UL LISTED | CE System | PESO

FireCease®

DHP INERT GAS SYSTEM

- Natural Human Friendly Gas
- Abstract from Atmosphere
- Best Uses for: Server / Electrical Panels
- Zero Global Warming Potential
- Zero Ozone Depletion

Intelligent Protection System

Round the Clock 24 x 7

FireCease®

DHP INERT GAS SYSTEM

Technical Properties of Extinguishing Agent

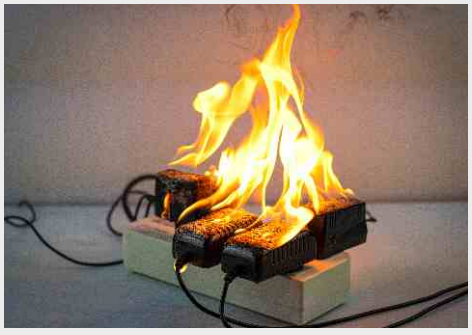
INERT Gas is effective on:

Class A Fires

Surface Fires of celluloid materials (wood, paper, cloth – anything that leaves an ash residue after combustion)

Class B Fires

Fires of Flammable Liquids and Gases



Class C Fires

Fires that involve energized electrical equipment

Inert Gas Suppression Systems use argon and nitrogen gases and their mixtures as an extinguishing agent and are based in the principle of reducing the Oxygen concentration inside the protected hazardous area. The Oxygen concentration is minimized by the application of inert gas until it reaches a level where combustion is no longer supported. Each system is designed so as to decrease oxygen to a specific level. When, discharged inert gas is quickly and uniformly distributed within the enclosure, achieving design concentration in 60 seconds.

As inert gases are derived from gases present in the earth's atmosphere, they exhibit no ozone depletion

potential and they do not contribute to global warming.

When an inert gas is discharged into an enclosure, it introduces the proper mixture of gas that will allow persons to breathe in a reduced oxygen atmosphere. The advantages of inert gases are:

- **Human safe at concentration levels required to suppress fire**
- **Zero ozone depletion (ODP- 0)**
- **No residue to clean up after discharge**
- **Zero global warming potential (GWP- 0)**
- **Stored as a gas**
- **Fogging does not occur when the extinguishing agent is discharged**
- **Colorless, odorless**
- **No decomposition products**
- **Electrically non-conductive**
- **Natural gas present in the atmosphere**

IG100 (N2) / INERT System uses for a Clean, Safe and 100% ecological extinguishment. This gas is widely used in a variety of extinguishing system due to its excellent pressurization conditions.

FireCease® INERT Gas System is a pre-engineered Direct High Pressure (DHP) fire suppression system designed for the extinguishing agent IG100 (N2)/ INERT Gas.

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Functional Description of FireCease® DHP IG100 (N2) / INERT Gas System

The System is designed for the extinguishing agent Nitrogen (N2). The System is used for suppressing fires in hazards in not normally occupied spaces where: -

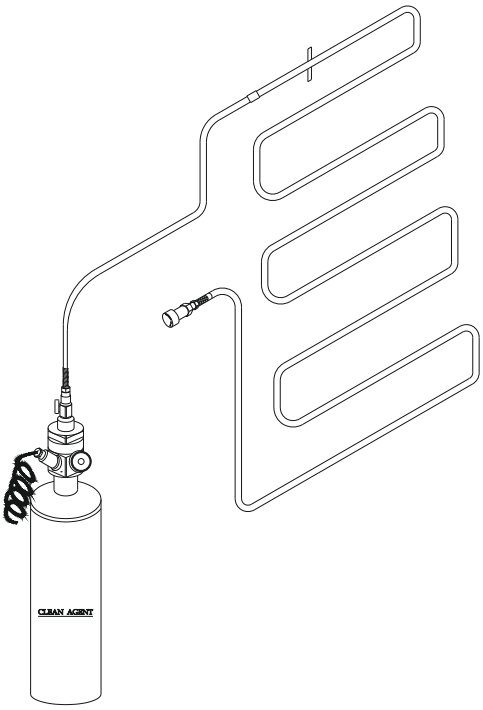
1. An inert, electrically non-conductive medium is required.
2. Cleaning of other extinguishing agents is a problem;
3. Other mediums might contaminate solvents, coolants, or other products associated with the hazard being protected.

The FireCease® direct INERT GAS-System can only be used with inert gas extinguishing agent to protect hazards that are enclosed. An enclosed hazard area will provide a means to contain the IG100 (N2) / INERT. By containing the Inert IG100 (N2) / INERT in the enclosure, when discharged it will establish and maintain an effective extinguishing agent concentration.

Inert gas suppresses fire by reducing the oxygen content of the protected area and/or local flame front to a point where it will not support combustion. Oxygen reduction below 16 % by volume will suppress most fires. The System must be designed in accordance with the requirements of NFPA 2001 "Standard on Clean Agent Fire Extinguishing Systems"(2018 edition) or latest edition. IG100 (N2) / INERT System specifically for local applications and operated automatically, assures early fire detection and very rapid-fire suppression. By suppressing these fires before they have a chance to spread and become conflagrations, major losses may be avoided, and precious down time is minimized

IG100 (N2) / INERT System uses a Sensor Tube (UL LISTED), a thermally sensitive tube as an automatic detection line. The sensor tube is pressurized with dry nitrogen when it is put into service. The sensor tube is installed in the hazard area as a continuous linear detector that will rupture from flame impingement or when the temperature reaches the release point. The extinguishing agent is discharged from the sensor tube. For the System therefore no additional pipework is required. This System is developed for use in local applications, where the hazard area is not normally occupied.

The Cylinder valve is made of brass and equipped with a ball valve that is the interface for the FireCease® sensor tube. The extinguishing agent is stored in PESO approved cylinders made of steel/MS, that are located in a safe and accessible location. They are designed to hold pressurized INERT gas at atmospheric temperatures, corresponding to a nominal pressure of 150/200 bar at +210C. Additional accessories are used to provide alarms, ventilation control, door closures, or other auxiliary shutdown functions.



Illustrations

- Pressure Cylinder/ DHP Valve/ Pressure Gauge
- Cylinder mounting bracket
- Protection spring top
- Cross panel protective fitting
- Cable ties
- FireCease® sensor tube
- End of line adapter
- Pressure switch
- Alarm box/Master Control Unit

Standards

The design and installation of the Clean Agent gas-based Fire Detection tube system is based on the latest applicable codes and as per the manufacturer's recommendations; the required Clean Agent gas quantity is arrived as per the volume of the respective panels to be protected. In addition, the following standards, references and rules and regulations shall be applicable:

- **Fire protection manual of the tariff advisory committee, Fire Insurance Association**
- **NFPA-2001-Standard on Clean Agent Fire Extinguishing System**
- **National Building Code Part-IV: Fire Safety System**
- **Gas Cylinder Rule**
- **Local Fire Brigade/Authority**

The standards listed, as well as other applicable codes, standards, and good engineering practices shall be used as "minimum" calculation standards.

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DHP INERT GAS SYSTEM

DHP KIT WITH ACCESSORIES

- Pressure Cylinder / DHP Valve / Pressure Gauge
- Cylinder Mounting Bracket
- Protection Spring Top
- Cross Panel Protective Fitting
- Cable Ties
- Firecease® Sensor Tube
- End of Line Adapter
- Pressure Switch
- Alarm Box / master Control Unit

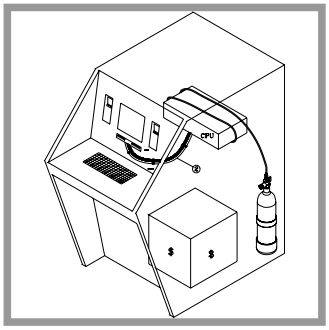
Variants

*Cylinder Capacity	Discharge / Outlet Pressure	Working Pressure	Filling Connection	Discharge / Outlet Connection
6.8 Ltr	16 Bar	150/200 bar at +21°C	W21,8 x 1/14"	Ø 6 mm
10.2 Ltr	16 Bar	150/200 bar at +21°C	W21,8 x 1/14"	Ø 6 mm
13.5 Ltr	16 Bar	150/200 bar at +21°C	W21,8 x 1/14"	Ø 6 mm

The following table shows the Physical Properties of INERT Gas Extinguishing Agents (SI Units)

Chemical Formula	Ar (IG01)	N2 (IG100)	N2 / Ar (IG55)	N2 / Ar / CO2(IG541)
Composition of Gas	100%	100%	50% Ar +50% N2	52% N2 + 40% Ar + 8% CO2
Molecular Weight	39,90 g/mole	28,02 g/mole	33,95 g/mole	34,00 g/mole
Ozone Depletion Potential ODP	0	0	0	0
Global Warming Potential GWP	0	0	0	0
Boiling Point at 760 mm Hg	-189,85°C	-195,80°C	-190,10°C	-196,00 □C
Boiling Point at 1013 bar	-185,90°C	-195,80°C	-196,00°C	-196,00 □C
Freezing Point	-189,35°C	-210,01°C	-199,70°C	-78,5 □C
NOAEL	43 %	43 %	43 %	43 %
LOAEL	52 %	52 %	52 %	52 %
Critical Temperature	-122,30°C	-146,95°C	-134,7°C	N/A
Critical Pressure	4903 kPa	3399 kPa	4150 kPa	N/A
Solubility of Water in Extinguishing agent at +25°C	0,006 %	0,0013 %	0,006 %	0,015 %
Heat of Vaporization at Boiling point	163 kJ/kg	199 kJ/kg	181 kJ/kg	220 kJ/kg
Specific Heat, Vapor at constant pressure (1 atm) at +25°C	0,519 kJ/kg	1,04 kJ/kg	0,782 kJ/kg	0,574 kJ/kg
Relative dielectric strength at 1 atm at 734 mm Hg at +25°C (N2= 1,0)	1,01	1,0	1,01	1,03

Extinguishing Mechanism



The extinguishing effect of inert gases is achieved by the displacement of atmospheric oxygen. This is called the sticking effect, which occurs when the specific limit value required for combustion is not reached. In most cases, the fire extinguishers as soon as the oxygen level is reduced to 13,8 % by volume. For this purpose, the existing air volume only has to be displaced by about one third, which corresponds to an extinguishing gas concentration of 34 % by volume.

Clean up and Associated Damage

Inert gases vaporize completely after discharge. Whereas the cost of clean up and peripheral damage associated with water, foam and dry chemical agents can exceed the cost of the fire damage itself, clean up costs and down time associated with inert gases are negligible. Most materials and equipment are totally unaffected by exposure to inert gases. Inert gases are stable, even at high temperatures, and does not decompose when subjected to fire; therefore, it does not cause metals to corrode.

Storage / Transportation

IG01, IG100, IG55 and IG541, when used as extinguishing agents are stored in gaseous state in pressure cylinders. The pressure inside the pressure cylinder varies as the ambient temperature changes. In general, the ambient storage temperature for pressure cylinders used in total flooding applications is -20,0□C to +65,6□C (-4□F to +150,1□F). Our pressure cylinders are manufactured according to transportation regulations, which specify the material of construction, method of manufacture, testing, and what products they are permitted to be filled with, as well as other details. Compliance with applicable Dangerous Goods regulations is required for all transportation by motor freight, rail, air and water. Cylinders are PESO approved for the Extinguishing agent to be used/filled.

The Sensor Tube Technology

FireCease® systems use a proprietary continuous linear sensor tube that reliably detects and actuates release of the extinguishing agent using pneumatic technology. It is more flexible, space efficient and cost effective versus alternative mechanical or electronic systems. The revolutionary pneumatic design enables cost-effective protection of individual high-risk areas like electrical and mechanical equipment that were previously not practical to protect.

Installation closer to the source

Because the sensor tubing is flexible, it can easily be installed directly inside machines and enclosures – directly among circuitry and mechanics. When in service, the tubing is pressurized with dry nitrogen under 240 psi / 16 bar of pressure. The dynamics of pressurization make the tubing more reactive to heat

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The information in this document contains the general description of technical options available, which do not always have to be present in indivisual cases, The required feature should therefore be specified in each individual case at the time of closing the contract.

Answers for infrastructure and cities.

Our world is undergoing changes that force us to think in new ways: demographic change, urbanization, global warming and resource shortages. Maximum efficiency has top priority and not only where energy is concerned.

In addition, we need to increase comfort for the well-being of users.

Also, our need for safety and security is constantly growing. For our customers, success is defined by how well they manage these challenges. FireCease has the answers.

“We are the trusted technology partner for energy-efficient, safe and secure buildings and infrastructure.”