

SPECIAL HAZARDS
PROTECTION

AUTOMATED FIREFIGHTING
SYSTEMS IN
CLEAN ROOMS

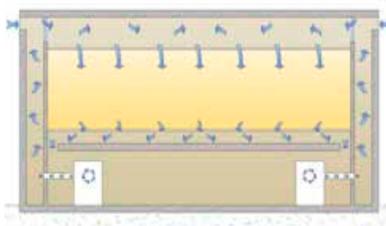




Hazard type

FRL FACTOR

PROBABILITY
OF A FIRE STARTING
X
CONSEQUENCES



movement of air into a clean room diagram

WHAT ARE THEY?

Clean rooms are enclosures with a low number of particles in the atmosphere due to the special requirements of the activities carried out there.

They are standard working environments in various industries such as: pharmaceutical, biotechnology, food, surgical equipment, optics, research and development labs, etc.

Fires cause great losses, not only due to damage from the fire itself on the combustible material, but for losses related to pollution in the room rising above permissible levels due to smoke and ashes.

When this occurs, the processes, components or tests carried out in these rooms are invalidated due to the modification of preset conditions.

Due to the high-end technology involved and the delicate processes undertaken in clean rooms, any change in established environmental conditions causes major damage.

THE EFFECT OF VENTILATION

In spaces which are this complex (mainly due to the continuous renewal of air) rapid detection is as important as the fast and efficient extinguishing of the fire in the shortest possible time. The challenge of detection lies in the difficulty of detecting smoke early because the air in the room is continuously being filtered.

SAFE EVACUATION

Clean rooms are occupied spaces or enclosures in which people work continuously. Their protection therefore becomes essential, protection both from fire and from the agent used to extinguish it. This agent must be non-toxic to humans and should not impair evacuation, for reasons of physical harm or impaired visibility.

Sources of fire

A fire is understood as its breakout and its immediate spread. However, considering that the oxidizer (air) is always present and that the chain reaction is a result of the fire, the basic conditions that will cause the breakout are: fuel and activation energy. Therefore, and taking the above into account, to assess the risk of fire you have to consider the probability of fuel and flashpoints coexisting in the same space and time, and with sufficient intensity.

The danger of a fire breakout quickly gathering force is high due to the continuous air supply and circulation.

The main causes of fire which can occur in this sort of installation are:

INTERNAL FACTORS

- High-risk activities, typical of the given business (if applicable)
- Using burners, lasers, welding machinery, etc.
- Handling highly flammable products (if applicable)
- Overheating machinery/equipment used in activities undertaken.
- Sparks caused by switches
- Short-circuits
- Overloading
- Static electricity

EXTERNAL FACTORS:

- External elements that might result in flames due to overheating
- Devices that produce heat: stoves, ovens, etc.
- Solar radiation
- Thermal and environmental conditions
- Welding operations
- Machinery running on a combustion engine

SPECIAL Note

*We must bear in mind that clean rooms have false ceilings equipped with air ducts and filters in addition to the wiring necessary for activities undertaken in these rooms. They also feature raised floors housing necessary HVAC and wiring elements and other installations. **Both false ceiling and raised floors are potential fire points to be controlled** due to the risk of elements they house and their own condition as blind elements, in which visual checks become more complicated.*



System selection

KEY CONSIDERATIONS

Rapid detection and extinguishing agent activation are essential in this type of hazard since the residue generated by the fire will be as damaging as the fire itself. The recommended extinguishing agents will vary due to the many features this type of enclosure can present, in its design, activity and the features of elements they house.

We will always prefer clean agent systems, as long as people in the clean room do not work with:

- Self-oxygenating pyrotechnic chemicals.
- Metal hydrides
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, etc.
- Radioactive elements such as uranium and plutonium

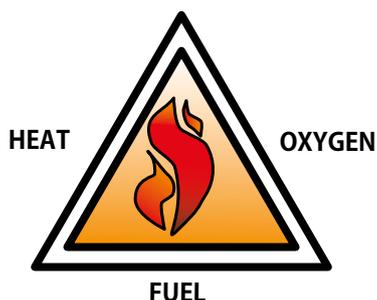
For these particular cases, we will choose specific systems.

RECOMMENDATIONS BY SIZE

The protection system and the agent selected depends largely on the size, shape and arrangement of the room itself.

The type, quantity and pressure of the agent—and the number of cylinders and storage space required—will also be factors.

The nozzles are designed according to system specifications, ensuring that the required pressure will be reached at the most unfavourable nozzle.



Small Clean rooms

- INERT-SIEX™
- SIEX-HC™ 227
- SIEX-NC™ 1230

Medium size Clean rooms

- INERT-SIEX™
- INERT-SIEX™ CONSTANT FLOW TECHNOLOGY
- SIEX-HC™ S-FLOW

Large Clean rooms

- INERT-SIEX™
- INERT-SIEX™ CONSTANT FLOW TECHNOLOGY
- SIEX™ WATER MIST SYSTEM

Fire prevention focuses on the removal of one of these factors: fuel, oxidizer (oxygen) and activation energy.

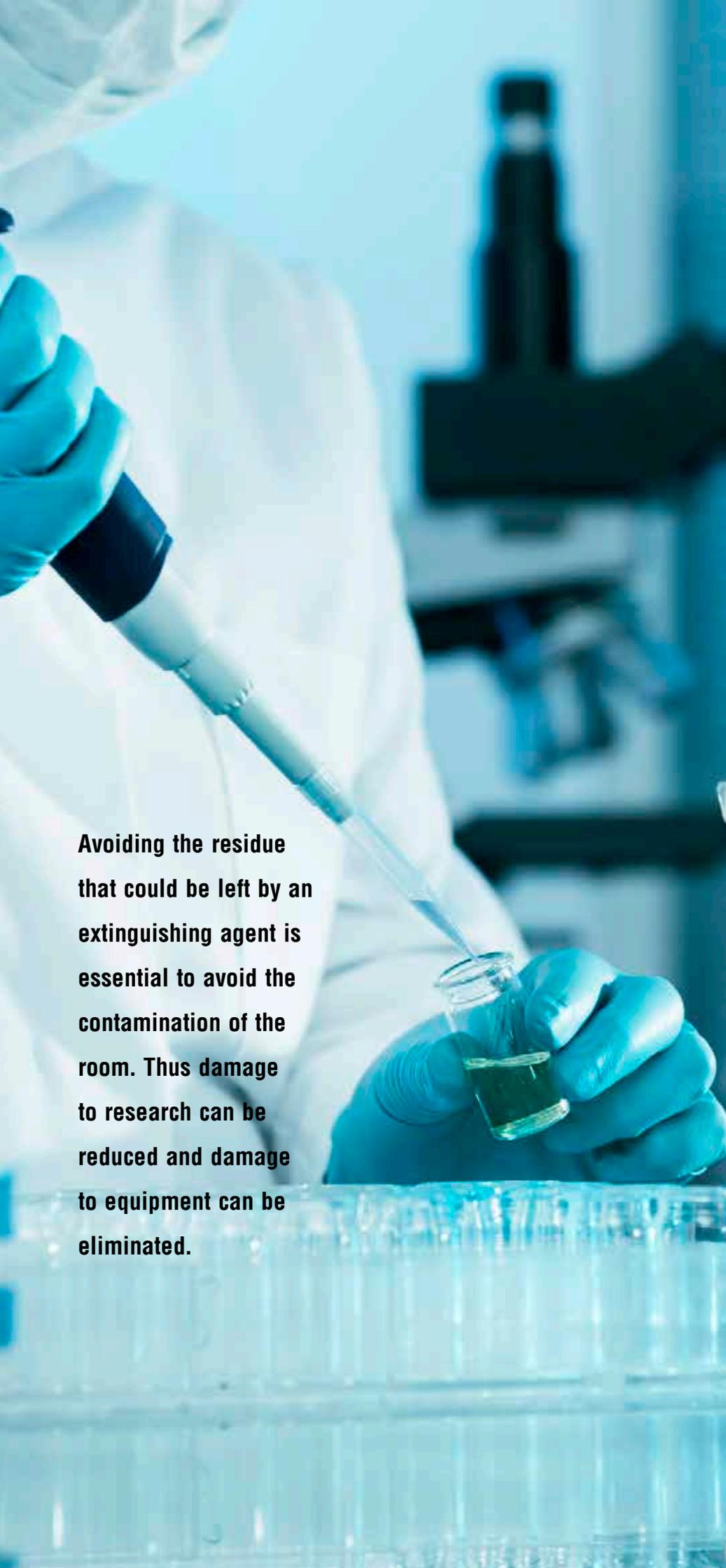
SIEX-HC™ S-FLOW

NEW

By storing HC-227 gas at pressures between 50 and 60 bar we ensure that gas is discharged at distances which would be unthinkable with less pressure. This facilitates the use of selector valves, saving on gas quantity, storage volume and space.

INERT-SIEX™ CFT

Adaptation of all inert agent equipment to systems with a constant pressure valve to ensure a more uniform, safe and controlled discharge.



Avoiding the residue that could be left by an extinguishing agent is essential to avoid the contamination of the room. Thus damage to research can be reduced and damage to equipment can be eliminated.

The risk considered for choosing the extinguishing agent concentration will depend on the type of materials that can be found in the room, such as the selected safety factor (if applicable).

The protection must be looked at from three different perspectives:

- Protection of any people that may be in the enclosure.
- Protection of equipment.
- Protection of the processes carried out in clean rooms.

TYPE OF APPLICATION

Total Flooding:

Since the main feature of these rooms is the continuous renewal and purification of air, they will always have openings and ventilation ducts. At the moment of discharge, the openings to the exterior must be sealed. Openings to other parts of the building (whether part of the clean room or not) need to be sealed as well or considered enclosures subject to total flooding.

Local application:

It should be used in cases where the hazard is not enclosed or where the enclosure does not meet the requirements for total flooding. The SIEX™ WATER MIST system is the most suitable for such applications in clean rooms, protecting only the spaces where the fire can start and without needing to flood the room.

SOLUTIONS

We offer a wide variety of extinguishing agents and application systems which address the multiple needs of modern buildings. All have been installed in the protection of this hazard and are characterized by:

QUICK RESPONSE
NON-TOXIC
NO RESIDUE
ELECTRICALLY NON-CONDUCTIVE



If we have to protect several hazards, it may be worthwhile to calculate the amount of agent for the one that needs the most agent. Both could be protected using selector valves from a main cylinder bank sized according to the most unfavourable hazard.

Due to the high value of products handled and the factors used for this handling, having a permanently connected backup unit is advisable. The protection of the hazard is therefore assured during refilling or maintenance periods.

It is also essential to ensure that proper maintenance is given to the system. For this purpose, continuous approved weighing systems, pressure switches and pressure gauges with electric contacts are highly efficient tools.

For greater maintenance convenience, SIEX boasts continuous weighing systems which allow ongoing monitoring of cylinder status.





Water mist extinguishing systems are those in which water resources are optimized by dividing the volume of drops discharged into tiny droplets, resulting in a very high cooling capacity for a reduced amount of H₂O. As an active

protection system, it is fast becoming one of the most developed and useful technologies in the firefighting industry due to its efficiency and respect for the protected material.

Low space requirement, application versatility, environmentally friendly, requires no sealing, easy to use and maintenance, rapid temperature reduction, protection of large areas, reduced pipe diameters, easy installation and maintenance, gas and toxic fume scrubbing.

MINIMAL SPACE REQUIREMENT
HIGH SUPPRESSION AND CONTROL CAPABILITY
ENVIRONMENTALLY FRIENDLY
MINIMUM NUMBER OF NOZZLES
SMALLER PIPE SIZES
LONG PIPE RUNS
EASY TO INSTALL
LESS DAMAGE FROM PARTICLES AND SMOKE
REDUCED WATER DAMAGE
LOW MAINTENANCE COST

Its high pressure allows the use of long pipe runs and selector valves. Extinguishing agent could thus be saved by having buildings devoted solely to this purpose or having various clean rooms for this use, with the associated savings in money, space and weight load on the building structure. Its design concentrations make it suitable for occupied areas.



IG-01 – Argon.

IG-55 - 50% Argon and Nitrogen

IG-100 – Nitrogen.

IG-541 – 52% N₂ +40% Ar +8% CO₂

OBTAINED FROM THE ATMOSPHERE
LOW-COST AGENT
EXCELLENT VISIBILITY FOR EVACUATION
CHEMICALLY NEUTRAL
STORAGE PRESSURES
150, 200 AND 300 BAR
LONG PIPE RUNS



It delivers very stable performance, offering great confidence both during storage and at the moment of discharge. Users can be assured that the HFC-227 System that has not been used for a long time will not underperform.

IDEAL FOR OCCUPIED AREAS
INCREASES THE SAFETY MARGIN
HIGH EXTINGUISHING CAPABILITY
STORAGE FROM 24 TO 60 BAR
ZERO OZONE LAYER DEPLETION
NON-CORROSIVE WITH ELECTRICAL AND ELECTRONIC MATERIALS

Our commitment

CHOICE OF SYSTEMS

SIEX has the widest range of products and systems to suit different needs, both as regards pressures and extinguishing agents.

COMPETITIVE PRICE

Optimizing all of our processes make us more and more competitive worldwide.

SPECIALIZED ENGINEERING

Our highly qualified staff ensure the best service for customers both as regards technical advice on the choice of system, and solving any problems that might arise after installation. Backed up by our extensive experience and a track record of successful projects.

INNOVATION

At the forefront of innovation in every product we develop, ensuring the technical features offered.

QUALITY GUARANTEE

All products meet the highest quality requirements and internationally recognised official approvals.

OTHER SPECIAL HAZARDS PROTECTING BY SIEX:

SERVICE STATIONS

ARCHIVES AND LIBRARIES

DPCs

PAINT SPRAY BOOTHS

ELECTRICAL PANELS

INDUSTRIAL KITCHEN

TURBINES AND GENERATORS

ROAD TUNNELS

NATURAL GAS PLANTS

CLEAN ROOMS

CABLE TUNNELS

TELECOMMUNICATION CENTRES

HOTELS

HOSPITALS

EDUCATIONAL ESTABLISHMENTS

TRAIN AND UNDERGROUND STATIONS

TRAINS

TRANSFORMERS

OFFSHORE PLATFORMS

SOLAR THERMAL PLANTS

MACHINE TOOLS

PRINTING INDUSTRY

HISTORIC BUILDINGS

ROBOTIC PARKINGS

WIND TURBINES

STEEL INDUSTRY

BANKS

OFFICES

LARGE VEHICLES

CONVEYOR BELTS

GAS PUMPS

OIL & GAS

TIMBER INDUSTRY



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