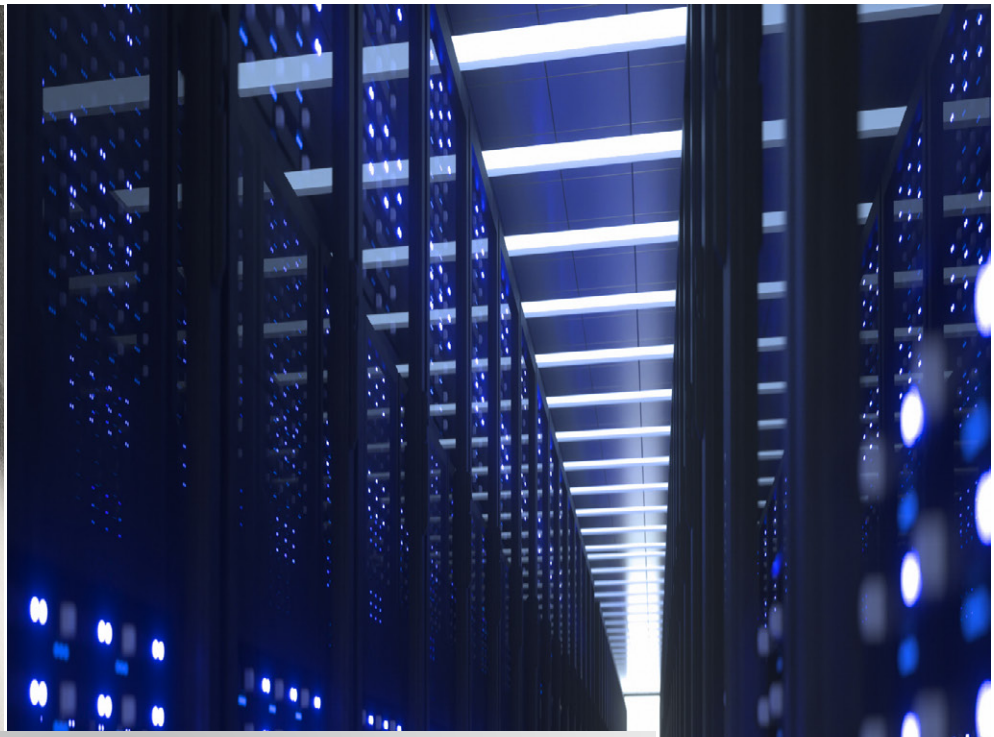
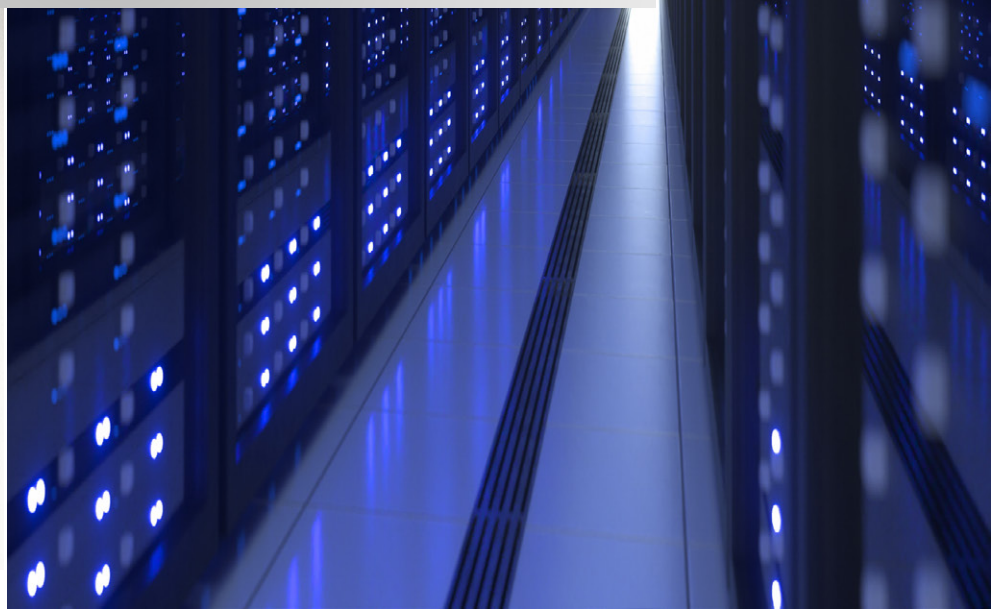
AY-SO

Fire | Gas | Valves | Pumps

YANGIN SÖNDÜRME SİSTEMLERİ



# HI-FOG Water Mist System
## Data Centers and Control Buildings



HI-FOG®  Marioff United Technologies  SECURITON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# Outline

# HI-FOG®

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Fire | Gas | Valves | Pumps

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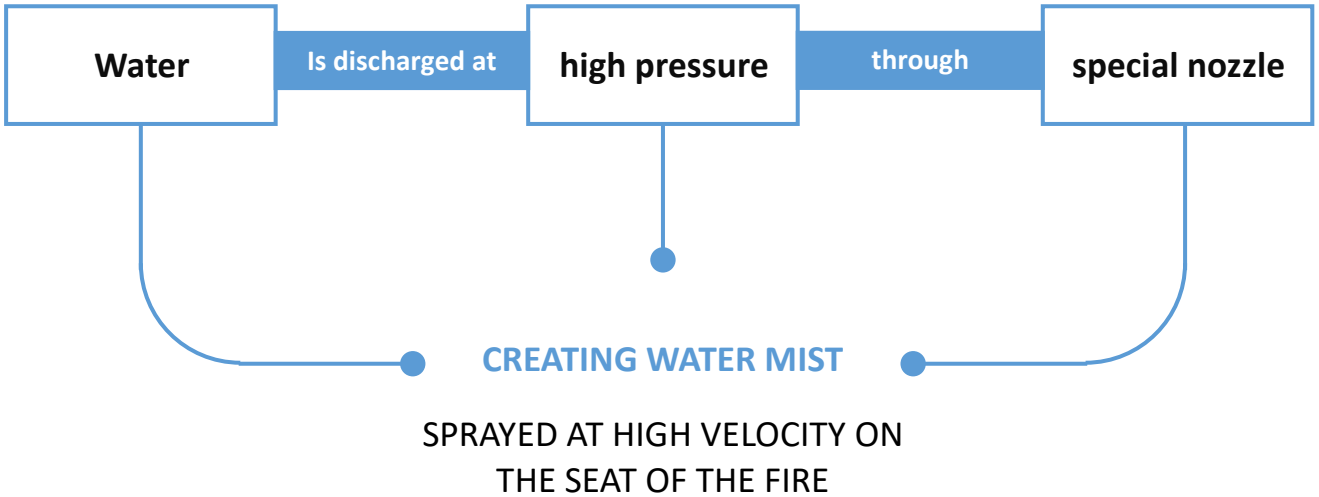
**Marioff** was founded in 1985 in Finland with pure entrepreneurial spirit and a motivating mission: to protect people, property and business from fire, on land and at sea. The spirit lives on in a story of continuous growth, and today Marioff is a leading supplier of water mist fire protection systems.

The company's background in marine and offshore high-pressure hydraulics (hence the name, Marine and Offshore) led to the development of a fire protection technology, which makes use of the best attributes of a truly environmentally benign agent: water. Since its launch in 1991, HI-FOG® has earned a reputation for superior fire suppression performance, and has become the standard fire protection with water mist.

**HI-FOG®** high-pressure water mist fire protection system is the result of great innovation: fire is suppressed with less water. The technology is incredibly versatile, and its performance has been verified in thousands of full-scale fire tests.



HI-FOG® fights fire in three ways: by cooling the fire and the surrounding area, by blocking the radiant heat, and by removing the oxygen from the seat of the fire.


HI-FOG® has been tested across a wide variety of applications and holds a large number of type approvals from recognized approval authorities.

# HI-FOG® Main Components

AY-SO
Fire | Gas | Valves | Pumps

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- **HI-FOG® Main Components – Pump Units**

**HI-FOG®** Electric Pump Unit

**HI-FOG®** Gas-driven Pump Unit (GPU)

- **HI-FOG® Main Components – Valves**

  HI-FOG® section valves are used to divide the system into sections, which make it easy to locate the fire and service the system in one area while the other parts are kept up and running.

Normally
Open Valves

Release and
Control Valves

Normally
Closed Valves

- **HI-FOG® Main Components – Piping and Fittings**

- **HI-FOG® Main Components – Sprinklers**

# Protecting Your Cloud With Mist

AY-SO
Fire | Gas | Valves | Pumps

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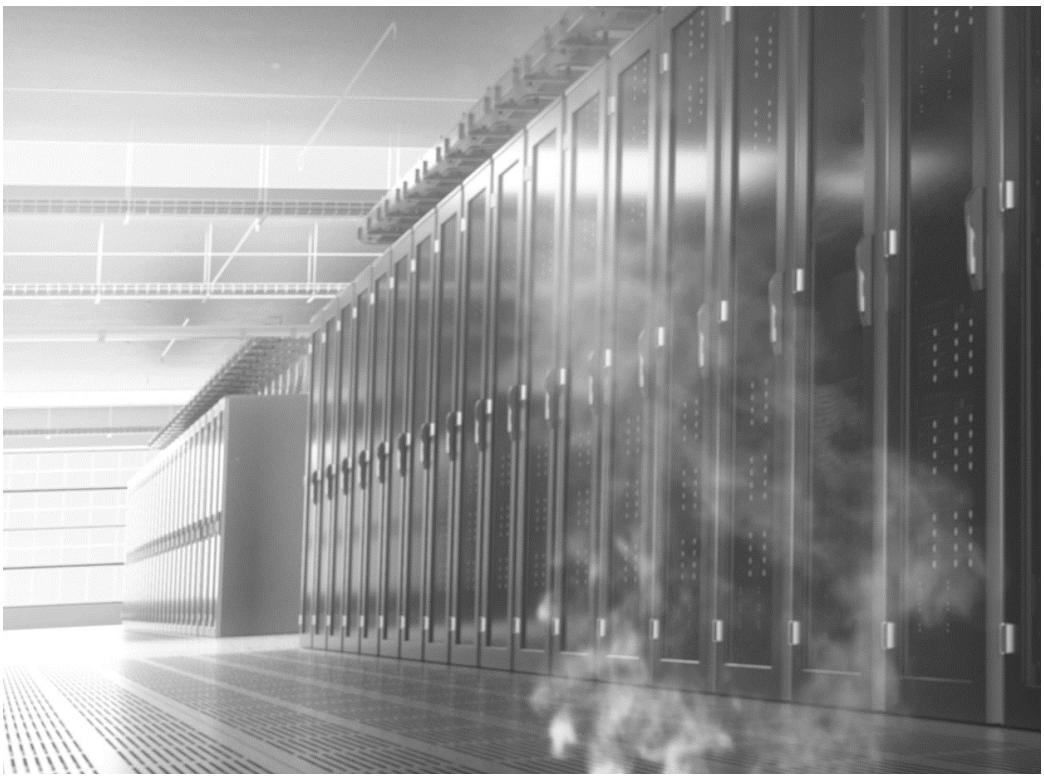
## Protecting Your Cloud With Mist

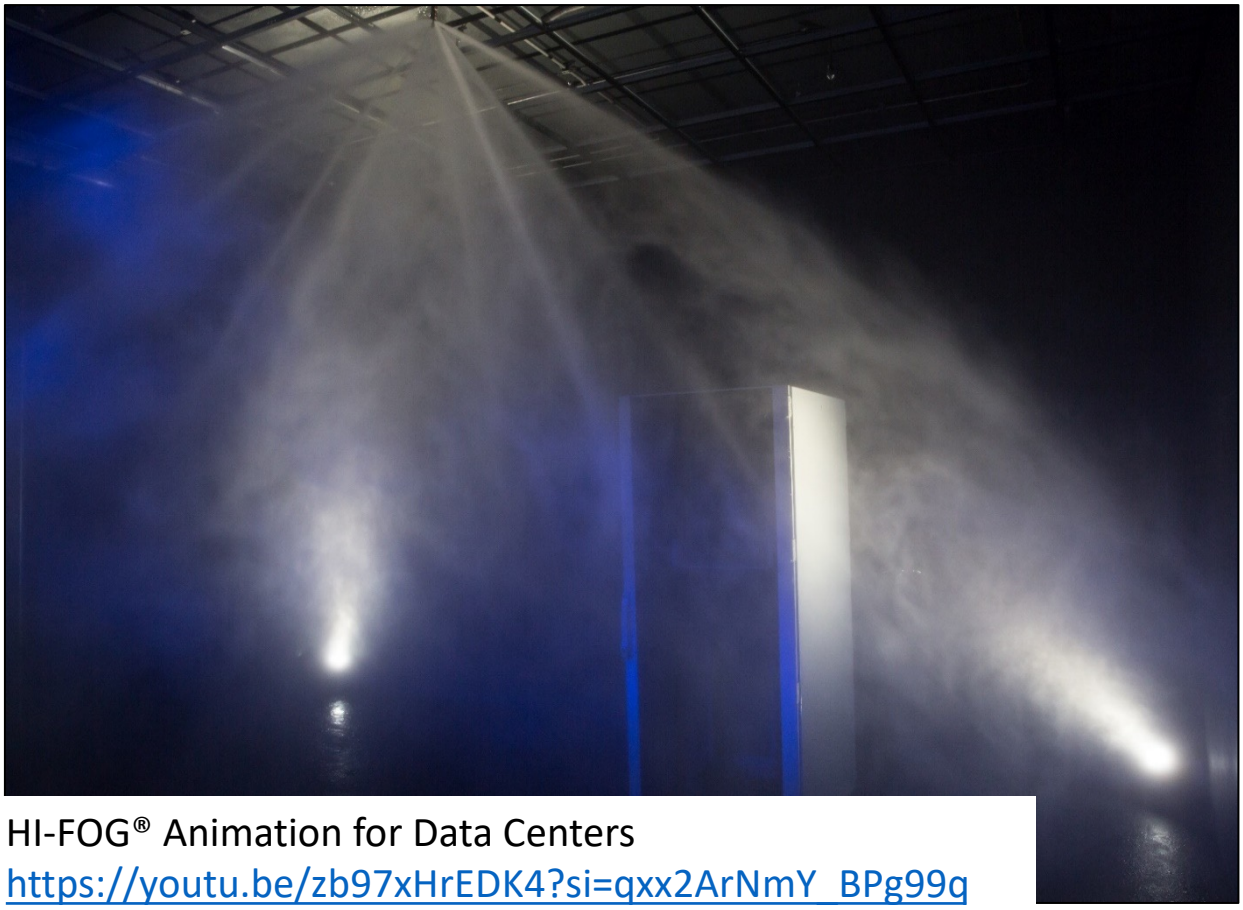
Fire suppression in data centers can be challenging due to the high airflow and the increased power density of servers.
HI-FOG®, renowned for its ability to suppress, control and cool fires, has proven to be an ideal fire protection system for these critical facilities as it can efficiently function in ventilated conditions and narrow spaces under the raised floor of a data hall.
HI-FOG® is the first high-pressure water mist fire protection system to fulfill the new standards for data center fire safety and receive FM Approvals Certificate for protecting data halls and subfloors from fire.



## Protecting Your Cloud With Mist

FM Approvals has identified the increased fire risks in data centers and upgraded the FM Standard 5560 to incorporate new fire test protocols for data processing equipment halls and cable trays below the raised floors.

HI-FOG® is the first high-pressure water mist system to meet the new requirements and earn FM Approvals Certificate after full-scale fire tests.



HI-FOG® Animation for Data Centers
https://youtu.be/zb97xHrEDK4?si=qxx2ArNmY_BPg99q

# HI-FOG® Benefits

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Fire | Gas | Valves | Pumps

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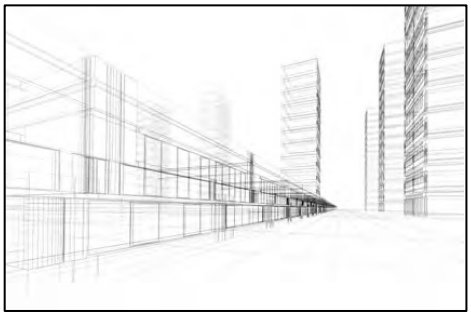
## Total Facility Fire Protection



**HI-FOG® can protect not only the main server areas but also the ancillary spaces:**

- Back-up power generator areas, UPS areas, HVAC / CRAC system areas, offices, corridors etc.
- Optimized system design
  - Variety of system configurations

**Fires may start in areas surrounding the server hall:**

- “Waste-basket fires”, arson, human error, electrical appliance malfunctions etc.

**No need for several different systems in the building:**

- Simplicity of maintenance
- Total cost savings
  - Reduced purchase costs
  - Reduced lifecycle costs

**Planning for HI-FOG® in the building can lead to total cost savings:**

- Lower fire rating
- Reduced need for evacuation-related features

## Scalability

**“The modern data center will be a ‘living organism’ built in modules when the need for new capacity arises”**
(Source: Gartner analyst, October 2008)

**HI-FOG® can easily be expanded to cover new areas:**

- One centralized pump unit can cover wide areas over long distances
- Only the sprinkler / tubing network needs to be expanded
  - Fast system expansion

## Flexible Installation

HI-FOG® system accommodates to other equipment, structures etc. In the facility thanks to its installation flexibility and small components

**HI-FOG® tubing is small (Ø12 - Ø38 mm)**

- Can be routed to difficult spaces, bent onsite
- Accommodates other equipment in the space

**Compact pump units require relatively little space**

**Small water consumption: small water tank / water feed**

## Operational Reliability

### The reliability of the HI-FOG® system is ensured

- By high-quality components
- By strong R&D

### Minimal risk of leakage and false discharge

- Connections & fittings are of high-pressure hydraulic type
- Different system configurations e.g. pre-action, dry-pipe, wet-pipe…
- Sprinklers are durable and the heat-sensitive bulb is protected by a cage structure

## Minimized Business Disruption

HI-FOG® provides efficient fire protection and minimizes business disruption due to fire

**HI-FOG® uses very small amounts of water**

- 70-90% less than traditional sprinkler system
  - Flux densities of 0.6 –1.5 lpm/m² (conventional 4.1 – 5 lpm/m²)

**Localized system discharge**

- Water mist is discharged only at the point of the fire

**Stainless steel tubing (AISI 316L) ensures clean water**

- “Black water” discharge is common with conventional sprinkler systems

## Safety

HI-FOG® is entirely harmless to people and the environment

**Fire fighting agent is clean potable water**

- No chemical additives, no toxic by-products

**No risk of being banned**

- Water is the most benign agent there is!

**Evacuation & fire fighting possible with system activated**

- No visibility-related problems
- Efficient radiant heat blocking actually enhances personnel safety

## HI-FOG® for green data centers

HI-FOG® supports environmentally sustainable design for the data center of the future

- Supports a modular design approach
- Does not impose specific structural demands on the building
- Not hazardous to the environment or people
- Possible savings during building construction
- Virtually no electricity consumption in stand-by state
- Long-lasting materials with high reclamation value

# System Comparison

AY-SO
Fire | Gas | Valves | Pumps

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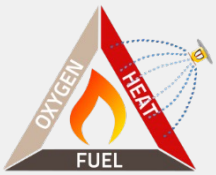
## Systems Comparison - System Performance

| | High Pressure Water Mist System | Low Pressure Water Mist System | Gaseous Systems |
|---|---|---|---|
| **Fire extinguishment** | Superior<br>Works using 3D gaseous characteristics | Wetting the serves | Wetting the serves |
| |  <br>Cooling<br>Oxygen inerting<br>Blocking radiant heat |  <br>Cooling |  <br>Oxygen inerting |
| **System life time** | Long<br>Stainless steel tubes 316L | Short<br>Steel pipes | Medium<br>Due to the limited life time for the agent in the cylinders |
| **Smoke scrubbing** | High<br>Clean the smoke for easier scape | No effect on smoke<br>Depends on the cooling mechanism only | No effect on smoke |
| **Down time for cleaning after extinguishment** | Low<br>Uses very small amount of water | High<br>Uses larger amount of water | Medium |
| **Down time for refilling** | Low<br>System can start immediately due to the small size of the tank | Medium<br>Much larger water tank | Very High<br>System become out of service until cylinders are refilled |

## Systems Comparison - System Performance

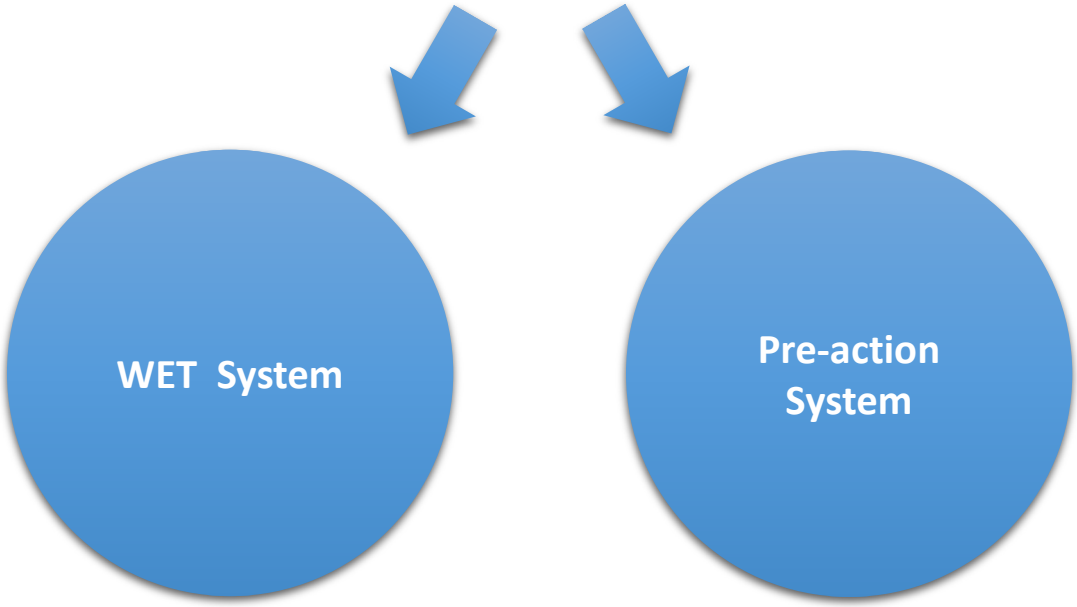
| | High Pressure Water Mist System | Low Pressure Water Mist System | Gaseous Systems |
|---|---|---|---|
| **Electricity** | Not required in case of using GPU | MUST | Not required |
| **Time of operation** | More than 40 minutes | More than 40 minutes | 10 min |
| **Pipes size** | Small | Large | Medium |
| **System real test** | Applicable | Not applicable | Demo test only Due to the high cost of the gas cylinder |
| **People safety** | High Blocks radiant heat and prevents the spread of fire | Medium | No safety |
| **Occupied areas safety** | High Uses a very small amount of water | Very low The large amount of water causes more damages than the fire | Medium |
| **Environmental safety** | High | Medium | Low |
| **Electrical panels damages** | Minimal damage | Very high The large amounts of water cause more damage than even the fire damages | Low |
| **Applications variety** | Could be used in almost all the applications and has approvals for this | Limited variety | Limited variety |

## Systems Comparison - System Requirements

| | High Pressure Water Mist System | Low Pressure Water Mist System | Gaseous Systems |
|---|---|---|---|
| **The need to disconnect the electricity** | No need<br>Has the approvals and is coded to operate without disconnecting the electricity | MUST | Not Required<br>Has the approvals and coded that operate without disconnect the current |
| **Enclosure integrity** | Not Required | Not Required | Required |
| **Pump station area** | Small | Large | Very Large<br>Required a large area for gas cylinders |

# HI-FOG® System
Sequence of Operation

## HI-FOG® Solutions for Data Center



## HI-FOG® System
Sequence of Operation

**Pre-action System:**

- The system consists of normally close section valve with sprinklers.
- The water is pressurized till the section valve.
- The pipe is DRY inside data center.
- HI-FOG® sprinklers are precision-engineered devices designed and tested to deliver a water mist discharge in a form that ensures effective fire protection.
- The sprinklers are coupled to purpose designed mounting adapters that are being fitted at the time of the distribution network installation.
- HI-FOG® sprinklers are individually fitted with a 300 □m strainer to prevent any particles carried in the discharge network from clogging the discharge orifices.
- The system will start activation and discharge upon receiving signal from the related aspirator smoke detection and the heat sensitive bulb is broken.

So, this system has one more benefit over the wet system by minimizing risks of false activation.

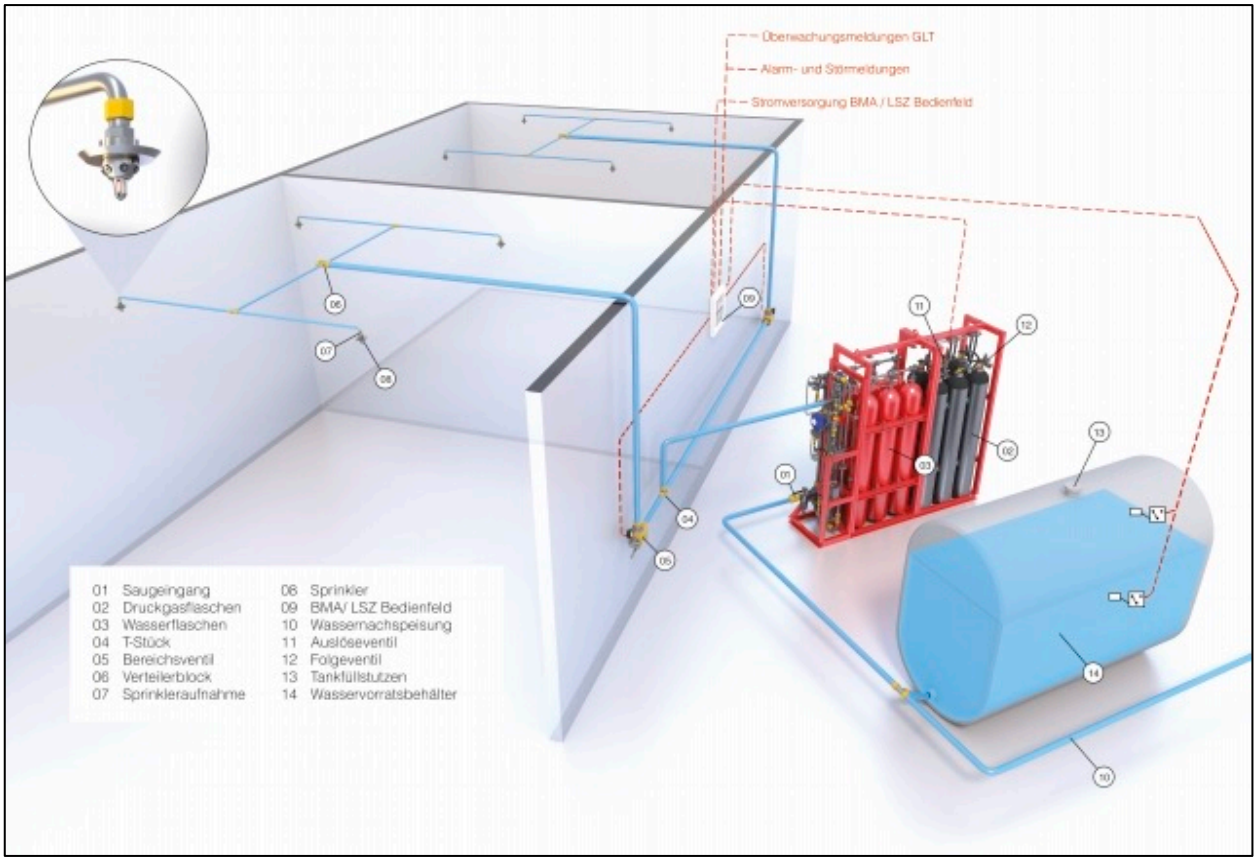
# HI-FOG® System
Sequence of Operation

## WET System:

- The system consists of normally open section valve with sprinklers.
- The water is pressurized till the HI-FOG® sprinklers.
- HI-FOG® Nozzles are precision-engineered devices, designed and tested to deliver a water mist discharge in a form that ensures effective fire protection.
- HI-FOG® sprinklers contain a heat sensitive bulb, which breaks in the 57ºC.
- The Nozzles are coupled to purpose designed mounting adapters that are being fitted at the time of the distribution network installation.
- Each Nozzle fitted with a 300 um strainer to prevent any particles carried in the discharge network from clogging the discharge orifices.
- The system Will start to discharge if:
  - One or several heat sensitive HI-FOG® sprinkler bulbs break, opening the access of water through the activated HI-FOG® sprinkler(s).

# HI-FOG® System
Sequence of Operation

## WET System:



# Certificates and Approvals

AY-SO
Fire | Gas | Valves | Pumps

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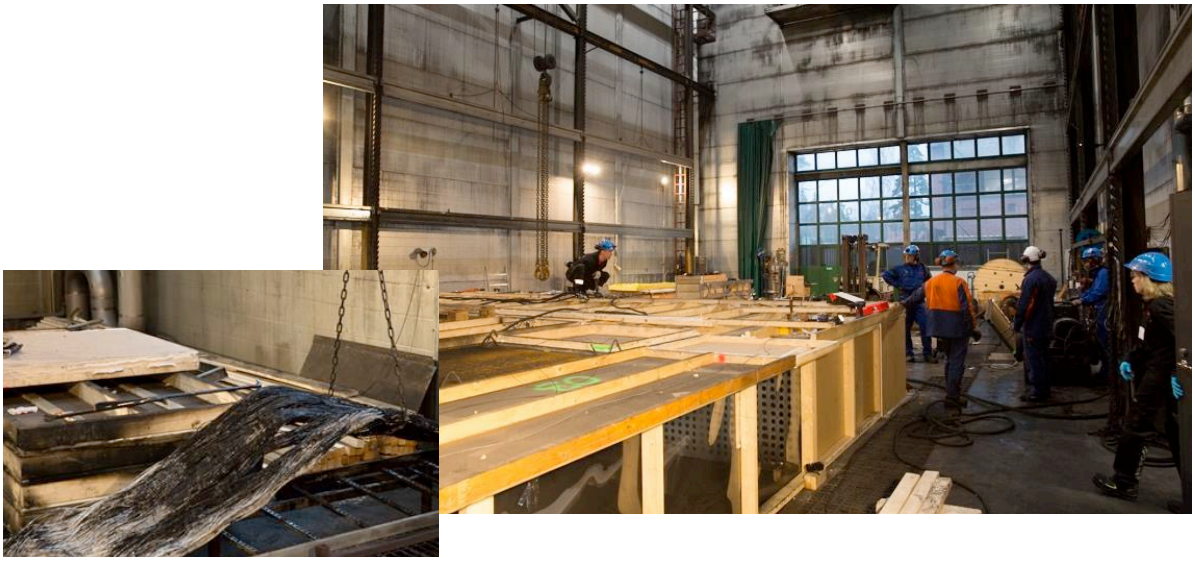
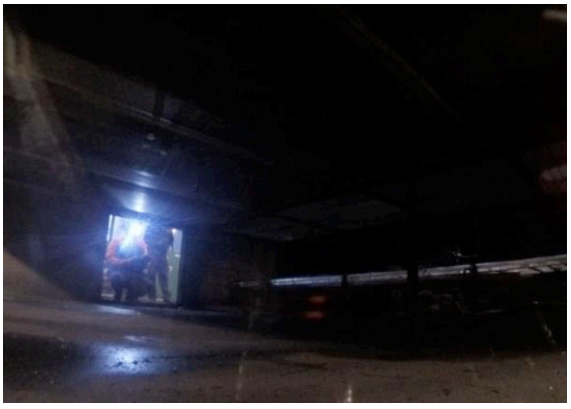
## Full-Scale Fire Test

HI-FOG® System's performance has been assured in thousands of full-scale fire tests As a result, HI-FOG® has received more than 120 type approval certificates for several applications.





## FM - Certificate of Compliance

HI-FOG® Water Mist Systems for the Protection of Data Processing Equipment Rooms / Halls.

FM APPROVED

# Certificate of Compliance

This certificate is issued for the following:

**Water Mist System**

| | |
|---|---|
| System Designation: | HI-FOG® Water Mist Systems for the Protection of Data Processing Equipment Rooms/Halls |
| Design, Installation, Operation and Maintenance Manual: | HI-FOG® Systems (HI-FOG 2000) for Protection of Data Processing Equipment Rooms/Halls Design, Installation, Operation, and Maintenance Manual, Document ID: MO/ES40/DIOM/FM/16, Revision: 1.0, Date of Issue: January '17. |

**Prepared for:**

MARIOFF CORPORATION OY
PLAZA BUSINESS PARK HALO
AYRITIE 24, P.O. BOX 86
01510 VANTAA, FINLAND

**Manufactured at:**

MARIOFF CORPORATION OY
MOREENITIE 4
FIN-04250
KERAVA, FINLAND

FM Approvals Class: 5560

Approval Identification: 3053005 Approval Granted: February 16, 2017

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

David B. Fuller
AVP, Manager – Fire Protection Group
FM Approvals
1151 Boston-Providence Turnpike
Norwood, MA 02062 USA

FM Approvals
*Member of the FM Global Group*

## Relevant Regulations

Approval Standard for water mist systems,
Class Number 5560.

FM Global Property Loss Prevention Data Sheets 5-32.

VdS 3188 Guidelines for water mist sprinkler systems.

## Relevant Regulations

The Approval Standard 5560 (2016) - Appendix M and N incorporates two new test protocols:

Data processing equipment halls (white spaces)
Cable trays below raised floors.

The new test protocols take into account forced ventilation. This reflects the real life conditions within a data center where process cooling stays on.

**”Unlike most flooding agents, water mist works in areas where a door or vent has been left open and does not pose a health risk to occupants or firefighters, and it is environmentally benign.”**

- FmApprovals.com

## Relevant Regulations



Δ Table C.1.2 Internationally Recognized Agencies with Published Fire Test Protocols for Water Mist Fire Protection Systems

| Agency | Water Mist Fire Test Protocol |
|---|---|
| 1. International Maritime Organization, London, England | IMO MSC/Circ. 668, *Alternative Arrangements for Halon Fire-Extinguishing Systems in Machinery Spaces and Pump-Rooms.*<br>(a) Appendix A, "Component Manufacturing Standards of Equivalent Water-Based Fire Extinguishing Systems," 1994.<br>(b) Appendix B, "Interim Test Method for Fire Testing Equivalent Water-Based Fire-Extinguishing Systems for Machinery Spaces of Category A and Cargo Pump-Rooms," 1994.<br>As amended in MSC/Circ. 728, *Amendments to the Test Method for Equivalent Water-Based Fire-Extinguishing Systems for Machinery Spaces of Category A and Cargo Pump-Rooms Contained in MSC/Circ. 668*, Appendix B, June 1996. |
| | IMO Res. A.800 (19), *Revised Guidelines for Approval of Sprinkler Systems, Equivalent to That Referred to in SOLAS Regulation II-2/12.*<br>(a) Appendix 1, "Component Manufacturing Standards for Water Mist Nozzles."<br>(b) Appendix 2, "Fire Test Procedures for Equivalent Sprinkler Systems in Accommodation, Public Space and Service Areas on Passenger Ships," December 1995. |
| | *International Code for Application of Fire Test Procedures*, 2012. |
| 2. FM Approvals, 1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA, 02062. | ANSI/FM Approvals 5560, *American National Standard for Water Mist Systems*, December 2007.<br>(a) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines with Volumes up to, and including, 2825 ft³ (80 m³)<br>(b) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines with Volumes<br>(l) Fire Tests for Water Mists Systems for the Protection of Chemical Fume Hoods<br>(m) Fire Tests for Water Mists Systems for the Protection of Data Processing Equipment Rooms/ Halls – Above Raised Floor<br>(n) Fire Tests for Water Mists Systems for the Protection of Data Processing Equipment Rooms/ Halls – Below Raised Floor<br>(o) Scaling Methodology: Fire Tests for the Protection of Machinery and Combustion Turbines in Enclosures in ½-Scale |

Volumes not Exceeding 2825 ft³ (80 m³)
(b) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines in Enclosures with Volumes not Exceeding 2825 ft³ (80 m³)
(c) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes not Exceeding 9175 ft³ (260 m³)
(d) Fire Tests for Water Mists Systems for the Protection of Combustion Turbines in Enclosures with Volumes not Exceeding 9175 ft³ (260 m³)
(e) Fire Tests for Water Mists Systems for the Protection of Machinery in Enclosures with Volumes Exceeding
(f) Fire Tests for Wa tection of Combustion Turbines in Enclosures with Volumes Exc
(g) Fire Tests for Water Mists Systems for the P tection of Light Hazard Occupancies
(h) Fire Tests for Water Mists Systems for the P tection of Wet Benches and Other Similar Processing Equipment
(i) Fire Tests for Water Mists Systems for the Pr tection of Local Applications
(j) Fire Tests for Water Mists Systems for the Pr tection of Industrial Oil Cookers
(k) Fire Tests for Water Mists Systems for the P tection of Continuous Wood Board Presses
(l) Fire Tests for Water Mists Systems for the Protection of Chemical Fume Hoods
(m) Fire Tests for Water Mists Systems for the Protection of Data Processing Equipment Rooms/ Halls – Above Raised Floor
(n) Fire Tests for Water Mists Systems for the Protection of Data Processing Equipment Rooms/ Halls – Below Raised Floor
(o) Scaling Methodology: Fire Tests for the Protection of Machinery and Combustion Turbines in Enclosures in ½-Scale

Zoom In

*(continues)*

## Relevant Regulations

**Δ A.4.1** A water mist system is a water-based fire protection system using very fine water sprays (i.e., water mist). The very small water droplets allow the water mist to control or extinguish fires by cooling of the flame and fire plume, oxygen displacement by water vapor, radiant heat attenuation, and prevention of fire spread by pre-wetting of combustibles.

Water mist systems have proved effective in controlling, suppressing, or extinguishing many types of fires. Potential applications include the following:

(1) Gas jet fires
(2) Flammable and combustible liquids, including storage
(3) Hazardous solids, including fires involving plastic foam furnishings
(4) Protection of aircraft occupants from an external pool fire long enough to provide time to escape
(5) Ordinary (Class A) combustible fires such as paper, wood, and textiles
(6) Occupancy classifications in accordance with Chapter 5
(7) Electrical hazards, such as transformers, switches, circuit breakers, rotating equipment, and cable tunnels
(8) Electronic equipment, including telecommunications equipment
(9) Highway and railway tunnels *(see NFPA 502)*
(10) Fighter aircraft hangars, light aircraft hangars, and helicopter hangars

## High Pressure Water Mist System

**3.3.11 High Pressure System.** A water mist system where the distribution system piping is exposed to pressures of 34.5 bar (500 psi) or greater.

**3.3.12 Intermediate Pressure System.** A water mist system where the distribution system piping is exposed to pressures greater than 12.1 bar (175 psi) but less than 34.5 bar (500 psi).

**3.3.13 Low Pressure System.** A water mist system where the distribution piping is exposed to pressures of 12.1 bar (175 psi) or less.

NFPA®

**3.3.14 Pressure.**

**3.3.14.1** ***Nozzle Operating Pressure.*** The pressure range at which nozzles are listed to control, suppress, or extinguish a fire.

**3.3.14.2** ***Standby Pressure.*** The pressure that exists in the distribution system in the static state, prior to nozzle discharge.

**3.3.14.3** ***System Design Pressure.*** The maximum pressure a system or component is rated to withstand.

**3.3.14.4** ***Working Pressure.*** The maximum anticipated pressure applied to the system components exclusive of surge pressures.

**3.3.15 Pressure Relief Device.** A device designed for the purpose of preventing pressure levels in excess of the design pressure of the system, the system components, or both.

**3.3.16 Pressure-Regulating Valve.** A valve designed for the purpose of reducing, regulating, controlling, or restricting water pressure.

# DT References in Data Centers and Control Buildings

AY-SO
Fire | Gas | Valves | Pumps

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DATA CENTERS

# Qatar Petroleum District Data Center

- **Background:** The new datacenter Qatar Petroleum Headquarter complex was designed to consolidate majority of Qatar Petroleum's Doha-based staff in one location. It is a 570,000 m² project.
- **Protection Method:** HI-FOG®
- **Pump Unit Used:** Gas-driven Pump Unit (GPU)
- **Location: Doha, Qatar**

Date: 2015

DATA CENTERS

# Qatar Airways Simulator Building NITC

- **Background**: Qatar Airways has made significant headways in the flight training simulators capabilities by build The New Integrated Training Centre (NITC).The simulator equipped with five new CAE 7000XR Series full-flight simulators and two CAE 500XR Series flight training devices for the Boeing 777X and the 737 MAX.
- **Protection Method:** HI-FOG®
- **Pump Unit Used:** Modular Sprinkler Pump Unit (MSPU)
- **Location: Doha, Qatar**


**Date:** 2019

DATA CENTERS

# National Civil Aviation Training Organization (NCATO)

- **Background**: On 22 November 1971 President of Egypt, Anwar Sadat, issued a Republican Deree for the Establishment of the National Civil Aviation Training Organization (NCATO). It is considered the first regional institute for training pilots in the field of Civil Aviation.
- **Protection Method:** HI-FOG®
- **Pump Unit Used:** Gas-driven Pump Unit (GPU)
- **Location: Alexandria, Egypt**

Date: 2009

DATA CENTERS

# Operations and Crisis Management Building

- **Background:** The international Airport of Cairo and the busiest in Egypt and serves as the primary hub for Egypt Air and Egypt Air Express as well as several other airlines
- **Project Information:** The operation and crisis management room includes four systems as operation systems that follow up the trips operation for every airport.
- **Protection Method:** HI-FOG®
- **Location: Cairo International Airport, Egypt**


Date: 2009

DATA CENTERS

# Regional Center for Food and Feed

- **Background:** It was established in 1980 with the cooperation of the government of Denmark under the authority of the Egyptian Agricultural Organization. In addition, the Lab shares in conducting the research plan for the development of food and nutrition for human and animals
- **Pump Unit Used:** Modular Sprinkler Pump Unit (MSPU)
- **Protection Method:** HI-FOG®
- **Location: Giza, Egypt**


Date: 2013

www.ayso.com.tr

DATA CENTERS

# King Abdullah Petroleum Studies and Research Center (KAPSARC)

- **Background**: KAPSARC began its activities in 2010. It is as institution that focuses on research in energy economics, policy, technology, and the environment. Its research areas include global Energy Markets And Economics, Energy Efficiency And Productivity, Energy And Environmental Technologies, And Carbon management
- **Project Information:** 3 Rooms Of Central Server With Total Area Of 1584 $m^2$
- **Protection Method:** Hi-fog®
- **Scope Of Work:** Data Center Rooms By Water Mist Other Building Fire Alarm By VESDA.
- **Pump Unit Used:** Gas-driven Pump Unit (GPU)
- **Location: Riyadh, Saudi Arabia**

Date: 2014

DATA CENTERS

# Sohag East Data Center

- **Background**: Telecom Egypt or **We** is an Egyptian joint stock company specialized in the field of communications and information technology, and it is the first integrated telecom operator in Egypt.

- **Protection Method : Traditional system**
- **Systems used:**
  - -FM200: SIEX
  - -Traditional FHC system
  - -Fire Alarm: Simplex

- **Location: Sohag, Egypt**


Date: 2019

DATA CENTERS

# Ain Shams Datacenter

- **Protection Method:** HI-FOG®
- **Number of Nozzles:** 595 Nozzles
- **Pump Unit Used :** Gas -driven Pump Unit (GPU)
- **Scope of work:** HI-FOG high pressure water mist system of two floors, two Mezzanine for offices, IT rooms, Elec Rooms, Data Center etc.
- **Pump Unit Used:** EPU
- **Location: Cairo, Egypt**


**Date:** 2020

DATA CENTERS

# National Telecommunications Regulatory Authority - NTRA

- **Protection Method:** HI-FOG®
- **Scope of work:** HI-FOG high pressure water mist system for Strong & Meeting room & Elec room & Transformers and Offices
- **Pump Unit Used:** Modular Sprinkler Pump Unit (MSPU)
- **Location: Giza, Egypt**


**Date:** 2020

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DATA CENTERS

# Information Systems Infrastructure - Armed Forces

- **Protection Method:** Telecom Egypt
- **Scope of work:** Telecom Infrastructure
- **Location: New Capital, Egypt**

Date: 2020

DATA CENTERS

# Al-Sahayeb 6 Datacenters

- **Background**: Al-Sahayeb 6 Datacenter is designed to meet the growing demand for data storage and cloud computing services in the region.

- **Protection Method:** HI-FOG®- SIEX - Fire alarm.

- **Scope of work:**
  - Whole Data Center, including:
  - Data Halls
  - Offices
  - Transformers
  - Generators
  - Power Modules

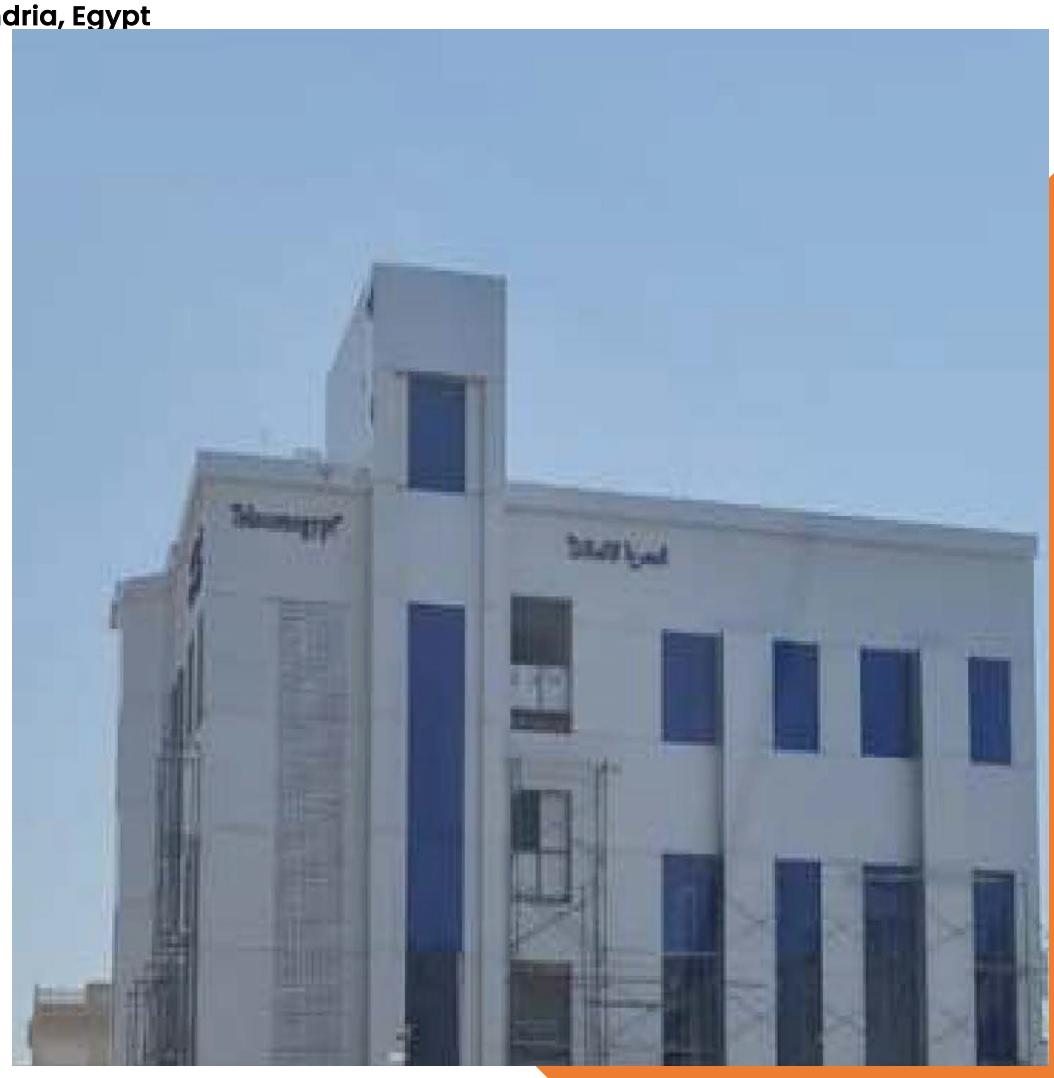
**Location: Saudi Arabia**

Date: 2022

DATA CENTERS

# Abu Talat Telecom Egypt

- **Background**: Telecom Egypt or **We** is an Egyptian joint stock company specialized in the field of communications and information technology, and It is the first integrated telecom operator in Egy
- **Pump Unit Used:** Gas Pump Unit (GPU)
- **Protection Method:** HI-FOG®
- **Scope of work:**
  -Supply & Install FHC Traditional system in Abu Talaat two buildings.
  -Supply & Install Fire alarm system in Abu Talaat two buildings.
- **Systems used:**
  -FM200: SIEX
  -Traditional FHC system
  -Fire Alarm: Simplex
- **Location: Alexandria, Egypt**



**Date:** 2023

DATA CENTERS

# Al-Zafarana Telecom Egypt

- **Background**: A submarine communications cable system that is planned to connect Italy, Greece, Egypt, Saudi Arabia, Oman, and India
- **Project Information:** The building has an 11 kV transformers
- **Protection Method:** HI-FOG®
- **Scope of work** Supply & Install FM200 System in all Central Rooms. Dismantling old HI-FOG system, maintenance it.
- **Pump Unit Used:** Central Al-Zafarana and Abu Talat is protected Gas-driven Pump Unit (GPU 30) and (GPU 24) respectively
- **Scope of work:** Firefighting system by HI-FOG high pressure water mist system for Electrical Rooms and diesel rooms and turbine
- **Pump Unit Used:** GPU Pump **Location: Alexandria, Egypt**

**Date:** 2023

DATA CENTERS

# Suez Canal Research Center

- **Protection Method:** Traditional system – FM200
- **Scope of work:** Fire Fighting Traditional system for all Research center buildings.
- **Pump Unit Used:** Traditional Pump
- **Location: Ismailia, Egypt**

Date: 2023

# The Holy Mosque CCTV Building

- **Background:** Authorities in Saudi Arabia have installed 1,700 CCTV cameras in Mecca to monitor the millions of pilgrims visiting the holy city
- **Project Information:** It contains Electric room, low current room, control room and electronic room
- **Pump Unit Used:** Gas -driven Pump unit (GPU)
- **Protection Method:** HI-FOG ®
- **Scope of work:** Engineering, Supply, installation, Testing & Commissioning and Handover of Water Mist System and GRP Sectional Tanks for firefighting Water Mist System for service building zone 12,13,14and 15.
- **Pump Unit Used :** SPU **Location: Makkah, Saudi Arabia**

**Date: 2012**

www.ayso.com.tr

# T.V STUDIO

- **Protection Method:** HI-FOG®
- **Scope of work:** Engineering, Supply, installation, Testing & Commissioning and Handover of Water Mist System for T.V rooms zone 12
- **Pump Unit Used:** Connect to pump zone 12 service building
- **Location: Makkah, Saudi Arabia**


Date: 2023

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# Aqalat (STC)

- **Scope of work:**
  - Electrical Rooms
  - Transformer Rooms
  - UPS Rooms
  - Generator Rooms
  - Transformer Rooms
  - Fuel Tank
- **Location: Saudi Arabia**


Date: 2020

# Makkah Bus

- **Function:** Main Control Room
- **Protection Method:** HI-FOG®
- **Scope of work:** Design, Supply, Installation, Testing and Commissioning of Water Mist Fire Protection System in Control Room of CDC Building.
- **Pump Unit Used :** GPU
- **Location: Makkah, Saudi Arabia**

**Date:** 2021

# **New Administrative Capital** (1st Phase)

- **Function:**
  - C.C.C - Central Command Center
  - C.O.C - City Operation Center
  - NN1 - Network Node 1
  - NN2 - Network Node 2
- **Protection Method:** HI-FOG®
- **Scope of work:** Turnkey
- **Location: New Administrative City, Egypt**

Date: 2020

# Command Control Center – C.C.C – 360 Rack

- **Function:** To monitor and control the District of Ministries & 6 governorates
- **Project End User:** ACUD Administrative Capital for Urban Developments
- **Protection Method:** HI-FOG®
- **Number of Nozzles:** 1048 Nozzles
- **Size of protected area:** 9372 $m^2$
- **Pump Unit Used :** Electric Pump Unit (EPU)
- **Operator:**
- **Location: New Administrative City, Egypt**

Honeywell


Date: 2020

# City Operation Center
# - C.O.C - 500 Rack

- **Function:** To monitor and control the New Administrative Capital
- **Project End User:** ACUD Administrative Capital for Urban Developments
- **Protection Method:** HI-FOG®
- **Number of Nozzles:** 987 Nozzles
- **Size of protected area:** 10465 $m^2$
- **Pump Unit Used :** Electric Pimp Unit (EPU)
- **Operator:**
- **Awards:**
- **Location: New Administrative City, Egypt**

Date: 2020

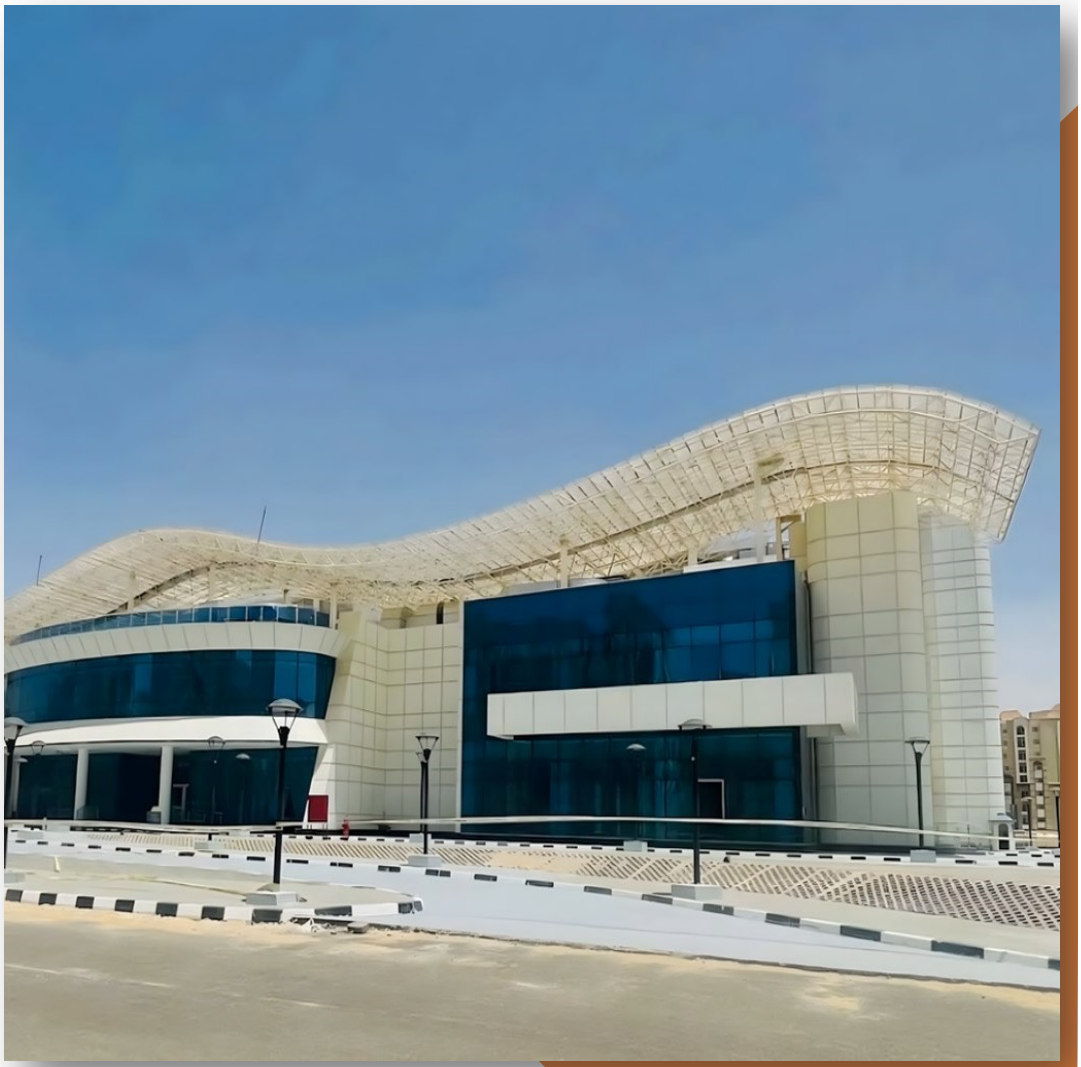
# Network Node 1 – NN1 – 920 Rack

- **Function:** To monitor and control the Commercial & Financial District
- **Project End User:** ACUD Administrative Capital for Urban Developments
- **Protection Method:** HI-FOG®
- **Number of Nozzles:** 1877 Nozzles
- **Size of protected area:** 14297 $m^2$
- **Scope of work:** HI-FOG high pressure water mist system of Basement, Ground and three floors for Data Center, IT rooms, Elec rooms, UPS etc.

# Network Node 2 – NN2 – 920 Rack

- **Function:** To monitor and control the Commercial & Financial District
- **Project End User:** ACUD Administrative Capital for Urban Developments
- **Protection Method:** HI-FOG®
- **Number of Nozzles:** 700 Nozzles
- **Size of protected area:** 5196 $m^2$
- **Scope of work:** HI-FOG high pressure water mist system of Basement, Ground and three floors for Data Center, IT rooms, Elec rooms, UPS etc.

- **Pump Unit Used :** Electric Pimp Unit (EPU)
- **Operator:**
- **Location: New Capital, Egypt**



Date: 2020

# National Training Academy - NTA

- **System used:**
  - Fire Fighting System
  - Electrical & Communications
  - Plumbing
  - HVAC: VRF
  - Elevators
  - BMS
  - MEP

- **Scope of work:** Turnkey

- **Location: Giza, Egypt**

Date: 2020

# The Main Operations Room at Police Academy

- **Protection Method:** HI-FOG®

- **Scope of work:** HI-FOG® High-pressure Water Mist System in the following areas:
  - Meeting room VIP floor
  - RACK Room
  - UPS Room
  - Maintenance corridor
  - VIP Hall
  - Operation Hall
  - VIP Salon
- **Pump Unit Used:** MSU4 **Location: New Cairo, Egypt**

Date: 2024

# Marioff Reference List

AY-SO
Fire | Gas | Valves | Pumps

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**First large data center protected by HI-FOG® in 1999. Since then, more than 350 large data centers and computer rooms were protected globally.**

- KPN Amsterdam
- Equinix AM8 Westpoor
- Telecity IV Data Center, The NL
- Ericsson Amsterdam
- KIO Networks Data Center, Spain
- The Commission for Atomic Energy (CEA), France
- Telecity IV Data Centre
- Data Hotel CX2
- Data Hotel TCN Eemsdelta
- Toledo Industry Department Data Centre
- Telefónica Data Centre, Spain
- National Support Centre for the Eurofighter