

**SECTION 15360
CARBON DIOXIDE EXTINGUISHING SYSTEMS**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Carbon Dioxide Fire Suppression System

Suitable for hazard areas such as printing presses, vaults, open pits, dip tanks, spray booths, ovens, engine rooms, coating machines, process equipment, hoods and ducts, flammable gas or liquid storage areas, computer rooms/subfloors, generators and other similar areas.

B. Related Sections:

1. Section 13900 – Fire Suppression and Supervisory Systems
2. Section 16720 – Fire Alarm and Detection Systems

1.02 REFERENCES

A. National Fire Protection Association (NFPA):

1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems
2. NFPA 70 – National Electrical Code
3. NFPA 72 – Standard for Protective Signaling Systems
4. NFPA 72E – Standard for Automatic Fire Detectors
5. ANSI B31.1 – Power Piping Code

B. Underwriters Laboratories, Inc. (UL) – Fire Protection Equipment Directory

C. Factory Mutual Insurance (FM) Approval Guide

1.03 SYSTEM DESCRIPTION

A. Hazard:

1. The carbon dioxide fire suppression system shall protect the following hazard(s).

2. A high pressure carbon dioxide fire suppression system shall provide for extinguishment if a fire condition should occur within the hazard area(s).

B. Design Requirements:

1. System shall be designed in accordance with all applicable requirements of NFPA Standard No. 12.
2. System shall be designed for [total flooding] [local application] requirements.
3. System shall utilize a fixed nozzle agent distribution network.
4. System shall be capable of automatic detection and [automatic] [manual] actuation.

C. Performance Requirements:

1. System shall be capable of extinguishing fires in Class A, B and C hazards.
2. CO₂ agent shall dilute the oxygen content of the protected hazard to a point where it will not support combustion.
3. Detection system shall be tested to all applicable FCC rules and regulations for Class “A” computing devices.

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1.04 SUBMITTALS

- A. Product Data: Submit product data under the provisions of Section [01300.] [01340.]
- B. Shop Drawings: Submit drawings under the provisions of Section [01300.] [01340.]
- C. Quality Control Submittals:
 - 1. Design Data: Submit design calculations under the provisions of Section [01300.] [01340.]
 - 2. Manufacturer's Instructions: Submit manufacturer's instructions for system maintenance and recharge under provisions of Section [01300.] [01360.] [01700.] [01730.]

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: The manufacturer of the system components shall have a minimum of 10 years experience in the manufacture and design of specialized fire suppression systems and related fire detection and control equipment.
 - 2. Installer: The installer shall be authorized and trained by the manufacturer to design, install and maintain carbon dioxide fire suppression systems.
- B. Regulatory Requirements:
 - 1. Conform to [applicable] [____] building code for requirements specified herein.
 - 2. Codes and Permits: Conform to the local code requirements applicable to this section. Obtain and pay any necessary permits prior to beginning work involved in this section.
 - 3. All system components must be U.L. listed.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Job Site:
 - 1. Deliver materials to job site in sealed, original containers bearing the manufacturer's labels.
 - 2. Materials arriving at the job site without labels, opened or damaged shall not be accepted for use.
- B. Storage and Protection:
 - 1. Store, protect and handle products at the job site under provision of Section [01600.] [____].
 - 2. Materials shall be stored in a well ventilated area at temperatures between 32°F and 130°F (0°C and 54°C).

1.07 SCHEDULING

- A. Coordinate work performed under this section with work specified in Section [13900.] [16720.] [____].

1.08 MAINTENANCE

- A. Maintenance Service: Shall be provided by an authorized, factory trained representative in accordance with the manufacturer's recommendations.

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PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturer: Fike Protection Systems, Inc., 704 South 10th Street, Blue Springs, MO 64015

2.02 MECHANICAL COMPONENTS

- A. CO₂ Agent:
1. A clean, dry, non-corrosive, non-damaging, non-deteriorating chemical meeting the requirements outlined in Section 1-9.2 of NFPA Standard No. 12.
- B. Cylinder:
1. Constructed, tested and marked in accordance with all applicable Department of Transportation (DOT) specifications for 3AA seamless steel cylinders.
- C. Cylinder Assembly:
1. Seamless steel construction with a red enamel or epoxy finish available in 50 lb., 75 lb. and 100 lb. sizes and equipped with pressure differential type Fike discharge valve.
 2. Valve constructed of brass and anodized aluminum capable of withstanding a maximum pressure of 6,000 psi.
 3. Valve to accommodate a "straight-through" discharge without any directional changes for maximum discharge efficiency.
 4. Valve to contain a safety pressure relief device that provides relief at 2,650 to 3,000 psi (18,269 to 20,682 kPa).
 5. Cylinder charging pressure to be a minimum of 850 psi at 70°F (5,861 kPa at 21°C) with a filling density of not more than 68% of its water capacity.
 6. Cylinder shipped with maintenance record card and shipping cap attached.
 7. Cylinder serial number, full and empty weight capacities and part number recorded on a cylinder identification label attached to the cylinder.
- D. Solenoid Actuator:
1. Electrical actuation of agent cylinder to be accomplished by an electric solenoid actuator interfaced through a compatible control panel by the system manufacturer.
 2. The actuator must be capable of being used in [hazardous] [non-hazardous] environments where ambient temperature range is between 32°F and 130°F (0°C and 54°C).
 3. The actuator shall not require a special rearming tool to reset the actuator after operation.
- E. Manual Actuator:
1. Manual actuation of the system shall be accomplished by pulling the hand lever on the actuator. A manual actuator must be provided when the solenoid actuator does not include a manual operator.
- F. Cylinder Straps and Racking:
1. Cylinder straps shall be supplied for all single cylinder systems as a minimum. Straps may be used on any number of cylinders.
 2. Cylinder racking shall be supplied for multiple cylinder systems. Racking shall be available in single row, double row and back-to-back arrangements.
 3. Provisions for weighing the cylinders in place shall be made available as an option for all racking configurations.
- G. Check Valves:
1. Check valves shall be provided on all systems utilizing a connected reserve supply. This prevents the reserve bank of cylinders from being activated when the main bank discharges.
 2. The check valve shall be constructed of [brass] [stainless steel] and capable of withstanding pressures of up to 5,000 psi.

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3. The check valve shall be of an "inline flow" design for minimal flow restriction during discharge.
- H. Stop/Maintenance Valve:
1. A Stop/Maintenance Valve shall be included on each system to provide a manual shut-off means for the system during maintenance operations. The Stop/Maintenance Valve will prevent the discharge of CO₂ from the nozzles, thus providing fail-safe protection for the service technician.
 2. Stop Valves shall be constructed of stainless steel and be capable of withstanding pressures of up to 5,000 psi.
 3. Valve shall have a U.L. listed limit switch as part of the assembly to annunciate a trouble signal to the control panels whenever the valve is closed.
 4. Valve handle shall be lockable in either the open or closed positions for security purposes.
- I. Nozzles:
1. Designed to direct the discharge of carbon dioxide in a liquid or gaseous state.
 2. Orifice size to be determined by a computerized hydraulic calculation based on flow rate and the system design requirements.
 3. Nozzles to be constructed of natural brass or zinc plated aluminum for maximum corrosion resistance.
 4. Nozzles to be equipped with flange mounting kits and sealing discs where necessary.
- J. Distribution Piping:
1. Piping to meet the requirements of ASTM [A53] [A106] specifications.
 2. Distribution lines up to ¾ in. diameter shall be Schedule 40 seamless steel [black] [galvanized] pipe.
 3. Distribution lines larger than ¾ in. diameter shall be Schedule 80 seamless steel [black] [galvanized] pipe.
 4. For pipe sizes up to 2 in. diameter, Class 300 [malleable] [ductile] iron fittings shall be used. For pipe larger than 2 in. diameter, IPS and forged steel fittings shall be used.

2.03 ELECTRICAL COMPONENTS

- A. Detection System, Single Zone:
1. The control panel used shall be a Fike model SHP P/N 10-051-X-X or Rhino P/N 10-2161-X where an automatic control system is required to activate the fixed carbon dioxide system.
 2. The control system is used to operate a *single* fixed fire suppression or alarm system based on inputs received from approved detection devices.
 3. Detection circuits to be configured using cross-zone, verified detection or single input release concepts.
 4. System shall have an adjustable pre-discharge time delay circuit to allow evacuation of the protected area prior to the discharge of carbon dioxide.
 5. System shall be U.L. listed and F.M. approved and shall comply with all requirements of NFPA Standards 12, 71, 72A and 72D.
- B. Detection System, Multi-Zone:
1. The control system used shall be a Fike INTELLA-SCAN II or Cheetah multi-zone control system where an automatic system is required to activate and coordinate multiple zones of fixed carbon dioxide systems.
 2. All inputs shall be analog or addressable; configured as cross-zone, verified detection or single input release concepts.
 3. System shall have an adjustable pre-discharge time delay circuit to allow evacuation of the protected area prior to the discharge of carbon dioxide.
 4. System shall be microprocessor based and field programmable using a computer/software interface.
 5. System shall be capable of remote site status reporting via fiber-optic or modem communication means.
 6. System shall be capable of providing addressable output functions.
 7. System shall be U.L. listed and F.M. approved and shall comply with all requirements of NFPA Standards 12, 71, 72A and 72D.

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PART 3 EXECUTION

3.01 INSTALLATION

- A. The contractor shall install the system in accordance with the manufacturer's design, installation, recharge and maintenance instructions by a factory trained and authorized distributor.
- B. The system shall be installed in accordance with all applicable NFPA 12 requirements.

3.02 EXAMINATION

- A. Verification of Conditions: The contractor shall verify that the hazard is being protected by a carbon dioxide system that meets the requirements of NFPA 12.
- B. Functional Testing:
 - 1. After system installation is complete, a functional test of the control devices shall be performed without actually firing the cylinder(s).
 - 2. Verification of all system auxiliary functions shall be made.
 - 3. A thorough inspection of the distribution piping, supports and nozzles shall be made.

3.03 FIELD TESTING

- A. Field testing of the system shall be conducted by personnel that are trained and authorized by the system manufacturer.

Field testing can be waived by the authority having jurisdiction. Delete Article 3.03 if testing is not required.

3.04 TRAINING

- A. Instruct the owner's personnel in the operation of the [equipment] [system] under the provisions of Section [01670.] [_____.]