CARBON DIOXIDE LEAK DETECTION ALARM
SUBMITTAL REQUIREMENTS AND DETAILS

A. **SCOPE**

This document covers the installation, maintenance, operation and permitting requirements as they pertain to the use and storage of Carbon Dioxide (CO2) compressed gas systems with more than 100 pounds (45.4 kg) of Carbon Dioxide (CO2) or any system using any amount of Carbon Dioxide (CO2) below grade used in beverage dispensing applications in new and existing facilities within the City of Keller.

B. **CONSTRUCTION PERMITS**

Construction permits are required to install, repair damage to, abandon, remove, place temporarily out of service or close or substantially modify Carbon Dioxide (CO2) systems with more than 100 pounds (45.4 kg) of Carbon Dioxide (CO2) or any system using any amount of Carbon Dioxide (CO2) below grade used in beverage dispensing applications.

A separate tank installation permit is required for bulk tank installations over 2,000 pounds.

Keller Fire-Rescue Fire Prevention Division will review all Carbon Dioxide (CO2) systems used in beverage dispensing applications including bulk tanks over 100 pounds. 2,000 pounds. Upon approval by the Fire Marshal, fire construction permits will be issued.

To obtain required fire construction permit(s), the applicant must submit all required documentation at Keller Town Hall, 1st Floor Permitting Department, 1100 Bear Creek Pkwy, Keller, TX 76248

**Applicable plan review and permit fees shall apply.** Fees are calculated based on the cost of the installation.

Construction permits shall only be issued to licensed contractors.

C. **SUBMITTAL REQUIREMENTS**

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 (CO2) system conforms to the provisions of the 2015 IFC and NFPA 55, 2016 Edition 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:

1. Exact address, legal description and location of the work performed.
2. Name and address of the owner.
3. Name and address of the person or firm responsible for the preparation of the drawings and specifications. If after review of the construction drawings and specifications, the Fire Marshal determines that the proposed Carbon Dioxide (CO2) system is inadequately designed, the Fire Marshal may require that the construction drawings and specifications bear the seal of a licensed Texas professional engineer.
4. Minimum of two complete sets of construction documents showing the construction of architectural, structural, mechanical, plumbing and electrical arrangements. The full submittal, including plans, application, signed contract for the work showing cost, and cut-cuts shall be submitted in digital PDF format on CD.
5. One hard copy of specifications or notes that clearly describe the type, quality and finish of materials and the method of assembly, erection and installation of equipment to be installed with proper reference to accepted standards.
6. **Except for entirely interior installations**, a detailed plan showing the location of the proposed construction (i.e., tanks) and the location of every adjacent existing building on the property, roads, walks, utilities and other site improvements, all property lines, streets, alleys, easements and other public areas.
7. Bulk tank installations over 2,000 pounds will require an engineered structural foundation with a separate tank installation permit. Two complete sets of structural drawings, specifications and analysis (calculations) shall be provided and shall bear the seal of a licensed Texas professional engineer.
SECTION 5307
CARBON DIOXIDE (CO2)

5307.1 General. Carbon dioxide systems with more than 100 pounds (45.4 kg) of carbon dioxide used in beverage dispensing applications shall comply with Sections 5307.2 through 5307.5.2.

5307.2 Permits. Permits shall be required as set forth in Section 105.6.

5307.3 Equipment. The storage, use, and handling of liquid carbon dioxide shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13. Insulated liquid carbon dioxide systems shall have pressure relief devices vented in accordance with NFPA 55.

5307.4 Protection from damage. 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.

5307.5 Required protection. Where carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing carbon dioxide storage tanks, cylinders, piping and fittings and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with Section 5307.5.1 or an emergency alarm system in accordance with Section 5307.5.2.

5307.5.1 Ventilation. Mechanical ventilation shall be in accordance with the International Mechanical Code and shall comply with all of the following:

I. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cubic foot per minute per square foot [0.00508 m³/(s • m²)].

II. Exhaust shall be taken from a point within 12 inches (305 mm) of the floor.

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

5307.5.2 Emergency alarm system. An emergency alarm system shall comply with all of the following:

I. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.

II. The threshold for activation of an alarm shall not exceed 5,000 parts per million (9,000 mg/m³).

III. 15,000 PPM – Latching Alarm. Notification for employees only in approved locations. Requires a service company to investigate, repair and reset.

IV. 30,000 PPM – Latching Alarm. Initiate amber strobes and audible horns provided in the vicinity of each interior storage container, cylinder or tank and at each point of use.

V. The notification devices shall be rated a minimum of 80cd for a visible effect and 75 dBA for an audible effect and shall be mounted per NFPA 72 requirements.

VI. Activation of automatic system shutoff valve

VII. Evacuate room/area and call 911

Activation of the emergency alarm system shall initiate a local alarm within the room or area in which the system is installed.
Required inspections and testing. All piping installations shall be tested and inspected as follows:

1. Acceptance testing. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage and detectors have been tested by a qualified service company. All piping installations shall be visually inspected and pressure tested prior to initial operation. The test pressure downstream of the pressure regulator shall be not less than 110% of the operating pressure. Joints shall be checked with a bubble-forming solution. Acceptance testing is required to be witnessed by Fire Code Officials.

2. Daily inspections. All detectors and alarms shall be visibly inspected daily. These inspections are permitted to be conducted by trained employees.

3. Monthly inspections. All storage vessels, piping, and appurtenances shall be visibly inspected monthly. These inspections are permitted to be conducted by trained employees.

4. Semi-annual inspections. Systems shall be visually inspected, gas detectors calibrated per manufacturer specification, alarms tested, and tested for leaks semi-annually by a qualified service company.

5. Alterations and repair. In the event alterations, repairs or additions are made, the affected piping shall be retested.

6. Calibration. Detectors shall be checked for accuracy, calibrated to a reference gas concentration, and span reset.

7. Pressure testing. Pipe joints shall be exposed for examination during the test.

8. Test medium. The test medium shall be air, nitrogen, carbon dioxide, or an inert gas.

9. Section testing. Piping systems shall be permitted to be tested as a complete unit or in sections. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve-closing mechanism, is designed to safely withstand the test pressure.

10. Regulators and valve assemblies. Regulator and valve assemblies fabricated independently of the piping systems in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication. Test records shall be maintained.

11. Test preparation. All joints and fittings shall be exposed for examination during and after the test.

12. Pipe clearing. Prior to testing, the interior of the pipe shall be cleared of all foreign material.

13. Appliance and equipment isolation. Appliances and equipment that are not to be included in the test shall be isolated from the piping by closing the appliance shutoff valve.
14. Test pressure measurement. Test pressure shall be measured with a pressure-measuring device designed and calibrated to read, record or indicate a pressure loss caused by leakage during the pressure test period. The source of pressure shall be isolated before the pressure tests are made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than five times the test pressure.

15. Test pressure. The test pressure downstream of the pressure regulator shall be not less than 110% of the operating pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe or tubing. Pressures shall be adjusted smoothly and slowly to avoid pressure spikes.

16. Test duration. The test duration shall be not less than 10 minutes.

17. Visual inspection and cleaning. After testing is complete and the pressure is reduced to at or below operating pressure, all joints shall be cleaned of bubble forming solution and visually inspected.

18. Detection of leaks and defects. The piping system shall withstand the test pressure specified without showing any evidence of leakage or other defects. Any reduction of test pressures as indicated by pressure gauges shall be deemed to indicate the presence of a leak.

19. Corrections. Where leakage or other defects are located, the affected portion of the piping system shall be repaired or replaced and retested.

5307.8 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.
CARBON DIOXIDE (CO2) SYSTEMS USED IN BEVERAGE DISPENSING APPLICATIONS PERMIT APPLICATION

THIS FORM SHALL BE COMPLETED AND SIGNED BY BUSINESS OWNER OR A REPRESENTATIVE OF THE PROPERTY OWNER APPLYING FOR THE PERMIT(S).

PLEASE MAKE CHECKS PAYABLE TO THE CITY OF KELLER

NAME OF BUSINESS:________________________________________________________

MAILING ADDRESS:________________________________________ CITY________ STATE____ ZIP_____

PERMIT SITE ADDRESS:___________________________________________________________KELLER, 76248

CONTACT NAME:_______________________________________________________________

CONTACT PHONE NUMBER:____________________ E-MAIL:______________________________

GAS SUPPLY COMPANY NAME:____________________________________________________

COMPANY PHONE NUMBER:____________________ E-MAIL:______________________________

TYPE OF CO2 STORAGE CONTAINER(S):______________________________________________

TOTAL QUANTITY OF CO2 GAS ON SITE:____________________________________________

LOCATION OF CO2 GAS STORAGE (PROVIDE DIAGRAM): # OF AREAS

________________________

________________________

(CHECK ALL THAT APPLY)

INDOOR____ OUTDOOR____ ENCLOSED ROOM_____ ABOVE GRADE_____ BELOW GRADE_____

NUMBER AND DESCRIPTION OF POINTS OF USE (PROVIDE FLOOR PLAN)

____________________________________________________________________________

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I UNDERSTAND THAT KELLER FIRE-RESCUE PREVENTION DIVISION PERSONNEL WILL CONDUCT A SITE INSPECTION, AND IF THE INSTALLATION DOES NOT COMPLY WITH THE FIRE CODE, THE PERMIT MAY BE REVOKED WITHOUT A REFUND.

SIGNATURE:_________________________________________________________ DATE:_________