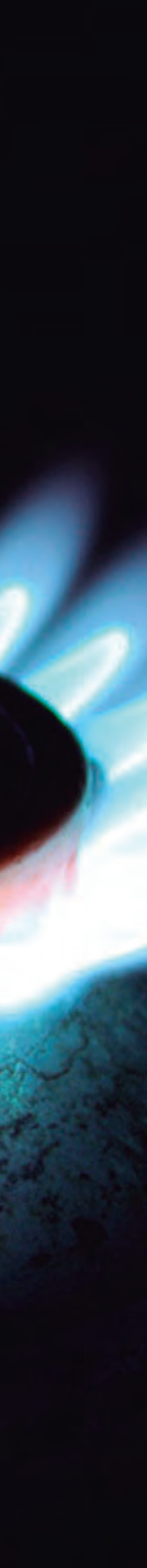


EXTINGUISHING AGENT CO2





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Physical characteristics of CO₂

Chemical Name:	Carbon Dioxide
Chemical Formula:	CO ₂
Molecular Weight:	44.01
Liquid density at 20°C:	777Kg/m ³
Critical temperature:	31°C
Critical pressure:	78.82 bar
Vapor pressure at 20°C	57.2 bar
Fill density max. at 20°C:	0.67 Kg/L
Relative density with respect to air:	1.5
Ozone destructive power:	0
Greenhouse potential:	1

What is CO₂?

CO₂ is an inert, colourless, liquefied, clean, non-corrosive and non-conductive gas. Its density is 1.5 times greater than air.

Ideal for extinguishing electrical and electronic risks, such as transformers, and where the location of the fire is well known.

It extinguishes through the reduction of Oxygen in the air below the limits of combustion (15%) and also cools and absorbs the heat of the flame.

Due to the fact that the effective concentration of CO₂ causes risks of suffocation, an evacuation of people must be guaranteed before the discharge of CO₂, as well as ensuring the ventilation of the room once the extinction has occurred.



Advantages



- ✓ Non-conductive of electricity
- ✓ Low cost
- ✓ Clean extinguishing agent
- ✓ Application Versatility:
 - Full flood
 - Local application
- ✓ Respectful with the ozone layer

Application Systems

Total Flood

Storage in a bottle or battery of bottles of the carbon dioxide necessary to reach the required extinction concentration by discharging it into the enclosure. It is connected to a network of distribution pipes and a series of discharge diffusers that distribute the CO₂ inside the enclosure to be protected, which must have high sealing.

Local Application

Storage in a bottle or battery of bottles of the necessary carbon dioxide. It is connected to a network of distribution pipes and a series of discharge diffusers, to discharge the CO₂ in a fast discharge time, in a state of carbon dioxide on the equipment to be protected. In this case, the sealing of the enclosure where the equipment is located is not necessary.

Types of Systems

Modular Systems

Composed of a single bottle with a small network of pipes and a minimum number of diffusers through which the extinguishing agent is discharged evenly within the area to be protected.

Centralized Systems

Composed of a set of storage bottles with the same pressure and quantity of extinguishing agent, connected by a common collector to a piped distribution network and a series of diffusers suitably distributed and sized so that the extinguishing agent is distributed evenly.

Types of fires

Superficial Fires

Fires of flammable liquids and vapors that are distinguished by total flooding of the enclosure with a concentration of CO₂ according to each material and the volume of the enclosure.

Deep Fires

Fires of flammable solids such as cotton, cardboard, paper, wood, electrical material... that require a longer period of cooling and maintenance of the external environment.

Table 1

CO ₂	
Nominal diameter	Discharge flow rate Kg/Min
DN10 (3/8")	Hasta 30
DN15 (1/2")	31-60
DN20 (3/4)	60-90
DN25 (1")	90-150
DN32 (1 1/4")	150-270
DN40 (1 1/2")	270-360
DN50 (2")	360-600
DN65 (2 1/2")	600-990
DN80 (3")	990-1380
DN100 (4")	1380-2400
DN125 (5")	2400-3800
DN150 (6")	> 3800

Table 2

CO ₂	
Nominal diameter	Maximum distance between supports
DN10 (3/8")	1 m
DN15 (1/2")	1,5m
DN20 (3/4)	1,8m
DN25 (1")	2,1m
DN32 (1 1/4")	2,4m
DN40 (1 1/2")	2,7m
DN50 (2")	3,4m
DN65 (2 1/2")	3,5m
DN80 (3")	3,7m
DN100 (4")	4,3m
DN125 (5")	4,8m
DN150 (6")	5,2m

Discharge pipe sizing

In general, the pipes and accessories to be used in the distribution network of CO₂ systems must be able to resist the pressures created in them.

The type of pipe recommended is seamless and type ASTM, A 106B or similar. The recommended union fittings and fittings are high pressure forged type ANSI 3000 Lb or similar.

The calculation of the dimension of the pipe is carried out using certified software, however, for a pre-sizing of the pipe, table 1 can be considered.

Pipe support

The supports for the distribution network must resist the dynamic and static loads generated, as well as the changes in length of the pipe due to thermal effects.

Table 2 indicates the maximum separation between the pipe supports depending on the diameter of the pipe.

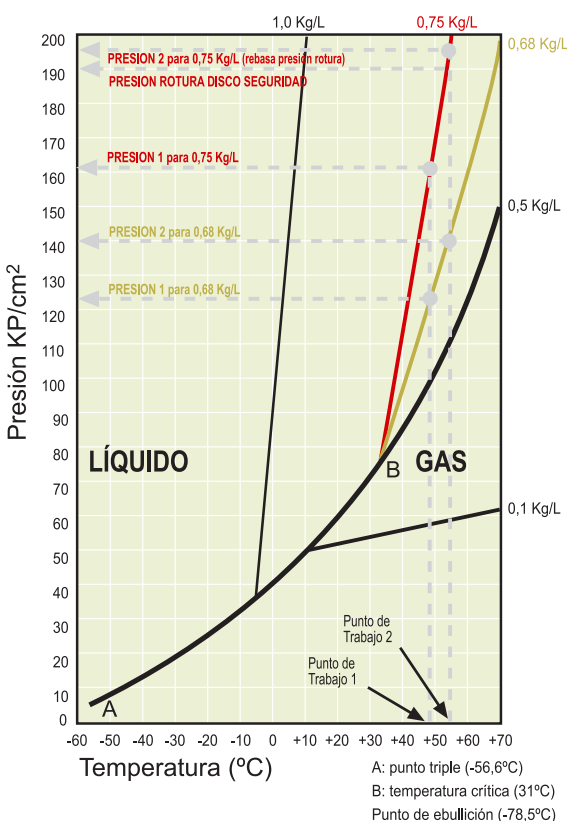
Temperature-Pressure Diagram

In general, the ambient storage temperature must not exceed the limits indicated according to the applied standard:

- UNE ISO 6183 at 0.75Kg/L: 40°C
- UNE ISO 6183 at 0.68Kg/L: 49°C
- NFPA 12 Local application: 49°C
- NFPA 12 Total Flood: 54°C
- RT CEPREVEN: 35°C

Based on the Temperature-Pressure diagram indicated on the left, it can be seen that the recommended filling factor is a maximum of 0.68 Kg/L, to avoid overpressure and triggering due to the opening of the discharge valve's safety disk.

Temperature-Pressure Diagram



Filling density

The bottle fill density must not cause pressures to exceed container specifications at the maximum design temperature. Exceeding the maximum fill density can cause an extremely high pressure rise for a small rise in temperature.

PROPERTY	UNITS	VALUE
Maximum recommended filling density	Kg/L	0,68
Container working pressure at 54°C	Bar	140

CO₂



Autonomous Bottles

High-pressure cylinders, made of heat-treated alloy steel without welding, (according to MIE AP7 instructions for pressure equipment and European Directive 84/525/CEE). Working pressure 60 bar, test pressure 250 bar, service temperature from -10°C to +60°C. Engraved and painted according to regulations.

Equipped with:

1" AE-100 main valve made of forged brass with stainless steel piston and shaft. Provided with safety disc and relief valve to prevent tripping in case of leaks.

Siphon tube.

Trip solenoid (24V power supply and 500mA consumption)

Fastening hardware.

Flange.

Protection cap.



Centralized Systems

High pressure batteries formed with bottles of 67 and 80L capacity. Made of heat-treated steel, without welding, (according to MIE AP7 instructions for pressure equipment and European Directive 84/525/CEE). Working pressure 60 bar, test pressure 250 bar, service temperatures from -10°C to +60°C. Engraved and painted according to regulations.

Equipped with a 1" AE-100 main valve with pneumatic opening through the head, non-return valves, hoses for pneumatic triggering and discharge hoses. Assembled on a metal frame with double fixing hardware and discharge manifold. The frames can be made by mounting bottles in a single row or special frame for mounting in double row.



Continuous Weighing Systems

The continuous weighing system has been developed and patented by the R&D department of Aguilera Electrónica, it is based on strain gauge traction load cell technology and electronic circuit, with microprocessor and display.

The display marks the weight of the bottle (tare + load). By means of acoustic and luminous alarms, it allows the detection of weight loss from 200 grams, faults in the equipment and signals from other weighing control equipment connected to it.

de un vistazo

Autonomous bottles with continuous weighing

High-pressure cylinders, made of heat-treated alloy steel without welding, (according to MIE AP7 instructions for pressure equipment and European Directive 84/525/CEE). Working pressure 60 bar, test pressure 250 bar, service temperature from -10°C to +60°C. Engraved and painted according to regulations.

Equipped with: 1" AE-100 main valve made of forged brass with stainless steel piston and shaft. Provided with safety disc and relief valve to prevent triggering in the event of small leaks, siphon tube, trigger solenoid (supply 24V and 500mA consumption), flange, protection cap.

Continuous weighing microprocessor equipment, where the weight of each bottle is controlled individually by an analog MOD equipment. AEX/CPC3. Programmable unit that detects weight loss from 200gr basically formed by an electronic cell, microprocessor and digital display that reflects the weight permanently. It is supplied with an anchoring system, which allows the bottle to be easily raised, connectors with mounted hoses for connection and other accessories.

Assembled in a special metal frame for continuous weighing and discharge collector.



Centralized systems with continuous weighing

High pressure batteries formed with bottles of 67 and 80L capacity. Made of heat-treated steel, without welding, (according to MIE AP7 instructions for pressure equipment and European Directive 84/525/CEE). Working pressure 60 bar, test pressure 250 bar, service temperatures from -10°C to + 60°C. Engraved and painted according to normativa. Equipped with a 1" AE-100 main valve with pneumatic opening through the head, non-return valves, hoses for pneumatic triggering and discharge hoses. Assembled in a special metal frame for continuous weighing and a discharge manifold with threaded coupling to installation.

The weight of each bottle is controlled individually by an analog AEX/CPC3 equipment. Programmable unit that detects weight loss from 200 grams basically formed by an electronic cell, microprocessor and digital display that reflects the weight permanently. It is supplied with an anchoring system, which allows the bottle to be easily raised, connectors with mounted hoses for connection and other accessories.



Directional Valves

Directional valves certified according to the UNE EN 12094-5 standard. Useful for protecting various risks by means of a single extinguishing system, whether it is an autonomous cylinder or a battery of cylinders, they are manufactured in different sizes depending on the flow rates required: 1 1/4", 2", 3" and 4" .

Pneumatic actuation is carried out by means of a propellant pilot bottle and a trigger system, designed according to the risk to be protected for 2 or 3 directional valves.

Both the pilot bottle and the firing system can work in automatic or manual mode. Activation causes the release of the propellant agent towards the corresponding directional valve, causing it to open and subsequently discharging the battery. With this configuration we guarantee that the opening of the directional valve occurs with the valve empty and that when the extinguishing agent is discharged, the directional valve is in the open position.

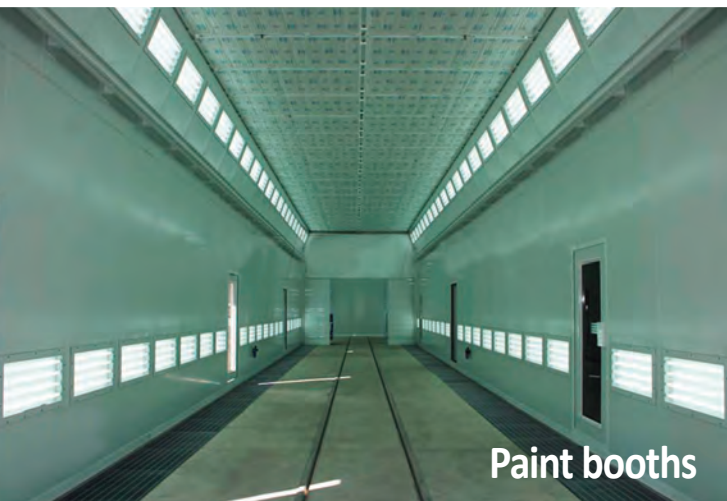




Storage areas



Transformation centers



Paint booths



6 Electrical stations and substations



Applications

- Flammable liquid storage areas
- Printing processes.
- Cooling tanks.
- Smoke outlet ducts.
- Painting processes.
- CPU/computer room raised floors.
- Switching electrical substations.
- Fryers/ovens.
- Kitchen hoods.
- Electrical cabinets.
- Transformation centers.

Characteristics of the Facilities

To achieve an adequate discharge of the extinguishing agent through the diffusers and that this allows a homogeneous concentration of the same in the area to be protected, the following points must be taken into account:

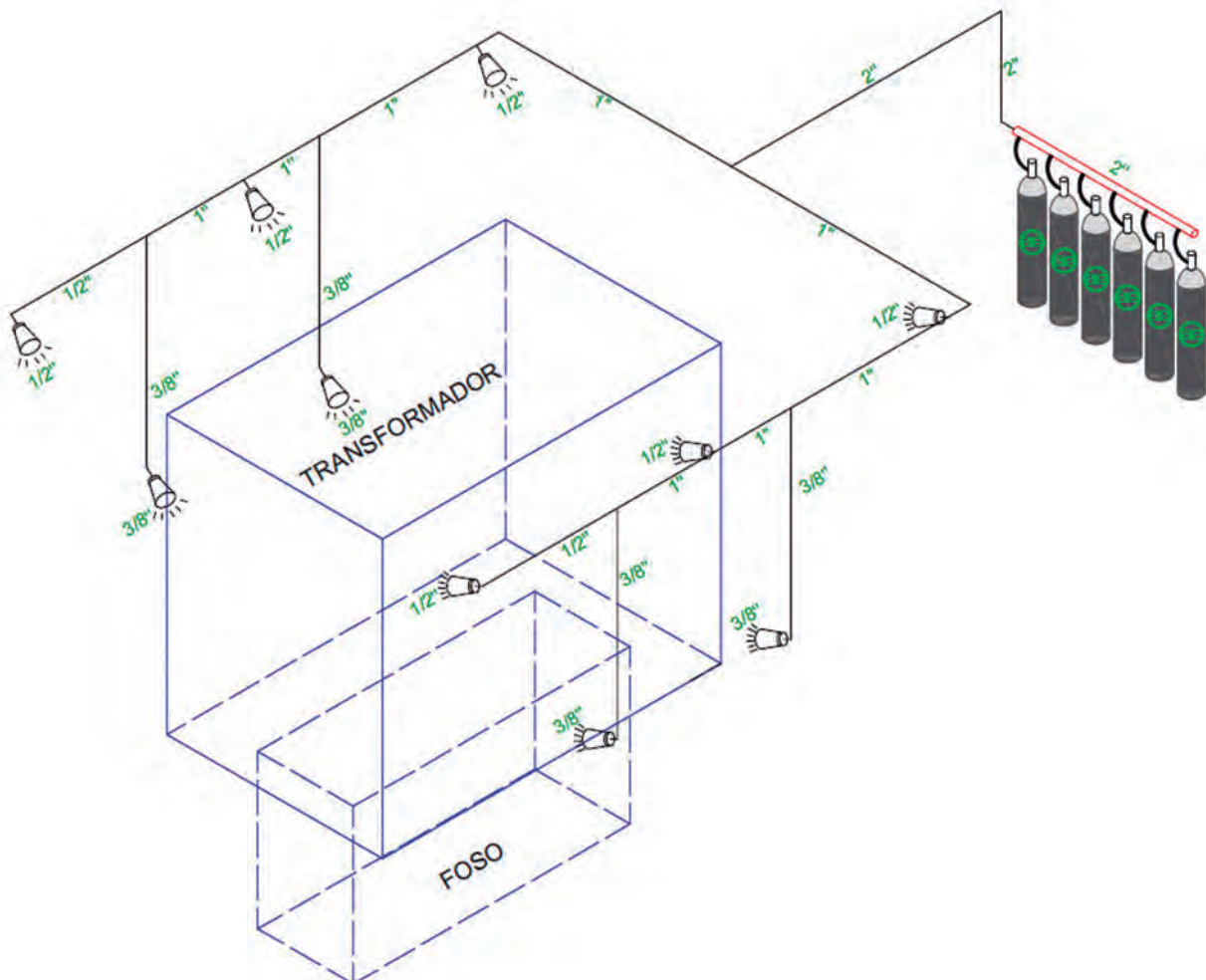
- The minimum discharge flow rate for liquefied gases must be sufficient to maintain the speed necessary for turbulent flow, and thus avoid separation of the liquid phase from the gas phase, which would cause unpredictable flow characteristics.
- The pressure reached at the inlet of the discharge diffusers after discounting losses due to friction and changes in height, must be the minimum necessary to allow the gasification of the extinguishing agent at this point, as well as the desired coverage thereof.
- The geometry of the installation and the location of the storage tanks must be set in such a way that the system is balanced and does not give rise to unnecessary losses due to long routes of the installation from the storage to the unloading points.

- The discharge of the extinguishing agent must be carried out in a short interval of time (60 s) so as not to allow the fire to reach dimensions and temperatures that cause the decomposition of the extinguishing agent, which would harm the occupants of the protected area.

- Any variation with respect to the original design would cause variations in the calibration of the diffusers and the dimensioning of the pipes of the distribution network of the extinguishing agent.

To guarantee an adequate discharge of the diffusers, a suitable hydraulic calculation program must be available, which is capable of carrying out the necessary repetitions, taking into account the aforementioned limitations and the variables introduced.

Aguilera Extinción has certified hydraulic calculation programs to carry out the calculation of the dimensioning of the pipes and the calibration of the diffusers of the facilities using the CO₂ extinguishing agent.



Our commitment: Services and Guarantees



Projects

The Aguilera Group offers its collaboration to engineering companies in fire detection, control and extinction projects, advising on the systems and coverage for each building. The projects department carries out the design and dimensioning of the system, the hydraulic calculations, the calibration of the diffusers and the installation isometric, advising on the effectiveness of the equipment in each risk and considering the operability in the maneuvers.



Training

Aware that we all want to know and control what we do, regardless of the technical support we provide to the installations that are executed with our products, the Aguilera Group offers training courses on the operation of our equipment, its installation and programming.



Personal Attention

At the Aguilera Group, each client is important. We are aware that not all of us have the same needs. For this reason, our team of professionals provides attention that is appropriate to their requirements.



Maintenance

The Aguilera Group undertakes to guarantee the services of repair, reprogramming and supply of original spare parts after the guarantee period.



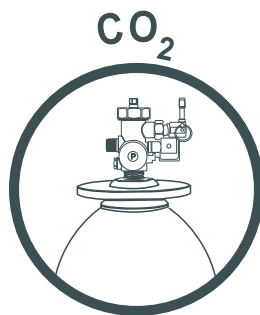
Technical service

With the aim of guaranteeing the proper functioning of the facilities, the Aguilera Group technical department carries out the operation tests and commissioning of the equipment, in addition to collaborating with the installer in all phases of the work.



Equipment Warranty

The Aguilera Group guarantees the proper functioning of its equipment for two years from the date of delivery; We are responsible for the replacement or repair of those in which anomalies or manufacturing defects are observed and are delivered to our factory in Madrid.



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