

1. GENERAL SPECIFICATION

- 1.1 An Engineered Carbon Dioxide Fire Suppression System shall be installed to meet a minimum design concentration of ___%, by volume in all designated spaces/areas to be protected.
- 1.2 The system shall be meet the design criteria for either total flooding or local application in accordance with the documents listed in section 2.

2. CODES/STANDARDS COMPLIANCE

- 2.1 The design, installation, testing and maintenance of the above stated Engineered Carbon Dioxide Fire Suppression System shall be in accordance to the following codes, standards and regulatory bodies:
 - A. NFPA 12 – Standard for Carbon Dioxide Fire Extinguishing Systems – 2005 edition.
 - B. Factory Mutual Approval Guide
 - C. ANSI B1.20.1 – Standard for pipe threads, General Purpose, 1992
 - D. ANSI B31.1 – Power Piping Code
 - E. NFPA 70 - NEC – National Electrical Code
 - F. NFPA 72 – National Fire Alarm Code
 - G. NFPA 72E – Standard for Automatic Fire Detectors
 - H. Design and installation practices set forth by system manufacturer
 - I. Requirements of the Local Authorities Having Jurisdiction (AHJ)
- 2.2 The Fire suppression system, at a minimum, must have the following listings and approvals:
 - A. FM Approved – Factory Mutual Research Center
 - B. UL Listed – Underwriters Laboratories, Inc.
- 2.3 The manufacturer shall meet ISO 9001 requirements for the design, production and distribution of the Carbon Dioxide fire suppression systems.

3. SYSTEM DESCRIPTION

- 3.1 All Carbon Dioxide Engineered Fire Suppression System equipment and accessories must be manufactured by:

Kidde Fire Systems
400 Main Street
Ashland, MA 01721
U.S.A.
phone: (508) 881-2000
URL: <http://www.kiddefiresystems.com>

- 3.2 The manufacturer shall warrant all Engineered Carbon Dioxide Fire Suppression System products for 36 months from date of shipment or one (1) full year from the date of installation.
- 3.3 The system shall be supplied and installed by a factory-authorized, Kidde Fire Systems distributor. The distributor / Installer shall be trained by the manufacturer to calculate / design, install, test and maintain the Engineered Carbon Dioxide Fire Suppression System and shall be able to produce a certificate stating such on request.
- 3.4 The systems design can be total flood or local application. Total flooding applications shall be designed to meet a minimum design concentration of 34% v/v. Higher design concentrations shall be used where appropriate.
- 3.5 Total flood systems shall be installed in operating conditions where the ambient temperature is not less than 0°F and does not exceed 130°F.
- 3.6 Local Application systems shall be installed in operating conditions where the ambient temperature is not less than 32°F and does not exceed 120°F.
- 3.7 The Engineered Carbon Dioxide System shall consist of the following mechanical components: Agent Cylinders, Actuation Hardware, Cylinder Mounting Hardware, Pressure Operated Ancillaries, Check/Stop Valves and Distribution Nozzles.

- 3.8 Where applicable the Engineered Carbon Dioxide System shall also include the following electrical components: Fire Alarm-Suppression Control Panel, Detection System consisting of Smoke and/or Heat Detectors, Manual Release Station(s), Audio-Visual Notification Appliances. Abort Stations shall not be used.

4. COMPONENTS

- 4.1 The contractor shall supply the mechanical elements of the Engineered Carbon Dioxide System that shall consist of the following components:
- A. Kidde Carbon Dioxide Storage Cylinder(s).
 - 1. The Carbon Dioxide agent shall be stored as liquid under-pressure in seamless steel containers manufactured to DOT3A - 2015 or DOT3AA - 2300 standard. The fill pressure shall be not less than 850psi at 70⁰F. Cylinders shall have a stated capacity of 25, 35, 50, 75 or 100-lbs of Carbon Dioxide. Cylinders shall not be charged in excess of 68% of their water capacity.
 - B. Kidde Carbon Dioxide Cylinder Valve(s).
 - 1. Cylinders of 25, 35 and 50-lb capacity shall be fitted with a ½” discharge valve and a bent siphon tube to facilitate horizontal installation. Cylinders of 75 and 100-lb capacity shall be fitted with a 5/8” discharge valve and straight siphon tube. The cylinder valve shall be fitted with a safety relief device designed to relieve pressure in accordance with US DOT requirements (reference CGA S-1.1). Cylinders shall be shipped with a steel protection cap installed over the valve and securely threaded to the cylinder neck.

C. Kidde Actuation Hardware**1. Cylinder Discharge Head.**

- ◆ The discharge valve shall accept the installation of Kidde discharge heads that facilitate; the operation of the valve; transport of the agent into the pipework and operate as check valves when disconnected from the cylinder valve. Two variations of the discharge head shall be available. The plain nut discharge head, P/N 872450 shall allow manifold pressure to discharge the cylinder. The grooved nut discharge head, P/N 872442 shall not allow manifold pressure to discharge the cylinder. Removal of the discharge head shall prevent cylinder discharge

2. Cylinder Valve Actuators (Control Heads).

- ◆ The Cylinder valve shall accept the installation of Kidde Control Heads. Electric/manual, Electric, Electric/cable, Cable/manual, Pneumatic and Manual only control heads may be used. Control heads must be designed for use on Kidde Carbon Dioxide discharge valves. Where the system is located in a Hazardous environment that requires electrical equipment to meet class I Div 1 Grps C & D/ Class II Div 1 E, F & G electric control heads P/N 81-100000-001 or P/N 897494 shall be used.

D. Kidde Cylinder Straps or Racking

1. Cylinders shall be mounted securely using single or double hoop straps at the manufacturers specified height. (OPTIONAL) Framing kits shall be used where multiple rows of cylinders are required or where additional structural support is required.

E. Kidde Check, Stop and Isolation Valves**1. Check Valves**

- ◆ Where main and reserve agent storage containers are connected into the discharge manifold check valves must be installed to ensure the reserve bank does not actuate upon main bank discharge.

2. Stop Valves

- ◆ Where agent is to be distributed to one of two or more areas, directional control is to be achieved using Kidde stop valves fitted with Kidde control heads.

3. Isolation Valves

- ◆ An isolation valve must be provided space to prevent discharge on or in to an occupiable hazard. The valve shall be operable by a local manual control and shall prevent discharge during access or maintenance in the hazard location. A Kidde isolation valve or stop valve shall be used for this purpose. The valve shall be capable of being monitored for open and closed positions.

F. Kidde Pressure Operated System Ancillaries**1. Pressure Switches**

- ◆ Release of extinguishant shall be evidenced by the operation of a discharge pressure switch that shall provide visual indication and shall allow the connection of up to three electrical circuits for equipment shutdown and alarm notification. Where the equipment is installed in a class I, grp D hazardous location P/N 981332 shall be used.

2. Pressure Trips

- ◆ Where the control of equipment in the hazard is to be achieved mechanically as a result of the discharge of carbon dioxide, a pressure trip P/N 874290 shall be used. The load applied to the unit shall not exceed 100-lb.

G. Kidde Agent Distribution Nozzles

1. Nozzles shall be supplied with orifice coding in accordance with NFPA 12. The orifice codes shall be determined by computer hydraulic flow calculation software. Only software approved by the system manufacturer shall be acceptable.
2. Nozzles shall be selected to provide the correct phase and distribution of agent according to the system design requirements.
3. Nozzles shall be manufactured from brass and/or steel. Steel parts shall be painted or zinc plated to provide corrosion resistance.
4. Nozzles with orifices smaller than N5 shall be fitted with a strainer to prevent nozzle clogging
5. The contractor shall supply, where relevant code and the AHJ require, a complete Fire Alarm-Suppression Control System designed to operate with the Kidde Engineered Carbon Dioxide System. Kidde Fire Systems shall manufacture all components of the detection and alarm system.

H. Pipe Network

1. Distribution piping, fittings and hangers shall be installed in accordance with NFPA 12, approved piping standards and the Kidde Engineered Carbon Dioxide Fire Suppression System Manual.

5. SUBMITTALS

5.1 Engineered Design Drawings

- A. The factory-authorized Kidde Fire Systems Distributor shall provide all required installation drawings per NFPA 12.

5.2 Flow Calculation Reports

- A. The contractor shall provide the following information in the flow calculation report.
 - 1. Customer Information and Project Data
 - 2. Enclosure Information – at a minimum enclosure information is to include Minimum and adjusted design concentrations, Minimum and maximum enclosure temperatures, minimum agent required and volume of enclosures, including non-permeable volume if applicable.
 - 3. Agent information – at a minimum agent information is to include Cylinder size and part number, quantity of cylinders, main and / or reserve cylinders, pipe take off direction and the floor loading for agent cylinder.
 - 4. Pipe network information – at a minimum pipe network information is to include pipe type, pipe diameter, pipe length, change in direction or elevation, pipe equivalent length and any added accessory equivalent length. In addition, the following nozzle information shall be provided; number of nozzles and identification of enclosure location, flow rate of associated nozzle, nozzle nominal size, nozzle type and nozzle orifice code.
 - 5. Detailed list of all Pipes and Pipe Fittings designed in the pipe network

5.3 Commissioning Equipment List

- A. The contractor shall provide a commissioning equipment list for each installed Carbon Dioxide Fire Suppression System. The equipment list shall identify all installed equipment and configurations.

5.4 Test Plan

- A. The contractor / Installer shall submit a test plan which describes how the system equipment and room integrity shall be tested. This shall include a step-by-step description of all tests and shall indicate type and location of test apparatus to be used. At a minimum, the tests to be conducted shall be per NFPA 12 and any additional supplemental tests required by the AHJ. Tests shall not be scheduled or conducted until the engineer of record approves the test plan.

5.5 Installation Drawings

- A. Four (4) sets of installation drawings for each installed Carbon Dioxide Fire Suppression System and One (1) set of the calculation report, owners manual and product data sheets shall be submitted to the end-user / owner.

- B. Upon completion of installation and commissioning acceptance, two (2) sets of “As-Built” installation drawings and One (1) set of the calculation report for each installed Carbon Dioxide Fire Suppression System shall be given to the owner / end-user for use and reference.

5.6 Operation and Maintenance Manuals

- A. Two (2) copies of the Kidde Carbon Dioxide Fire Suppression System, Operation and Maintenance Manual shall be submitted after complete installation.

6. SYSTEM INSTALLATION AND COMMISSIONING

6.1 Carbon Dioxide Fire Suppression System Equipment

- A. The contractor shall install the system in accordance with the manufacturer’s installation, operation and maintenance manual.

6.2 Training Requirements

- A. The contractor shall be certified and trained by the manufacturer on installation, design and maintenance of the Kidde Engineered Carbon Dioxide Fire Suppression System.

6.3 Commissioning

- A. The commissioning agent shall verify that the system has been designed and installed in accordance with the specifications detailed in the codes, standards and documentation as listed in section 2.
- B. All signage, safety training instruction and on-site documentation shall be reviewed prior to system testing.
- C. The commissioning agent shall verify that the that the system is in operable condition by performing a controlled discharge test
- D. Commissioning shall not be completed until the system can be left in a (re)charged ‘live’ condition.

6.4 Routine Maintenance

- A. Routine maintenance and inspection shall be performed as recommended by the manufacturer’s installation, operation and maintenance manual. Inspection shall be carried out at least every 30 days in accordance with NFPA 12: 2000 edition. At a minimum the routine maintenance will include the following:
 - 1. Verification of system operability.

2. Visual Check of Pipe network and distribution nozzles
3. Charge mass verification of all Carbon Dioxide cylinder(s)
4. Inspection of all cylinders and equipment for damage, corrosion or tampering.