Performance Based Fire Protection With Water Mist

the applications to industrial hazards, high rise buildings and other areas of interest

PART 1
PART 2
PART 3
PART 4
PART 5

Marioff Corporation
Why use HI-FOG®?
Industrial
High Rise
Other Examples

Luciano Nigro – Marioff Corporation

PART 1

Introduction - Marioff Corporation

In case of fire, this is good
This is better
Marioff Corporation

- **Activity**: Fire protection system manufacturer and supplier
- **Product**: HI-FOG® Water Mist Fire Protection System
- **Mission**: Protecting people, property & business continuity from fire
- **Core benefits**: Reduced fire, smoke and water damage
  - Minimal business interruption
  - Environmentally friendly

Marioff Corporation HQ, Vantaa, Finland

Marioff History in short

- **1985**: Company was founded
- **1991**: HI-FOG® was launched
- **Today**: World’s leading water mist fire suppression company
  - HQ in Finland; offices in Germany, Italy, Spain, Sweden, UK and France. Extensive distributor & agent network
  - Part of United Technologies Corporation
  - More than 400 employees worldwide
  - Thousands of Marine and Land systems installed

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Marioff and HI-FOG® today

- Marioff protects yearly hundreds of hazards that include, very often, important buildings as well as valuable industrial equipment
- Development of new systems and new applications continue every day of the year
- HI-FOG® is a well known brand, sometimes used as a synonym to water mist fire protection

PART 2
Why use HI-FOG®?

In case of fire, this is good

This is better
Let’s ask what are the reasons to install a HI-FOG® water mist fire protection system

• First of all: the reduced amount of water needed to control a given fire hazard, with respect to any other kind of technology – that means less water storage, but also less water damage!

  We talk about thousands of liters instead of hundred thousands

• the size of the system and the size of the piping also play a role, specially in retrofit projects

• The high system pressure allows us to reach long distance as well as high heights

Let’s ask what are the reasons to install a HI-FOG® water mist fire protection system

• When talking about industrial hazards water mist represents a valuable alternate solution to gaseous systems especially when room tightness is an issue for the efficacy of the protection!

  We talk of allowed openings going from significant leakages to open doors

• the size of the system can be quite similar to the size of an ordinary gaseous system.

• The refilling of the system generally requires just a certain amount of plain water.
Water Mist technology follows a Performance-based approach. All critical water mist system design and installation parameters are defined in full-scale fire tests:

- Nozzle type
- Operating pressure
- Flow rate
- Spacing
- Installation height

Therefore the applications strongly depend on the fire tests that have been conducted.

HI-FOG® have been tested

As mentioned before, HI-FOG® have been tested in a large variety of applications and therefore it can be used for a large variety of applications!

They include:

- The complete series of marine applications, allowing Marioff to protect the large cruise ships.
- Commercial buildings including Hotels, High Rise buildings, Data Centres, Museums and Hospitals.
- Industrial applications
- Tunnel
- Trasportations .... And many others...
# HI-FOG® fire testing

## Marine applications
- Accommodation spaces, public spaces, service areas
- Balconies
- Special category and Ro-Ro spaces
- Deep fat fryers
- Galley and laundry ducts
- Machinery spaces: compartment protection
- Machinery spaces: local application
- Various applications

## Land applications: buildings and construction
- Light & ordinary hazard 1 occupancies e.g. hotels, offices
- Ordinary hazard 2: parking garages
- Ordinary hazard 3 e.g. archives, shopping malls
- Ordinary hazard 4 e.g. theatres, cinemas
- Prisons
- Computer rooms
- Concealed spaces with cables / cable ducts

## Land applications: industry and energy
- Gas turbines, machinery spaces and special hazard machinery spaces
- Outdoor transformers
- Industrial oil cookers
- Industrial cable tunnels
- Wet benches
- Fume hoods
- Anechoic rooms

## Miscellaneous
- Window cooling
- Structural protection
- Smoke extraction
- Operational fire fighting

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EXAMPLES
among the others...

HI-FOG® for Industrial Applications
HI-FOG® for High Rise Buildings

Industrial Applications
Industrial HI-FOG® applications

Power Generation & Power Plants
- Gas turbines
- Diesel generators
- Turbines
- Conveyors

Power & Data Distribution
- Transformers
- Cable tunnels
- Cable rooms

Industrial Fryers
- Oil Cookers
- Ducts
- Fines Boxes

Manufacturing & Machinery Spaces
- Painting Booths
- Wind tunnels
- Engine test cells
- Production machinery

Pulp & Paper Industry
- Paper machines
- Conveyors
- Pulp dryers
- Coaters
- Accessory machinery

How to approach the challenge

When approaching a problem of fire protection with water mist technology, there are a few steps to comply with, in terms to achieve an effective protection system:

- Classify the Hazard
- Check whether a fire test protocol exists for that hazard
- Check whether there are approvals issued by any recognized fire protection authority according to that protocol
  - It is then possible to find at least an approved water mist system for the application
- Consider the available systems.
Fire test protocols for Machinery Spaces

In the specific case of the Machinery Spaces there are several fire test protocols available.

- Factory Mutual classify the Machinery spaces dividing the Combustion Turbines from the other Machinery Spaces and Special Hazard machinery spaces. They issue the test protocols (FM 5560) and approve several systems, including Hi-Fog.
- The German VdS also publish a fire test procedure for Machinery Spaces and issues approvals for water mist systems, including Hi-Fog.
- Other protocols are available from IMO for Machinery Spaces on board of ships.

Different types of water mist systems

The water mist systems that can be applied to the machinery space fire protection case are:

- Total Flooding water mist systems discharging water mist into the entire volume of the enclosure for a duration that is the key design parameter, together with the nozzle position and the water flow.
- Local application systems, where the water mist is applied to the specific area of hazard or to the specific machinery involved. In this case the extension of the system to cover all significant portions of the hazard also plays an important role together with the above mentioned parameters.
Example of Gas turbine fire protection with cylinder system (total Flooding)

Electrical Pump, MT4 Systems
GPU System (No electricity)

Hotels

Le Méridien Etoile, Paris, France
High-rise buildings

Hotel as well as Offices, or residences can be housed in a High rise building, that enhance the fire hazard...

- Cirrus, Helsinki, Finland’s tallest residential building
- 28 stories
- 1,000 HI-FOG® sprinklers

- Less space needed for risers
- No booster pumps needed up to 300 m
- Less water damage compared to traditional sprinklers

How to approach the matter

The approach is the same as before

- Classify the Hazard: when talking of High Rise buildings the hazard is mainly related to the occupancy of the building
- Check whether a fire test protocol exists for that hazard.
- Check whether there are approvals issued by any recognized fire protection authority according to that protocol
  - It is then possible to find at least an approved water mist system for the application
- Consider the available systems and their suitability for the protection to be provided.
Fire test protocols for Commercial Buildings

When talking about buildings the most common case is to deal with building having multiple occupancies and related hazards. The available protocols include:

- Factory Mutual Light Hazard fire test protocol
- The German VdS offices and Hotel protocol including raised floors and false ceilings.
- The UL 2167 protocol for Ordinary Hazard occupancies that very often are included in the buildings.

In any case we talk of closed nozzle “sprinkler like water mist systems”

High pressure water mist in action

Hotel Room Fire
Water Mist Fire Protection System

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Example: hotel room fire

- Safer evacuation
- Less fire & smoke damage
- Less water damage

The advantages are enhanced in High Rise Buildings

- HI-FOG® can protect high rise buildings with the advantages of high pressure that avoids the need for multiple pumping systems taking care each of a group of stories.

- HI-FOG® will use a limited amount of water, therefore minimizing the water discharge, that means minimizing also the need for water drainage facilities.

- HI-FOG® reduced size piping allows an easy installation, especially in retrofitting projects.
OTHER EXAMPLES

In case of fire, this is good

This is better

HI-FOG® marine references

Cruise Ships  Ferries & RoPax  RoRo & Car Carriers  Service Vessels

Cargo Vessels  Luxury Yachts  Navy  Offshore E&P
Large data centres

Key System Benefits

Total Facility Fire Protection
- All the spaces can be protected
- Simplicity of maintenance
- Total cost savings

Operational Reliability
- High quality components
- Strong R&D
- Minimized risk for leakages and false discharges

Safety
- No chemical additives & toxic by-products
- No risk of being banned
- Evacuation & fire fighting possible

Scalability
- Support for modular concept
- Centralized pump unit
- Only sprinkler & tubing network expanded

Flexible Installation
- Accommodates to other equipment
- Small tubing
- Compact pump units and water tanks
- No enclosure integrity requirements

Minimized business disruption
- Very small amounts of clean water
- Localised discharge

Green System
- HI-FOG® supports the environmentally sustainable design
- Low water consumption
- No demands on building fabric
- Etc.

Turn-key deliveries
- Expert services throughout the system lifecycle
HI-FOG® on land
Protecting transportation infrastructure

Transportation infrastructure

- Road and railway tunnels
- Metro stations
- Underground facilities
- Trains
Airport trains

Washington Dulles Airport, USA

Metro stations

Madrid Metro, Spain
Trains

Over 1,500 Madrid Metro train carriages protected and counting

Road tunnels

HI-FOG® benefits
• Proven performance
• Improved safety for people and property
• Low water consumption
• Harmless to people and the environment
• Long system life
Road tunnels

Paris
- A86 West tunnel, part of “super-ring” road
- HI-FOG® protects 10 km section, two super-imposed levels
- Three pumping stations

Madrid
- Tunnels of the M30 inner ring road
- HI-FOG® protects 5 important sections

Abu Dhabi
- HI-FOG® protects Salam street Tunnel 4.2 km
- Middle East first automatic tunnel fire protection system

Helsinki
- HI-FOG® protects City Service Tunnel
- Finland’s first automatic tunnel fire protection system

AND MANY OTHERS

JUST ASK...
THANK YOU