon detection of a CO_2 concentration of 30,000 ppm.
  - Stop the flow of CO_2 to the piping system.
  - Activate the mechanical exhaust ventilation system.
  - Ventilation shall remain on until manually reset
  - Activate an audible and visual evacuation alarm both inside and outside of the $CO2_2$ enrichment area, and the area in which the CO_2 containers are located.

- ✓ For extraction processes utilizing gaseous hydrocarbon-based solvents, a continuous gas detection system shall be provided.
- ✓ The gas detection threshold shall not exceed 25 percent of the LEL/LFL limit of the materials.

SIGNAGE

- ✓ Label – 704 Placard
- ✓ Waring sign shall be posted at the entrance to the building, room, enclosure, area where the container is 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_2) gas concentration in this area can cause suffocation.

MATERIAL SUBMITTALS

- ✓ Specification sheet for container(s), piping, hoses, fittings, and CO_2 detectors.

EMERGENCY PLAN REQUIREMENTS

An emergency plan shall be prepared and updated wherever compressed gases or cryogenic fluids are produced, handled, stored, or used in amounts exceeding the maximum allowable quantity (MAQ) per control area or where required by the authority having jurisdiction (AHJ).

1. The type of emergency equipment available and its location
2. A brief description of any testing or maintenance programs for the available emergency equipment
3. An indication that hazard identification labeling is provided for each storage area
4. The location of posted emergency procedures
5. A safety data sheet (SDS) or equivalent for each compressed gas or cryogenic fluid stored or used on the site
6. A list of personnel who are designated and trained to be liaison personnel for the fire department and who are responsible for the following:
    a. Aiding the emergency responders in pre-emergency planning
    b. Identifying the location of the compressed gases and cryogenic fluids stored or used
    c. Accessing SDSs
    d. Knowing the site emergency procedures
7. A list of the types and quantities of compressed gases and cryogenic fluids and their locations

*The above list is not intended to be inclusive of all requirements for a new Carbon Dioxide Enrichment System submittal, but rather a guide to indicate the minimum requirements. Refer to 2024 IFC Section 916, 3905, & 5307.3 and NFPA 55 Chapter 13 – Cabron Dioxide systems.