ANSUL

A Tyco International Company

MINI-BULK LOW PRESSURE CARBON DIOXIDE FIRE SUPPRESSION SYSTEM

Data/Specifications

FEATURES

- FM Approved
- CO_2 storage tanks available in 1000 and 1500 lb (454 and 680 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

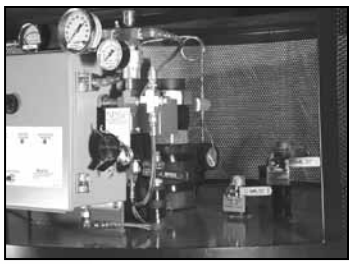
DESCRIPTION

The ANSUL® Mini-Bulk 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 1000 lb (454 kg) and 1500 lb (680 kg). The tanks can be arranged as single tank, main and reserve, or manifolded together to provide additional storage capacity.

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.

002416



004985

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). A pneumatically operated discharge valve, which is used to isolate the supply from the distribution network, is part of the tank hardware. Distribution of CO_2 is accomplished through the discharge valve, selector valve(s) 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 discharge valve.

The extinguishing agent is distributed to the protected space through a piping network and discharge nozzles that are sized in accordance with computerized flow and distribution calculations. 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 discharge valve assembly consists of a ball valve, a spring return pneumatic valve operator, an electrically operated solenoid valve, a time delay, and a manual override release button for emergency actuation. A UL listed/approved releasing control panel is used to provide automatic detection and control.

CO_2 vapor from the storage container is regulated to approximately 100 ± 20 psi (6.9 ± 1.4 bar) and piped to the inlet of the solenoid valve. While the discharge valve is in stand-by mode, the valve is closed to contain the pressure within the tank. Upon actuation of the solenoid valve, pressure enters the pneumatic actuator and fully opens the valve, permitting CO_2 to discharge.

SPECIFICATIONS

1.0 GENERAL

1.1 References

1.1.1 Factory Mutual (FM)

1.1.2 National Fire Protection Association (NFPA)
1.1.2.1 NFPA Standard 12

1.2 Submittals

1.2.1 Submit two sets of manufacturer's component sheets

1.2.2 Submit two sets of piping design drawings

1.3 System Description

1.3.1 The system shall be an automatic fire suppression system using low pressure carbon dioxide extinguishing agent.

1.3.2 The system shall be capable of suppressing fires in the following industrial related areas: 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, and Inerting Applications.

1.3.3 The system shall be FM approved and of the engineered type with guidelines established by the manufacturer and having a computer aided flow program to determine pipe and nozzle requirements.

1.3.4 The basic system shall consist of an agent storage tank, detection and control panel, discharge nozzles, and the necessary discharge and selector valves. Additional components shall be available for shutting down equipment and signalling system discharge.The system shall be fixed nozzle or hose reel type. The system shall be capable of total flooding, local application or hand hose line design.

1.3.5 The system shall be installed and serviced by personnel trained by the manufacturer.

1.4 Quality Control

1.4.1 Manufacturer: The Low Pressure Carbon Dioxide System shall be manufactured by a company with at least ten years of experience in the design and manufacture of engineered fire suppression systems.

1.5 Warranty

1.5.1 The low pressure mini-bulk CO_2 system components shall be warranted for one year from date of delivery.

1.6 Delivery

1.6.1 Packaging: All system components shall be securely packaged to provide protection during shipment.

1.7 Environmental Conditions

1.7.1 The low pressure mini-bulk storage tank shall be capable of operating in a temperature range of 0 °F to +110 °F (–18 °C to +43 °C).

1.7.2 The mini-bulk storage tank shall be located indoors or shall at least be sheltered from direct exposure to outside elements.

2.0 PRODUCT

2.1 Manufacturer

2.1.1 Tyco Fire Protection Products, One Stanton Street, Marinette, WI 54143, Telephone (715) 735-7411.

2.2 Components

2.2.1 CO_2 Agent: The agent shall be a clean, dry, non-corrosive, non-damaging, non-deteriorating chemical. It shall dilute the oxygen content of the protected hazard to a point where it will not support combustion.

2.2.2 Low Pressure CO_2 Storage Tank: The storage unit shall be built to the ASME code for unfired pressure vessels. The unit shall be equipped with all necessary safety relief devices. The refrigeration system shall be capable of maintaining the liquid CO_2 at a storage pressure of 300 psi (20.7 bar).

2.2.3 Valves: Valves shall be capable of operating manually, pneumatically, or electro-pneumatically. They shall be either ball or butterfly design. They shall include a spring return actuator and manual override. Valves with pre-piped pneumatic delay timers shall be provided for all hazards that can endanger personnel as defined by NFPA 12.

2.2.4 Detection System: The detection system shall be listed and approved by UL and FM and approved by the manufacturer for use with the low pressure CO_2 system.

2.2.5 Nozzles: Nozzles shall be designed to direct the discharge of carbon dioxide in a liquid or gaseous state. The orifice size shall be determined by the manufacturer's computerized flow calculation program and based on the flow rate and system design required. Nozzles shall be corrosion resistant and available in natural brass, stainless steel, zinc plated steel, or painted red.

2.2.6 Piping: Distribution and control piping shall meet the requirements stated in the manufacturer's listed installation manual.

3.0 IMPLEMENTATION

3.1 Installation

3.1.1 The Low Pressure Mini-Bulk CO_2 fire suppression system shall be designed, installed, inspected, maintained, and recharged in accordance with the manufacturer's approved instruction manual.

3.1.2 Training: Training shall be conducted by representatives of the manufacturer.

COMPONENT DESCRIPTION

CO_2 Low Pressure 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 sizes of 1000 or 1500 lb (454 or 680 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 valve(s) 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 extinguishing 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.

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.

Control Valves: ANSUL CO_2 valves may be used in various locations in the fire suppression system. Therefore, the valve's name is derived from the location of the valve within the system. The terms "discharge" and "selector" will be used to describe location of the valves in the system. When a single valve is used to control the discharge into a hazard, it is called a discharge valve. The discharge valve controls the flow of carbon dioxide from the storage tank directly to the hazard or to the selector valves. Selector valves control discharge of carbon dioxide to a specific hazard and are located downstream of the discharge valve. Discharge valves are supplied with the system and are located on the storage tank; selector valves are normally located close to the protected hazard. The valves are available as a factory assembled unit complete with valve, brackets, actuator, manual override, solenoid assembly, and are available with pre-piped delay timers for use in protecting normally occupied or occupiable spaces.

DISCHARGE VALVE – An electro-pneumatic actuated ball valve located at the end of the dip tube and maintained in the closed position. Opening this valve provides a discharge of CO_2 from the storage tank.

SELECTOR VALVE – A valve that is located between the discharge valve and the nozzles that controls the flow of carbon dioxide into a specific hazard. When the discharge valve is opened, it will permit carbon dioxide to flow through the system up to the selector valve. Selector valves can also be located on the main header to serve different hazards. Each selector valve remains closed until actuated by its associated control function.

The discharge and selector valves are of the same design, regardless of their use in the system. The valves consist of ball valves in 1/2 in. through 2 in. sizes and butterfly valves in 3 in. through 4 in. sizes. The valve actuators are of the "fail-safe" design whereby loss of actuation pressure will not cause the valves to open. The valves are also equipped with a manual override that will open them in the event they fail to operate under normal conditions.

The 350 psi (24.1 bar) safety relief valve(s) must be installed in any closed section of pipe between Mini-Bulk discharge valve(s) and associated selector valve(s).

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.

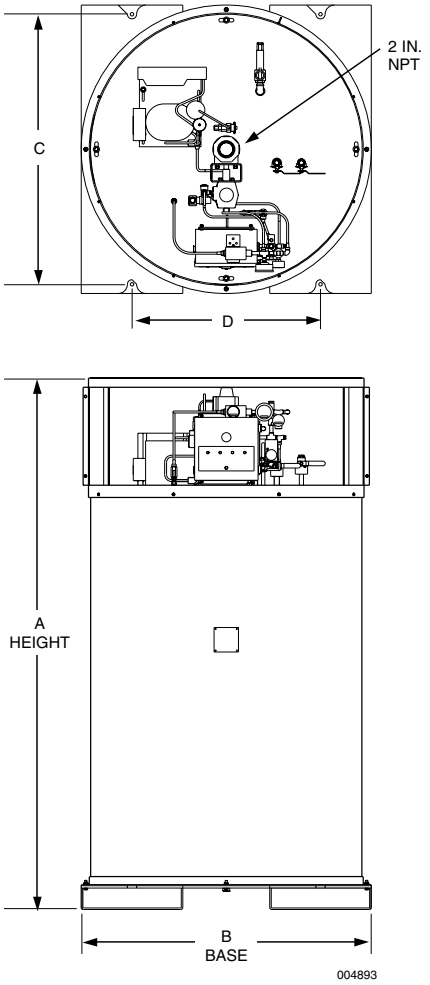
APPROVALS

ANSUL Low Pressure Carbon Dioxide Systems are designed to meet the requirements of NFPA 12 "Standard on Carbon Dioxide Extinguishing Systems." They are Factory Mutual Approved.

ORDERING INFORMATION

Order all system components through your local ANSUL Distributor authorized to support the ANSUL Low Pressure CO_2 product line.

DIMENSIONAL INFORMATION



Dimensions					
Tank Size	**Part No.**	**A – Height**	**B – Base**	**C**	**D**
1,000 lb (454 kg)	422986	86 in. (2184 mm)	39 1/8 in. (994 mm)	36 1/8 in. (918 mm)	22 5/8 in. (575 mm)
1,500 lb (680 kg)	422985	86 in. (2184 mm)	47 1/8 in. (1197 mm)	45 5/8 in. (1159 mm)	30 5/8 in. (778 mm)

tyco
Fire Protection Products

One Stanton Street
Marinette, WI 54143-2542

+1-715-735-7411
www.ansul.com

Form No. F-96161-05