ANSUL

A Tyco International Company

LOW PRESSURE CARBON DIOXIDE FIRE SUPPRESSION SYSTEM

Data/Specifications

FEATURES

- FM Approved
- Wide range of CO_2 storage units available (2 3/4 ton to 46 ton capacity)
- Hydraulic program for piping design and nozzle sizing
- CO_2 storage units are saddle mounted
- Low profile design

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® Commercial 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 unit, master valves, selector 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 system consists of liquid CO_2 stored 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 manually operated tank shut-off valve, which is used to isolate the supply from the distribution network, is fitted to the storage unit. Low pressure storage units are available in sizes from 2 3/4 ton up to 46 ton capacity. Distribution of CO_2 is accomplished through a selector valve, master/selector valve 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. The master/selector valve arrangement is typically used to protect several hazards from the same supply manifold where the selector valve is located close to the hazard and at a significant distance from the storage unit. Hand-hose lines can either be supplied from a separate low pressure storage unit or connected to the same storage unit that supplies a fixed pipe system. In all cases, 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.

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Valve control is accomplished through electro-pneumatic or manual means. Each master and selector valve assembly consists of a ball or butterfly valve, a spring return pneumatic valve operator and an electrically operated solenoid valve. Selector valves with spring return actuators, solenoid valves, and pneumatic delay timers are available. A listed and approved releasing control panel is used to provide automatic detection and control. CO_2 vapor from the storage container is regulated to approximately 100 psi (6.9 bar) and piped to the inlet of the electrically operated solenoid valve. Upon receipt of an electrical actuation signal from the releasing panel, the solenoid valve operates, opening the selector valve and allowing the CO_2 extinguishing 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

CO_2 Low Pressure Storage Unit: The low pressure storage unit is built to the ASME code for unfired pressure vessels. The storage unit is available in sizes from 2 3/4 ton to 46 ton. The pressure vessel has piping for filling, for supplying CO_2 vapor to the system controls, and a large outlet for discharging CO_2 into the protected hazard. The pressure vessel is covered with 4 in. (102 mm) of polyurethane insulation. The insulation is covered with an aluminum vapor barrier. The pressure vessel is provided in a saddle mount configuration.

The pressure vessel is equipped with a safety relief valve(s) in accordance with ASME requirements. In addition to the safety relief valve required by ASME, the pressure vessel is also supplied with an auxiliary relief device known as a “bleeder” valve.

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 system 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 vessel. Pressure of the CO_2 inside the tank is lowered to 295 psi (20.3 bar). The refrigeration compressor turns on when the CO_2 pressure reaches 305 psi (21.0 bar). When the vapor space temperature is cooled to about 0 °F (–18 °C), the CO_2 pressure switch opens to start the refrigerant pump-down cycle and turn off the compressor.

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 unit, detection and control panel, discharge nozzles, and the necessary master and selector valves. Additional components shall be available for shutting down equipment and signaling system discharge. The system shall be fixed nozzle or hose reel type or a combination of both. 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 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 storage unit shall be capable of operating in a temperature range of –10 °F to +120 °F (–23 °C to +49 °C).

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 Unit: The storage unit shall be built to the ASME code for unfired pressure vessels. The unit shall be insulated with 4 in. (102 mm) of polyurethane insulation and covered with an aluminum vapor barrier. 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 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 (Continued)

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.

Distribution Valves: Valves which control the discharge of CO_2 into the protected space(s) can be arranged in one of two configurations: master/selector or selector. Operation of the valve(s) is done either pneumatically, electro-pneumatically, or manually.

MASTER/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/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 discharge 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. 2) Widely separated from other protected hazards. Cost of the equipment is less than that of a master/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.

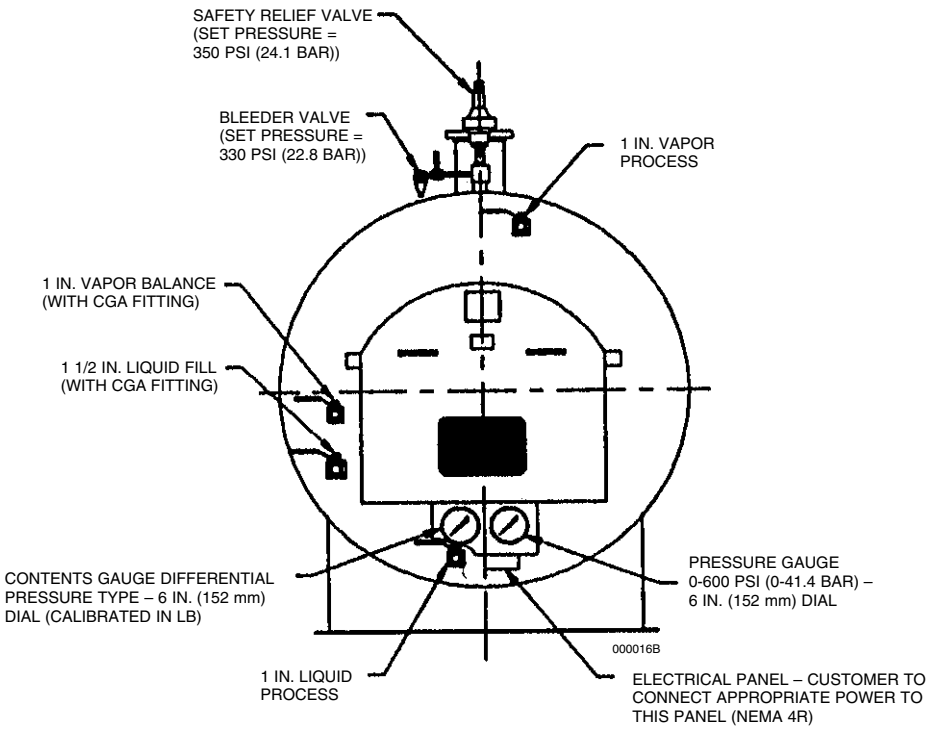
Hose Reels: In addition to the fixed pipe systems, hose reels can be supplied by a low pressure storage unit. Hose reels consist of a corrosion resistant painted reel. Several different lengths of 1 in. (25 mm) hose are available.

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 (FM) Approved.

ORDERING INFORMATION

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



FRONT PANEL OF STORAGE UNIT

tyco
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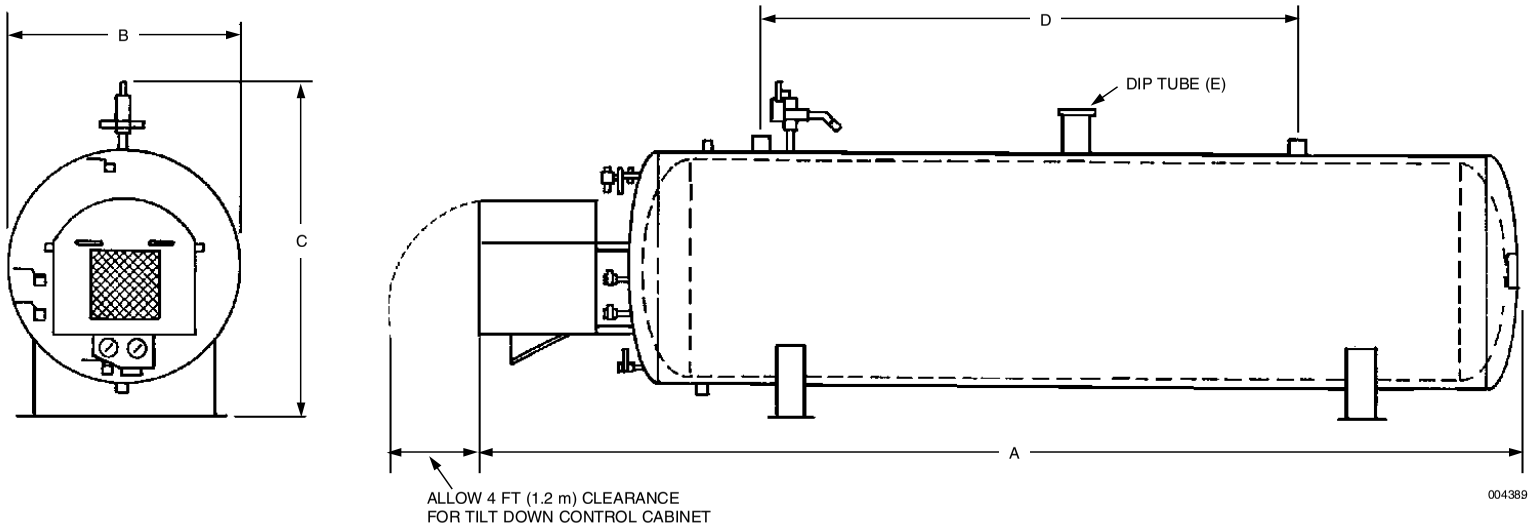
Dimensional Information Chart (E-Style Saddle Mounted Vessel)

Tank Capacity (Tons)	Part No.	A Length ft-in.	(m)	B Width ft-in.	(m)	C Height ft-in.	(m)	D Lift Lugs ft-in.	(m)	E Dip Tube in.	(mm)	Empty Weight lb	(kg)	Weight of CO_2 lb	(kg)
2.75	425400	15-8	(4.8)	4-3	(1.3)	6-5	(1.9)	7-0	(2.1)	4	(102)	4000	(1814)	5500	(2495)
3.75	425950	11-10	(3.6)	5-10	(1.8)	8-6	(2.6)	3-3 1/2	(1.0)	4	(102)	7500	(3402)	7500	(3402)
6.00	425899	15-10	(4.8)	5-10	(1.8)	8-6	(2.6)	5-2	(1.6)	4/6	(102/152)	9000	(4082)	12000	(5443)
8.00	425928	19-9	(5.6)	5-10	(1.8)	8-6	(2.6)	8-8	(2.6)	6	(152)	10200	(4627)	16000	(7258)
10.00	437372	23-4	(6.7)	5-10	(1.8)	8-6	(2.6)	12-3	(3.7)	8	(203)	11500	(5216)	20000	(6350)
12.00	437369	26-5	(7.9)	5-10	(1.8)	8-6	(2.6)	15-4	(4.7)	8	(203)	12650	(5738)	24000	(10886)
14.00	425406	19-6	(5.7)	7-4	(2.2)	9-8	(2.9)	7-2 5/8	(2.2)	8	(203)	14000	(6350)	28000	(12700)
18.00	425407	25-0	(6.9)	7-4	(2.2)	9-8	(2.9)	11-0	(3.3)	8	(203)	16800	(7621)	36000	(16330)
22.00	425408	28-6	(8.7)	7-4	(2.2)	9-8	(2.9)	14-0	(4.3)	8	(203)	20500	(9299)	44000	(19958)
30.00	425410	36-6	(11.1)	7-4	(2.2)	9-8	(2.9)	22-0	(6.7)	8	(203)	26500	(12020)	60000	(27216)
38.00	425412	44-6	(13.6)	7-4	(2.2)	9-8	(2.9)	22-3 1/2	(6.8)	8	(203)	33000	(14970)	76000	(34474)
46.00	425414	52-6	(16.0)	7-4	(2.2)	9-8	(2.9)	25-4	(7.7)	8	(203)	37500	(17010)	92000	(41731)



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