

SYSTEMS DATA SHEET

MINI-BULK LOW PRESSURE CARBON DIOXIDE FIRE SUPPRESSION SYSTEM

FEATURES

- FM Approved
- Wide Range of CO₂ Storage Tanks Available (350, 500, 800, 1000, and 1500 lb. Capacity) (159, 227, 363, 454, and 680 kg)
- Hydraulic Program For Piping Design
- Refrigerant Media is Environmentally Safe (R134a)
- The ASME Coded Inner Vessel Does Not Require Regular Intervals of Hydrostatic Testing
- High-Efficiency Filling 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

Typical hazards protected by carbon dioxide systems are:

- 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 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 when compared to multiple high pressure cylinders with the same total CO₂ capacity.

The Mini-Bulk tanks are available in capacities of 350 lb. (159 kg), 500 lb. (227 kg), 800 lb. (363 kg), 1000 lb. (454 kg), and 1500 lb. (680 kg). The tanks can be arranged in single tank, main and reserve, or can be manifolded together to provide additional storage capacity. Unlike the traditional low pressure CO₂ equipment, the Mini-Bulk tanks are designed to discharge the entire tank contents.

The ANSUL Preferred Mini-Bulk Low Pressure CO₂ 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,



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and supervisory devices as required to maintain a supply of carbon dioxide in a stand-by fire ready state, and to provide effective distribution of agent on demand.

The low pressure mini-bulk tank stores liquid CO₂ in an ASME coded pressure vessel which is equipped with its own refrigeration system. The pressure within the pressure vessel is maintained near 300 psi (20.7 bar) by maintaining the internal temperature at approximately 0 °F (-18 °C). A pneumatic operated discharge valve, which is used to isolate the supply from the distribution network, is part of the tank hardware. Distribution of CO₂ is accomplished through the discharge valve, selector valve(s) or 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 either 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, a three way electrically operated solenoid valve, and a manual override release button for emergency actuation. A UL listed/approved releasing control panel is used to provide automatic detection and control.

CO₂ vapor from the storage container is regulated to 100 psi (6.9 bar) and piped to the inlet of the solenoid valve. While the discharge valve is in a stand-by fire ready mode, the valve is closed. The discharge valve is normally closed to contain the pressure within the tank. Upon activation of the solenoid, pneumatic pressure enters the pneumatic actuator and fully opens the valve, permitting CO₂ to discharge.

COMPONENT DESCRIPTION

CO₂ Low Pressure Storage Tank – The low pressure storage tank consists of a pressure vessel built to Section 8, Division 1 of the ASME Code for Unfired Pressure Vessels. The storage tank is available in sizes from 350 to 1500 lbs (159 to 680 kg). The pressure vessel has outlets for filling, for supplying CO₂ vapor to the system controls, and a large outlet for discharging CO₂ into the protected hazard. The 350 and 500 lb. tanks are insulated with a full vacuum jacket with a fiberglass/foil backing paper insulating medium and the 800, 1000, and 1500 lb. tanks are insulated with a 4 in. 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 CO₂. A refrigeration unit supplies low pressure refrigerant to the evaporator coils inside the pressure vessel. The refrigeration extracts heat from the CO₂ vapor which surrounds the coils. The refrigeration compressor cycle is controlled by a pressure switch which monitors the pressure of the CO₂ within the pressure vessel. The refrigeration compressor turns on when the CO₂ pressure reaches 305 psi (21.0 bar). When the vapor space temperature is cooled to about 0 °F (-18 °C), the CO₂ pressure switch opens to start the refrigerant pump down cycle and turn off the compressor. When the pressure of the CO₂ inside the tank is lowered to 295 psi (20.3 bar), the refrigeration cycles ends.

When multiple tanks are manifolded together, provide in-line check valve(s) to prevent gas flow if a tank is disconnected from the manifold.

CO₂ 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 containing oxygen which supports combustion, and results in fire extinguishment. 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 CO₂ 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 and, where the hazard warrants, some can be equipped with blow-off caps or sealing discs.

Control Valves – Ansul Preferred CO₂ 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 located on the storage tank whereas selector valves are normally located close to the protected hazard. The valves are available as a factory assembled unit complete with valve, brackets, couplings, actuator, manual override and solenoid assembly.

DISCHARGE VALVE – Electro-pneumatic actuated ball valve located at the end of the diptube and maintained in the closed position. Opening this valve provides a complete discharge of the storage tank.

SELECTOR VALVE – A valve that is located near the hazard area and 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 its use in the system. The valves consist of full port ball valves in 1/2 in. through 2 in. and butterfly valves in 3 in. through 4 in. 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 to open the valves in the event the valves fail to operate under normal conditions.

Install 450 psi (31.0 bar) safety relief valve(s) 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 off a low pressure storage unit. Hose reels consist of a corrosion resistant painted reel with several different lengths of 3/4 inch hose available.

APPROVALS

Ansul Preferred Low Pressure Carbon Dioxide Systems are designed to meet the requirements of NFPA 12 "Standard on Carbon Dioxide Extinguishing Systems." They are approved by Factory Mutual (FM).

ORDERING INFORMATION

Order all system components through your local authorized Ansul Preferred Distributor.

SPECIFICATIONS

1.0 GENERAL

1.1 References

- 1.1.1 Factory Mutual Research Corporation (FMRC) approved
- 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 drawing

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 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 master and selector valves required. Additional components shall be available for shutting down equipment and signalling system discharge. The system shall be fixed nozzle type or hose reel type. The system shall be capable of total flooding or local application 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 five years experience in the design and manufacture of engineered fire suppression systems.

1.5 Warranty

- 1.5.1 The low pressure mini-bulk CO₂ system components shall be warranted for one (1) 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).

2.0 PRODUCT

2.1 Manufacturer

- 2.1.1 Ansul Preferred CO₂, 9800 Harwood Ct., Fairfield, OH 45014, Telephone (513) 860-0405.

2.2 Components

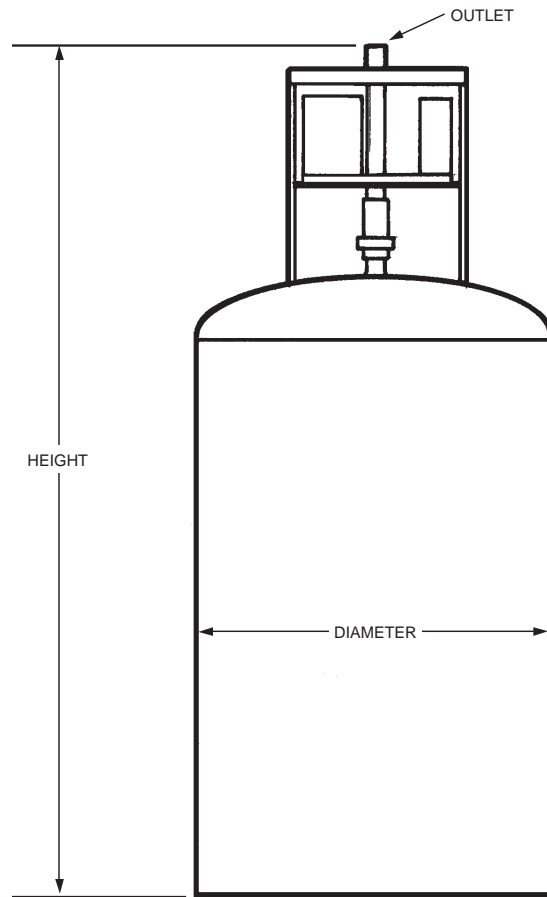
- 2.2.1 CO₂ Agent: The agent shall be a clean, dry, non-corrosive, non-damaging, non-deteriorating chemical. It shall dilute the oxygen content of the protected hazard to a point where it will not support combustion.
- 2.2.2 Low Pressure CO₂ Storage Tank: The storage unit shall be built to the ASME code for unfired pressure vessels. The unit shall be equipped with all necessary safety relief devices. The unit's refrigeration system shall be capable of maintaining the liquid CO₂ at a storage pressure of 300 psi (20.7 bar).
- 2.2.3 Valves: Valves shall be capable of being operated either manually, pneumatically, or electro-pneumatically. They shall be either ball or butterfly design.
- 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 CO₂ 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 flow rate and system design required. Nozzles shall be corrosion resistant and available in natural brass, 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 CO₂ 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.

Dimensional Information



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Dimensions					
Tank Size	Part No.	Height	Diameter	Outlet Size (NPT)	Bottom Base
350 lb. (159 kg)	425448	75 in. (191 cm)	20 in. (51 cm)	1 1/2 in. (3.8 cm)	None
500 lb. (227 kg)	425449	88 in. (224 cm)	22 in. (56 cm)	1 1/2 in. (3.8 cm)	None
800 lb. (363 kg)	425450*/422987**	85 in. (216 cm)	36 in. (91 cm)	2 in. (5.1 cm)	39 1/8 in. x 39 1/8 in. (100 cm x 100 cm)
1,000 lb. (454 kg)	425451*/422986**	95 in. (241 cm)	36 in. (91 cm)	2 in. (5.1 cm)	39 1/8 in. x 39 1/8 in. (100 cm x 100 cm)
1,500 lb. (680 kg)	425452*/422985**	92 in. (234 cm)	44 in. (112 cm)	2 in. (5.1 cm)	48 in. x 48 in. (122 cm x 122 cm)

* Tank Sub-Assembly is manufactured by others.

** Tank Sub-Assembly is manufactured by Ansul.