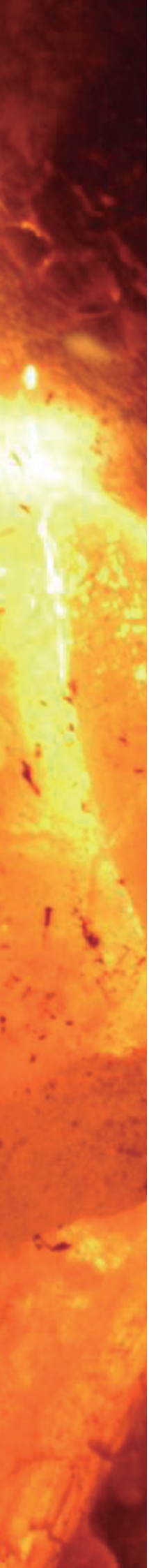
aguilera extinción

Fire Extinguishing

EXTINGUISHING AGENT HFC-227ea
SAFE FOR PEOPLE



Index

What is HFC-227ea?

HFC-227ea or heptafluoropropane is the most widespread replacement gas for halon worldwide. Its NOAEL allows its application with a total flooding system in occupied areas.

HFC-227ea is a liquefied extinguishing agent, non-conductive of electricity, it extinguishes fire by absorbing and extracting heat from the flames, thus stopping the chemical reaction.

NORMATIVE

The regulations that regulate the use of HFC-227ea are:

UNE-EN 15004-1, UNE-EN 15004-5.

Total flooding systems can be used to put out fires of all kinds.

The minimum design concentrations according to the standard are the following:

Concentration	
Risk	**HFC-227ea**
Class B	9
Class A Superficial	7,9
Class A superior risk	8,5

The calculation of the amount of Kg required is done using VdS certified software. The design is made for discharges in times less than 10s.

Application systems

Total flood

Storage in a bottle or battery of bottles of the necessary extinguishing agent to reach the required concentration of extinction by discharging it into the enclosure. It will be connected to a network of distribution pipes and a series of discharge and gasification diffusers that distribute the extinguishing agent inside the enclosure to be protected.

To ensure the effectiveness of the extinction with the calculation made, it is essential that the design concentration is maintained for at least 10 minutes.

System Types

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 homogeneously 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

Surface fires

Fires involving flammable liquids and vapors that are extinguished by total flooding of the enclosure with a concentration of extinguishing agent 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 extinguishing environment.

Toxicological information HFC-227ea	
Property	Value %
NOAEL	9,0
LOAEL	>10,5

NOAEL (Non-Observable Adverse Effect Level). Highest concentration at which no adverse physiological or toxic effects have been observed.

LOAEL (Lowest Observed Adverse Effect Level). Lowest concentration at which an adverse physiological or toxic effect has been observed.

Safety for people

The risk to people is caused by the discharge of the extinguishing agent in the enclosure. This can be caused by the extinguishing agent itself, the combustion products of the fire, or the decomposition products of the extinguishing agent resulting from exposure to fire.

Minimum security measures for occupied areas (HFC-227ea)			
Maximum concentration	Time delay	Auto/manual switch	Locking device
NOAEL- Concentration	Yes	It is not required	It is not required
NOAEL>Concentration>LOAEL	Yes	Yes	It is not required
Concentration>LOAEL	Yes	Yes	Yes

Table 1

Diameter nominal	Flow rate download Kg/Sec
DN10 (3/8")	0,3
DN15 (1/2")	1,2
DN20 (3/4")	2
DN25 (1")	4
DN32 (1 1/4")	6
DN40 (1 1/2")	9
DN50 (2")	1 8
DN65 (2 1/2")	2 5
DN80 (3")	4 0
DN100 (4")	6 5
DN125 (5")	9 5
DN150 (6")	136

Discharge pipe sizing

In general, the pipes and accessories to be used in the distribution network of HFC227ea systems must be able to resist the pressures created in them.

According to the applicable standard UNE EN 15004-1, the system pipes must be able to withstand the pressure of the extinguishing agent at 50ºC.

For this reason, we recommend using ASTM A 106 Grade B Sch 40 pipe and ANSI 3000 or similar high pressure forged fittings for HFC227ea.

The calculation of the dimensioning of the pipes and the calibration of the diffusers is carried out using VdS certified software based on table 1.

Table 2

Diameter of the pipe	Maximum separation between supports
DN10 (3/8")	1 m
DN15 (1/2")	1,5 m
DN20 (3/4")	1,8 m
DN25 (1")	2,1 m
DN32 (1 1/4")	2,4 m
DN40 (1 1/2")	2,7 m
DN50 (2")	3,4 m
DN65 (2 1/2")	3,5 m
DN80 (3")	3,7 m
DN100 (4")	4,3 m
DN125 (5")	4,8 m
DN150 (6")	5,2 m

Piping supports

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.

HFC-227ea

Autonomous Bottles

High pressure cylinders, made of heat-treated alloy steel without welding. 42 bar working pressure, 250 bar test pressure, service temperature from -20ºC to +50ºC, engraved and painted in red.

Centralized systems

High-pressure batteries made up of bottles with a capacity of 67, 80 and 120L each. Made of heat-treated steel without welding. Working pressure at 42 bar, test pressure 250 bar, service temperature from -20ºC to +50ºC.

Engraved and painted in red.

Continuous weighing system

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 detecting 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. 42 bar working pressure, 250 bar test pressure, service temperature from -20ºC to +50ºC, engraved and painted in red.

The bottles are equipped with continuous weighing microprocessor equipment, where the weight of each bottle is controlled individually by a computer. The bottles are assembled in a special metal frame for continuous weighing, valve and discharge hose.

Centralized systems with continuous weighing

High-pressure batteries made up of bottles with a capacity of 67, 80 or 120L each. Made of heat-treated steel, without welding, test pressure 250 bar, service temperature from -20ºC to +50ºC. Engraved and painted in red.

The weight of each bottle is controlled individually by an analogue continuous weighing equipment Mod. AEX/CPC3.

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 propellant agent to exit towards the corresponding directional valve, causing it to open and the battery to discharge. 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.

Applications

The use of fluorinated gases in Fire Protection (in total flooding systems) is, technically, a quality, efficient and safe option. It is, of course, necessary to take into account all the design conditions that ensure the reliability of these systems and, for this, there is a national and international regulatory framework that helps to provide correct protection.

The typical risks that are correctly protected by these systems range from transformation centers and many critical installations in industry and services.

Hydrofluorocarbons (HFCs) are viable and proven solutions to the problems addressed in the Montreal and Kyoto Protocol processes. They are energy efficient, low in toxicity, cost-effective and can be used safely.

Governments and industries support their global use in applications that meet important environmental and social needs.

Control towers

Archives

Computer rooms and data centers

Radio/radar station

Low temperature storage

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 discharge points.

- In gases overpressurized by nitrogen (HFC-227ea), the energy that drives the extinguishing agent comes from the added nitrogen and therefore there must be a balance between the amount of itrogen and that of the extinguishing agent.

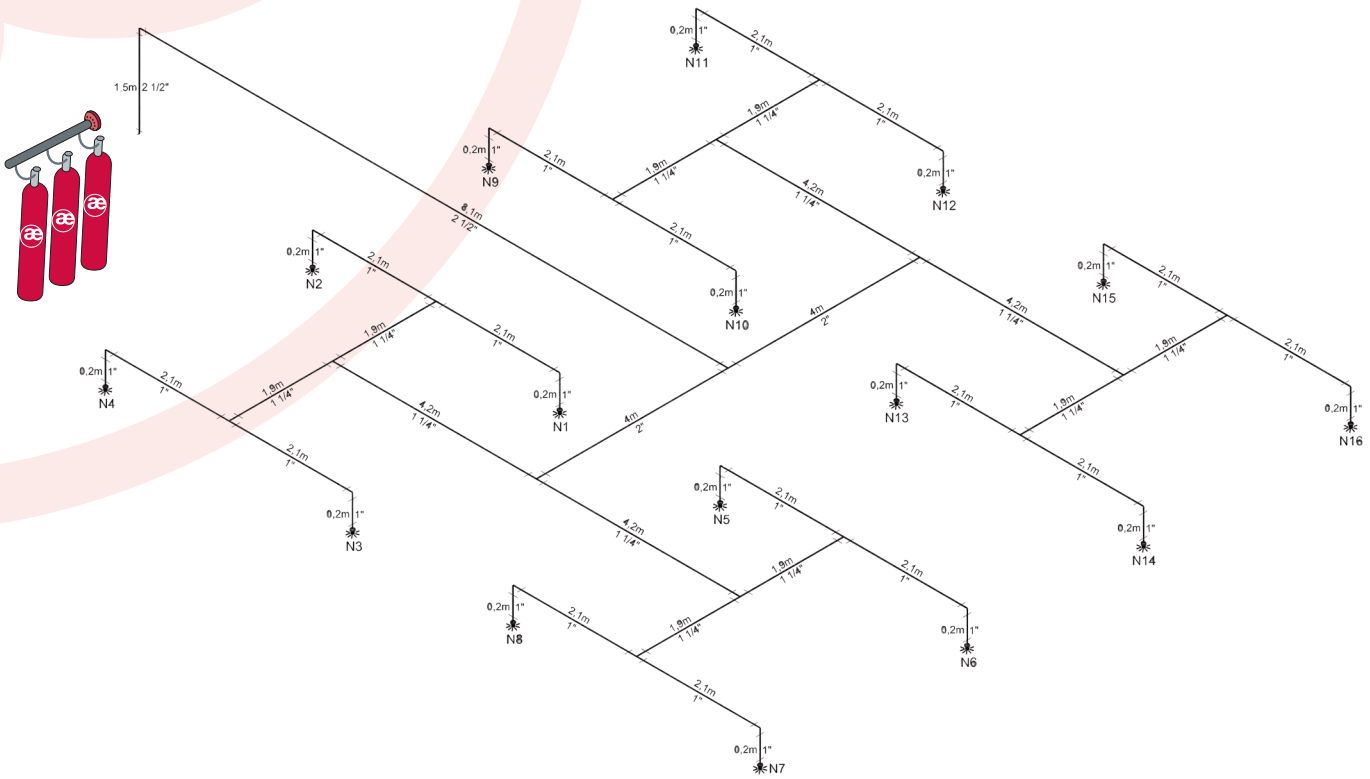
For this reason, depending on the total amount of extinguishing agent to be unloaded and the routes of the installation, the filling density of the storage bottles of the extinguishing agent may vary (ratio between the amount of extinguishing agent and the amount of driving nitrogen).

- The discharge of the extinguishing agent must be carried out in a short interval of time (10 s) so as not to allow the fire to reach dimensions and temperatures that cause the decomposition of the extinguishing agent.

- 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 the best hydraulic program on the market to carry out the calculation of the dimensioning of the pipes and the calibration of the diffusers of the facilities using the HFC-227ea 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

In 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 adequate attention to your requirements.

Maintenance

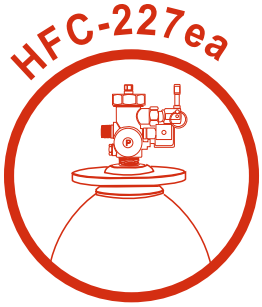
The Aguilera Group undertakes to guarantee the services of repair, reprogramming and supply of original spare parts after the guarantee period.

Technical service

With the aim of guaranteeing the proper functioning of the facilities, the Aguilera Group technical department advises on the operation tests and start-up 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.



GRUPO aguilera

SEDE CENTRAL
C/ Julián Camarillo, 26 - 2ª planta - 28037 MADRID • Tel: 91 754 55 11

FACTORÍA DE TRATAMIENTO DE GASES
Av. Alfonso Peña Boeuf, 6. P. I. Fin de Semana - 28022 MADRID • Tel: 91 312 16 56

DELEGACIÓN GALICIA
C/ José Luis Bugallal Marchesi Nº 9, 1º B - 15008 A CORUÑA • Tel: 98 114 02 42

DELEGACIÓN CATALUÑA
C/ Rafael de Casanovas, 7 y 9 - Sant Adría del Besos - 08930 BARCELONA • Tel: 93 381 08 04

DELEGACIÓN LEVANTE
• Tel: 628 92 70 56

DELEGACIÓN ANDALUCÍA
C/ Industria, 5 - Edificio Metropol 3, 3ª Planta, Mod. 17. P.I.S.A. 41927 Mairena del Aljarafe - SEVILLA
• Tel: 95 465 65 88

DELEGACIÓN CANARIAS
C/ Sao Paulo, 17 - Pol. Ind, El Sebadal - 35008 LAS PALMAS DE GRAN CANARIA
• Tel: 928 24 45 80

www.aguilera.es • e-mail: comercial@aguilera.es

Versión 2.0