

High and Low Pressure CO₂ System

CO₂ systems are used as total flooding systems in engine rooms, machinery spaces and cargo holds. The HP system consists of a number of CO₂ cylinders, whose outlets are connected to a common manifold. From there, the CO₂ is directed, via selector valves, into the various protected spaces. If the protected space is large, a high number of cylinders are required. These can be replaced by a single CO₂ tank, saving approximately 50% in weight and installation costs. The tank contains CO₂ cooled to -18 °C. The tank, refrigerators, distribution valves, controls, etc., are supplied pre-wired and ready assembled on a steel frame.

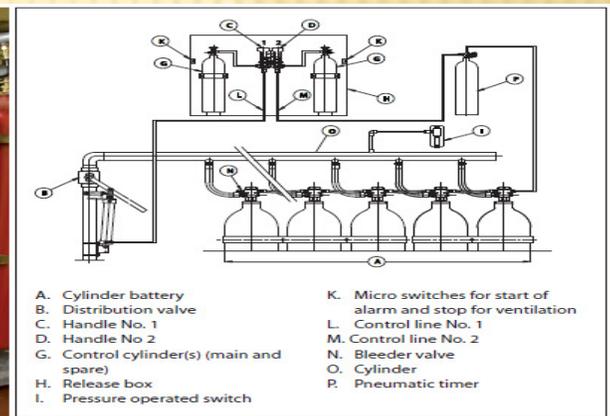
A. [CO₂ High Pressure Systems](#)

B. [Low Pressure CO₂ Systems](#)

A. CO₂ High Pressure Fire Extinguishing System

Characteristics

- Suitable for extinguishing in closed spaces like engine rooms, auxiliary rooms, cargo holds, etc.
- Extinguish the fire within a short time and leave no residue after extinguishing: shut-down time after a fire will be reduced to a minimum
- Suitable for extinguishing fires in combustibles liquids, gases and electrical equipment, and for extinguishing smouldering fires in wood, paper, textiles, etc.
- Installed as a total flooding central bank system inclusive a number of distributions
- Normally installed with pneumatic release, but can also be supplied with mechanical, electrical, and manual Release.



Construction. The CO₂ system consists of one or more pressure cylinders containing the extinguishing agent CO₂. The cylinders are connected via a common manifold. From the main manifold, the extinguishing agent is led through distribution valves to the protected spaces. The valve construction, cylinder size, and cylinder pressure, combined with the computer calculated pipe and nozzle dimensioning, ensures that the extinguishing agent is distributed in correct quantities and within the prescribed time. The release is activated pneumatically, electrically and/or mechanically.

Pressure-operated cylinder valves offer the possibility of connecting CO₂ cylinders in groups operated pneumatically from one or more release cabinets equipped with CO₂ gas cylinders. The release cabinets are equipped with pilot valves for use in opening cylinders and distribution valves by pipe connections. For pneumatic operation, the built-in actuator is used for each cylinder valve. These are connected to the other cylinder valves in the group via series-connected, flexible high-pressure hoses.

CO₂ Cylinders. The cylinders are delivered as 67.5-litre steel cylinders filled with 45 kg of CO₂, or alternatively as 80-litre steel cylinders filled with 53.6 kg of CO₂. To enable remote control and quick release, the cylinders are supplied with pressure operated quick opening valves, which also offer the possibility of manual operation. The valve construction secures against damaging overpressure in the cylinder, as the valve has a built-in bursting disc, activated at a nominal pressure of 190 bar.

CO₂ Room. The cylinders are normally stored in a separate, well-ventilated and insulated room, where the temperature is kept between 0° and 40°C. The room must have free access to open air. The room should have a minimum clear height of 2.4 m to provide adequate space for the mounting of manifolds and weighing beams for check weighing of the cylinders.

Checking Equipment. The cylinders can be checked by a weighing device or liquid level measurement.

Special Equipment. To reduce the installation time in CO₂ rooms onboard ships, cylinder arrangements mounted in racks consisting of up to 100 pieces of 45/53.6 kg cylinders, complete with manifold and fixing equipment, can be supplied.

CO₂ Extinguishing System: Release System

The Pressure Controlled Cylinder Valve . All release systems are based on the unique pressure operated cylinder valve. This valve is used in all systems in which pressure cylinders (CO₂ and N₂) form a part. CO₂ cylinders, with contents of up to 60 kg discharge, can be released within one minute. Valve housings and internal parts are made of brass or stainless steel, with tightening materials of neoprene or copper.

The valve is constructed as a combined pressure operated quick opening valve with hand wheel for manual opening. The valve is designed with a unique function that enables the user to perform a real check of the valve function. By opening the control valve for releasing the cylinders while leaving the distribution valve closed, the manifold will be pressurized. It can then be proved that each valve is opened. By closing the control valve, the release piping system will be relieved and the cylinder valves will close. This function is required by some classes and authorities.

Pneumatic Release System. Total flooding systems require groups of cylinders to be released simultaneously.

For this purpose, pneumatically operated cylinder valves are used in conjunction with the pilot pressure from the master release box containing control cylinder(s) (CO₂ or N₂), two control valves, a pressure gauge, and one or two door switches.

As an option, the system can be supplied with a pneumatic time delay device to delay the opening of the main valve. Emergency release from the CO₂ room can be made by manually opening the cylinder valve and then operating the two local control valves.

B. Low Pressure CO₂ Systems

Low pressure CO₂ systems are intended for use where large machinery and cargo spaces require protection with carbon dioxide. The advantage of the low pressure system is that one single tank replaces a large number of CO₂ cylinders with an approximate saving of 50% in weight. The tank, main valves, distribution valves, refrigerators, and associated controls are supplied prewired and ready assembled on a common steel frame. The quantity of carbon dioxide is shown directly by an electronic gauge indicating the actual tons of CO₂ in the tank. The gauge unit is fitted with alarm contacts for warning at low CO₂ contents in the tank. Recharging after use is made directly from a truck.

For large vessels the installation cost of a low pressure CO₂ system is considerably lower compared to the installation costs of a high pressure CO₂ system.

The system is designed to meet the requirements of the appropriate classification societies to which the vessel is being built.



Tank. The tank is constructed as a steel pressure vessel in accordance with the classification society requirements. The tank is equipped with two safety valves, which are fitted to a three way change-over valve, thus one safety valve is connected to the vessel if the other one is out of operation. The tank unit is supplied complete and ready for use, installed on a rectangular steel framework and held in position by thermally insulated supports. The tank is insulated with non-flammable polyurethane foam protected by an aluminium cover.

Refrigeration Units . The refrigeration units are installed at the end of the tank on the support frame and are completely duplicated both mechanically and electrically. The refrigerant is environmentally friendly and the cooling circuits on the compressors and condensers are suitable for either seawater, fresh water or air-cooling. The tank is maintained at a temperature of -18°C, which is equivalent to a CO₂ storage pressure of 2.1 MPa. the pressure fall below 1.05 MPa which would cause freezing at the nozzle

CO2 Level Indication. An electrical capacitance type liquid gauge is fitted and the meter is calibrated from zero tank contents to tank full. The indicator has an accuracy of +/- 2% and is fitted with an alarm switch indicating minimum filling level.

To meet rule requirements an overflow valve and a level sight tube with isolation valve is fitted.

Controls . A pre-wired operating panel is installed at the end of the tank on the support frame, at which are grouped all controls and overload relays for the refrigerators, tank pressure, level indicators, and various indicators and warning lamps. The panel is completely watertight and fitted with cable glands.

Valves and Filling Connections. The automatically operated main stop valve and distribution valves are ball valves fitted with manual override. The valves are sized so that the appropriate quantity of carbon dioxide will be discharged in accordance with the rule requirements. To prevent ice formation on the valves the main outlet pipe from the tank is located at the top of the tank as a continuation of the tank dip tube. The tank is filled by a truck through twin filling and balancing lines led from the tank to deck level port and/or starboard. Isolation valves and hose connections are fitted to these lines.

Release of Carbon Dioxide. Remote release of the required quantity of gas to a particular space is made from master control boxes located as required. The release system utilizes the CO2 pressure from the tank to actuate the main stop valve and the distribution valve via pressure operated control valve, and these valves are arranged for remote operation from the master control box. When the appropriate quantity of carbon dioxide has been discharged, the distribution valve is closed automatically by means of a solenoid operated control valve actuated by the electronic timer.

Distribution System. The distribution valve is connected to a computer calculated piping system within the protected space and to which the CO2 nozzles are connected. The piping is dimensioned so that the required quantity of gas will be discharged within the prescribed time and at no point in the piping system will