Mini-Bulk Low Pressure Carbon Dioxide (CO_2) Fire Suppression System

Features

- Factory Mutual (FM) Approved
- CO_2 storage tanks available in 1,500 lb (680.4 kg) capacities
- Hydraulic flow program for piping design
- The ASME coded inner vessel does not require regular intervals of hydrostatic testing
- Design allows tanks to be filled in place
- Liquid level and pressure gauges allow in-place service, eliminating the need to weigh individual cylinders

Applications

The following are typical hazards protected by carbon dioxide systems:

- Printing presses
- Transformer vaults/electrical cabinets
- Open pits
- Dip tanks
- Rolling mills
- Ovens
- Coating machines
- Process equipment
- Exhaust and fume handling systems
- Flammable gas or liquid storage areas
- Generators
- Inerting applications

Description

The ANSUL® Mini-Bulk CO_2 Fire Suppression System was developed to provide an alternative to manifolding high pressure cylinders. The tanks are configured vertically to save valuable floor space. In applications where floor loading is of concern, Mini-Bulk tanks offer a significant reduction in lb/ft^2 (kg/m^2) when compared to multiple high pressure cylinders with the same total CO_2 capacity.

The Mini-Bulk tanks are available in capacities of 1,500 lb (680.4 kg). The tanks can be arranged as single tank, main and reserve, or manifolded together to provide additional storage capacity.

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The Mini-Bulk Low Pressure CO_2 Fire Suppression System is designed to meet the requirements of NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*. The system consists of a low pressure storage tank, discharge valves, manual and automatic controls, distribution nozzles, alarms, indicators, and supervisory devices as required to maintain a supply of carbon dioxide in a discharge-ready state, and to provide effective distribution of agent on demand.

The low pressure mini-bulk tank stores liquid CO_2 in an ASME coded pressure vessel which is equipped with a refrigeration system. The pressure within the vessel is kept near 300 psi (20.7 bar) by maintaining the internal temperature at approximately 0 °F (–18 °C). Distribution of CO_2 is accomplished through selector valves or a hand-hose line arrangement. A selector valve arrangement is commonly used when multiple hazards are protected from a common supply manifold that is located in close proximity to the storage unit. Hand-hose lines can also be supplied from a separate low pressure storage unit. The hand hose line has its own operating selector valve.

The carbon dioxide is distributed to the protected space through a piping network and discharge nozzles that are sized in accordance with the ANSUL® Mini-Bulk Flow Calculation software. The type of nozzles used depends upon the specific flow and distribution requirements of each application.

Valve control is accomplished through electro-pneumatic or manual means. Each selector valve assembly consists of a ball valve, a spring return pneumatic valve operator, and an electrically-operated solenoid valve. A UL Listed and FM Approved releasing control panel is used to provide automatic detection and control.

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 | Form No. F-96161-08

Description (Continued)

CO_2 vapor from the storage container is regulated to approximately 100 psi ±20 (6.9 bar ±1.4) and piped to the inlet of the electrically-operated solenoid valve. While the discharge valve is in stand-by mode, the valve is closed to contain the pressure within the tank. Upon receipt of an electrical actuation signal from the releasing panel, the solenoid valve operates, opening the selector valve and allowing the CO_2 agent to flow into the protected area. When the discharge timing cycle is complete, the electrical actuation signal is removed. Deactivation of the actuation signal returns the selector valve to its stand-by position.

Component Description

Low Pressure CO_2 Storage Tank: The low pressure storage tank consists of a pressure vessel built to Section VIII, Division 1 of the ASME Code for Unfired Pressure Vessels. The storage tank is available in a size of 1,500 lb (680.4 kg) capacity. The pressure vessel has piping for filling and for supplying CO_2 vapor to the system controls. The vessel also has a large dip tube outlet for discharging CO_2 into the protected hazard. The tanks are insulated with 4 in. (102 mm) of polyurethane foam insulating medium.

The pressure vessel is equipped with a safety relief valve in accordance with ASME requirements.

In the upper part of the pressure vessel, refrigerant evaporator coils serve to cool the stored CO_2. A refrigeration unit supplies low pressure refrigerant to the evaporator coils inside the pressure vessel. The refrigeration extracts heat from the CO_2 vapor which surrounds the coils. The refrigeration compressor cycle is controlled by a pressure switch which monitors the pressure of the CO_2 within the pressure vessel. The refrigeration compressor turns on when the CO_2 pressure reaches approximately 305 psi (21.0 bar). When the pressure of the CO_2 inside the tank is lowered to approximately 295 psi (20.3 bar), the refrigeration cycle ends.

When multiple tanks are manifolded together, in-line check valves are added to the system to prevent gas flow if a tank is disconnected from the manifold.

CO_2 Agent: Carbon dioxide is an effective fire suppressing agent that can be used on many types of fires. It is effective for surface fires, such as flammable liquids and most solid combustible materials. It expands at a ratio of 450 to 1 by volume. For fire suppression purposes, the discharge is designed to raise the carbon dioxide concentration in the hazard. This displaces the air, which contains oxygen that supports combustion, and results in fire suppression. Other attributes are its high degree of effectiveness, its excellent thermal stability, and its freedom from deterioration. It is electrically non-conductive, and leaves no residue to clean up after discharge.

⚠ WARNING

Due to the method of suppression, personnel occupying areas protected by carbon dioxide systems must be evacuated prior to system discharge. For this reason, discharge time delays and alarms are mandatory for occupied hazards. Failure to do this could lead to **serious personal injury or death**.

Nozzles: Nozzles are designed to direct the discharge of CO_2 in the hazard area. The system design specifies the orifice size to be used for proper flow rate and distribution pattern. The nozzle selection depends on the hazard and location to be protected. Standard nozzles are painted red or are natural brass, depending on the type. All are corrosion resistant.

Distribution Valves: Valves which control the discharge of CO_2 into the protected spaces can be arranged in one of two configurations: master and selector, or selector. Operation of the valves is done pneumatically, electro-pneumatically, or manually.

Master and Selector: There are two discharge valves in the flow path between the low pressure storage unit outlet and the discharge nozzles. Starting from the storage unit, the first valve is the master valve. The valve downstream of the master valve is the selector valve. In most master and selector valve systems, one master valve will serve several selector valves. The advantage to this type of configuration is that it permits installing a single pipe from the storage unit to several distant hazards. The savings in installation cost by installing a single pipe rather than multiple individual pipes may more than offset the cost of the master valve and controls.

Selector: There is a single selector valve in the flow path between the low pressure storage unit outlet and the discharge nozzles. This configuration is typically used to protect multiple hazards which are 1) close to the low pressure storage unit and 2) widely separated from other protected hazards. Cost of the equipment is less than that of a master and selector arrangement, but installation may be greater if several large diameter pipe runs must be installed from the low pressure storage unit to the hazards.

Hose Reels: In addition to the fixed pipe systems, hose reels can be utilized with a low pressure storage unit. Hose reels consist of a corrosion-resistant painted reel. Several different lengths of 1 in. (25 mm) hose are available.

Approvals

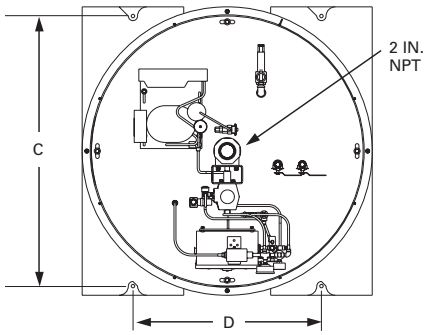
ANSUL® Low Pressure Carbon Dioxide Systems are designed to meet the requirements of NFPA 12 *Standard on Carbon Dioxide Extinguishing Systems*. They are FM Approved.

Ordering Information

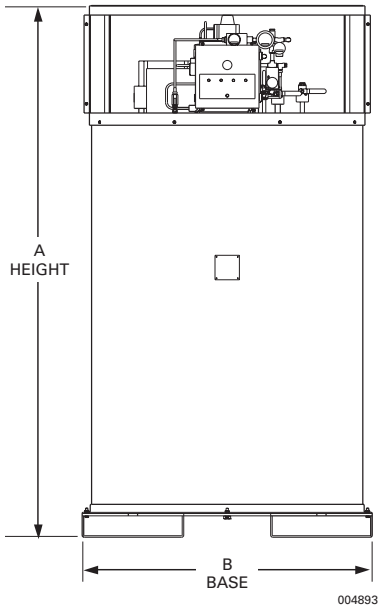
Order all system components through your Authorized ANSUL® Distributor who carries the ANSUL® Low Pressure CO_2 System product line.

Dimensional Information

Top View



Side View



Dimensions					
Tank Size	**Part No.**	**A – Height**	**B – Base**	**C**	**D**
1,500 lb (680 kg)	422985	86 in. (2,184 mm)	47 1/8 in. (1,197 mm)	45 5/8 in. (1,159 mm)	30 5/8 in. (778 mm)

Note: The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.