

AUTOMATIC FIREFIGHTING  
SYSTEMS IN  
**TRAINS**





## Hazard type

*SIEX WATER MIST solves the problems of traditional water-based extinguishing, minimizing the installation space, improving visibility for evacuation and protecting equipment.*

*FOAM SIEX PREMIX extinguishes fire quickly and effectively by covering the burning surfaces and preventing fire spread, with highly satisfactory results in the protection of LOCOMOTIVES*

The train or rail vehicle consists of two basic elements: machinery carriages and carriages carrying both people and various types of cargo. It is certainly the most important form of land transport. Moved by mechanical means, it rolls on specially designed track.

Underground or metro transport is included in this term.

Though it is essential to protect people, property and production continuity in any kind of hazard, trains carry not only people, but all kinds of products, so that in addition to generating significant losses, there is an added factor; the social risk in the face of catastrophes.

In a hazard of this kind, where the possibility of loss of life in case of accident is very high, protection depends largely on visibility and the impact on existing equipment. The successful use of water as an extinguishing agent depends on the pipe size. All of this is particularly challen-

ge since it the train is a moving object in an unconfined space.

Water mist does not affect visibility, does not damage existing equipment and used reduced pipe sizes when compared to conventional sprinkler systems, given its lower water requirements, with a consequent reduction in the number and size of tanks used. This is why it is the most effective solution.

It should be borne in mind that not only the carriages are protected, but it is important to protect the locomotive engines or motors. This solution can be adopted using the same system mentioned above or, given the small area to be protected, by foam systems.

SIEX provides approved equipment specifically for this purpose. The nozzles have passed the most stringent full scale fire tests, and have been approved by the major international certification bodies.

# Sources of fire

Possible causes that can trigger a fire in this type of equipment are internal factors such as sparks from switches, short circuits, overloads, static electricity, sparks due to friction with the tracks, and even sparks from nearby fires.

However, the most important factors are due to technical and human errors or to weather conditions such as:

- Accidents and faults
- Dirt or external elements that might result in flames due to overheating.
- Internal combustion vehicles or machinery
- Sabotage
- Acts of terrorism
- Thermal conditions, wind, etc.

All of these factors must be considered, as far as possible, when selecting the fire prevention system.



In any case, it must be borne in mind that there are countless types of rail transport, depending on:

- Type of load.
- Type of traffic: interurban, surface, underground
- Maximum number of carriages
- Directions of travel: Unidirectional or bidirectional.
- Type of structure.

It is essential with this type of infrastructure to reduce, as far as possible, the risk of a fire starting, so the design and choice of materials used for its construction is of the greatest importance. It is equally necessary to ensure a rapid response by the fire detection and extinguishing systems, to minimize and contain the risk.

*The consequences of the high rates of heat release produced by this type of hazard, in confined spaces, are:*

- *High cost in human lives and injuries. Social risk.*
- *High cost in damage to property.*
- *High cost of damage to the structures needed for transport, the slow recovery of rail traffic.*
- *Environmental cost.*

# Protection

The protection must be looked at from four different perspectives:

1. Protection of people inside the carriages, preventing the spread of fire and/or suppressing it.
2. Improved escape route visibility. A key element in underground transport is minimizing smoke.
3. Cooling the carriages in order to reduce the extent of damaged areas and protect surrounding areas.
4. Detection at an early stage, with a rapid response system.

In this particular case, four aspects are essential for fire protection:

## FIRE LOAD:

Control in the design of the various materials making up the different carriages.

## DEFINE THE OBJECTIVE:

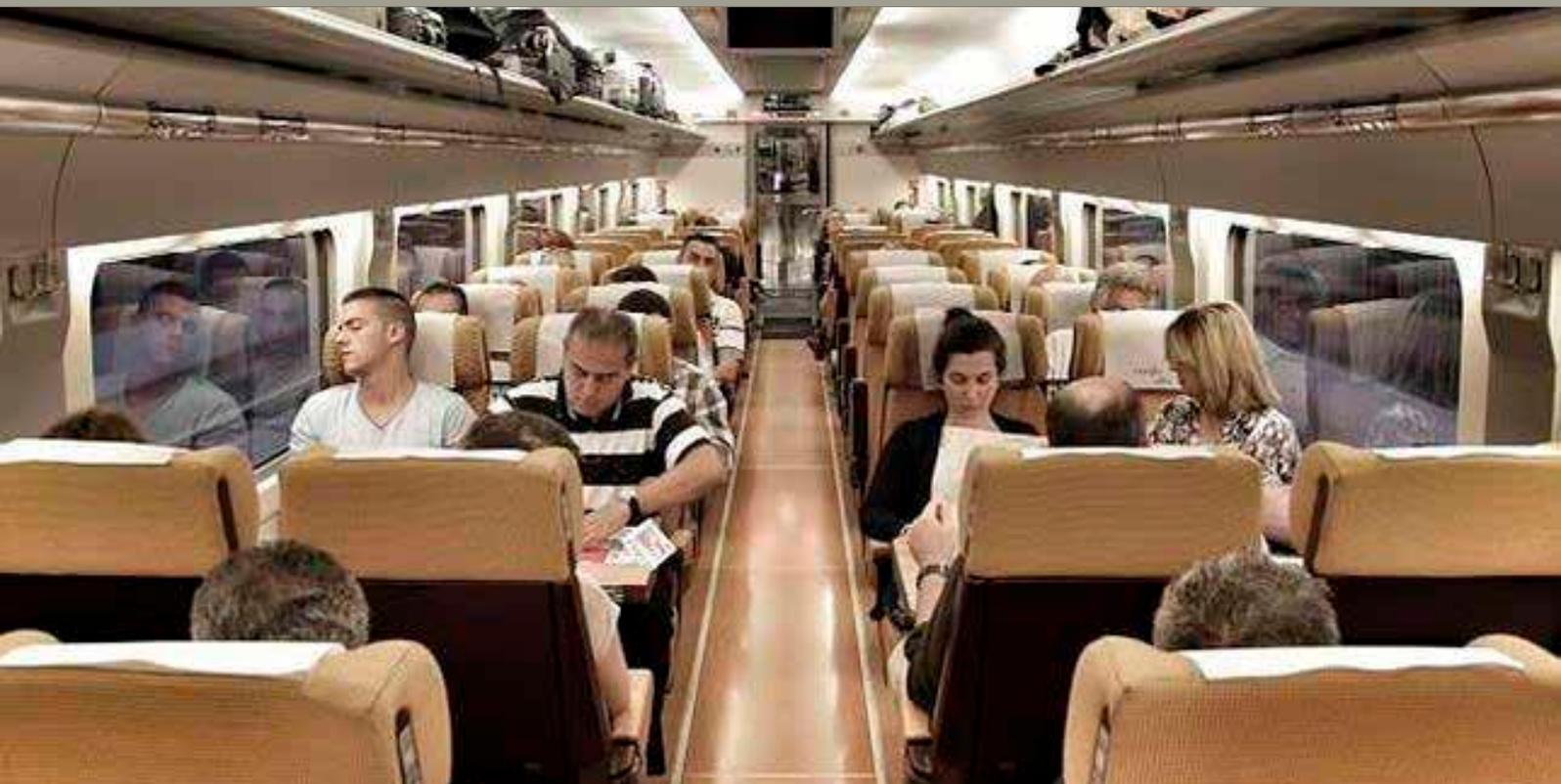
Control, suppression and/or extinguishment.

## FAST DETECTION:

Early detection by smoke aspiration for continuous analysis of the air.

## PROTECTION:

Remove the high temperatures which might activate or re-initiate the fire.



# Solutions



Water spray applied directly onto protected areas by LOCAL APPLICATION.

Designed to fulfill the following functions:

**FIRE CONTROL:**  
LIMIT THE GROWTH AND SPREAD OF FIRE.

**COOLING:** The high specific surface area of the droplet means the efficiency of heat absorption from the fire is greater than in other systems; this produces in the various carriages a considerable temperature drop in the materials and the air around the fire.

**SUFFOCATION:** the transformation of water into steam makes its volume increase about 1,600 times, which results in a reduction in the oxygen concentration around the fire, thus controlling the fire.

**FUEL SEPARATION:** droplets resting on the surface of the combustible material prevent heat reaching it and therefore the fire from spreading.

**FIRE BARRIER:** Complementing and reinforcing fire protection structures, preventing the spread of the fire to other areas and knocking down smoke and other combustion gases.

**FIRE SUPPRESSION:** TO REDUCE THE HEAT RELEASE RATE OF FIRE.

## SYSTEM

**Local Application:** designed to extinguish fire in motors, locomotives, etc. A direct discharge is directed onto the machine to be protected.

**Total Flooding:** aims to suppress and control the fire. It acts on the complete carriage.

**Agent storage:** cylinder bank, since they are small enclosures.

**Type of pipework:** for carriages dry pipe with open nozzles are used with the alarm and system release signals coming from the detection system.

*Water has been used as an extinguishing agent since man has been exposed to fire.*

*Of all the substances found in nature, water has the highest specific heat, after hydrogen and helium.*

*The latent heat of vaporization is the highest of all liquids, making it an excellent firefighting medium.*

*It is the nozzles which are the technological heart of this system and on which its effectiveness depends.*

*Our company currently boasts a large number of nozzles with proven effectiveness for various hazards.*





## BENEFITS OF WATER MIST SYSTEM

### EASY TO INSTALL

The handling of constituent elements makes assembly easier and drives down costs related to installation of the complete water mist system during construction of the car park or in subsequent integration, when compared with other systems.

### ENVIRONMENTALLY FRIENDLY

Water is currently a scarce resource and, thanks to water mist, its use is optimized. Pumps used in these systems are also more efficient than traditional systems.

### HIGH SUPPRESSION AND CONTROL CAPABILITY

The specific surface of water discharged is far superior to sprinkler systems and therefore the heat absorbed is much greater and faster for the same quantity of water.

### MINIMAL SPACE REQUIREMENT

The size of the pumpsets and water tanks installed is smaller than with those in traditional systems, thanks to significant savings in the water used. This reduces the space required in the pump room.

### MINIMUM NUMBER OF NOZZLES

Optimizing the design parameters of the nozzles maximizes their coverage compared to other systems and therefore reduces the number of these that need to be installed.

### LONG PIPE RUNS

The high pressure at which the water is pumped allows piping networks with longer pipe runs to be used, such that a single pump room can supply water to the entire car park.

### LESS DAMAGE FROM PARTICLES AND SMOKE

The discharge of water mist has the effect of scrubbing smoke and particles produced by the fire, which facilitates evacuation until the arrival of fire fighters responsible for extinguishing the fire.

### REDUCED WATER DAMAGE

Unlike traditional sprinkler systems, where sometimes the damage caused by the water discharged is greater than damage attributable to the fire itself, the small droplet size and the low flow of water mist systems ensures minimal damages.



For motors/engines, the properties of pre-mix foam make it very suitable and a highly effective solution. Reducing the risk by attacking the fire automatically in its early stages. With a low-expansion system, the foam increases in size 20 times when applied. The foam is applied to the surfaces, where it extinguishes the fire or prevents ignition by creating a protective layer that prevents O<sub>2</sub> reaching the surfaces.

**This provides the necessary security against flammable and combustible liquids.**

*The foam layer works efficiently on this type of fire since it prevents the creation of flammable vapours, restricts air and cools the fuel and hot surfaces.*

This efficiency is achieved by a suitable distribution of the nozzles and the efficient and instantaneous operation of all components of the system which contribute to the discharge.

DOES NOT REDUCE THE OXYGEN IN THE ATMOSPHERE
SUITABLE FOR OCCUPIED AREAS
EASY CLEAN-UP OF RESIDUE
RAPID EXTINGUISHMENT
IT INCREASES THE SAFETY MARGIN
HIGH EXTINGUISHING CAPABILITY
NON-CORROSIVE TO ELECTRICAL OR ELECTRONIC MATERIALS

## BENEFITS of PREMIX FOAM

### Very stable behaviour.

The film formed which separates air from the fuel, preventing re-ignition.

### Rapid extinguishment

It has a high extinguishing capability power of extinction because it prevents the possibility of new fires by separating the O<sub>2</sub> from the fuel.

### No adverse effects on health.

Does not reduce the oxygen level in the environment.

### Safe for equipment

Its chemical composition does not react with electrical or electronic components, so there is no risk of corrosion or damage to electrical and automation equipment.

### Standalone installation

As a premix, it works efficiently and independently, even with the train in motion, with no need for an external supply or extra storage space.

## 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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