Watermist Fire Suppression

Commercial Marine Applications (IMO and SOLAS)
and
US NAVY (ABS-NVR and NRL)

Presented to

PRODUCT DESIGN AND MATERIALS

TECHNOLOGY PANEL

Sept 3, 2008 - Parkwood Inn in Bath, Maine

Presented by

IMECO

A Systems Integrator

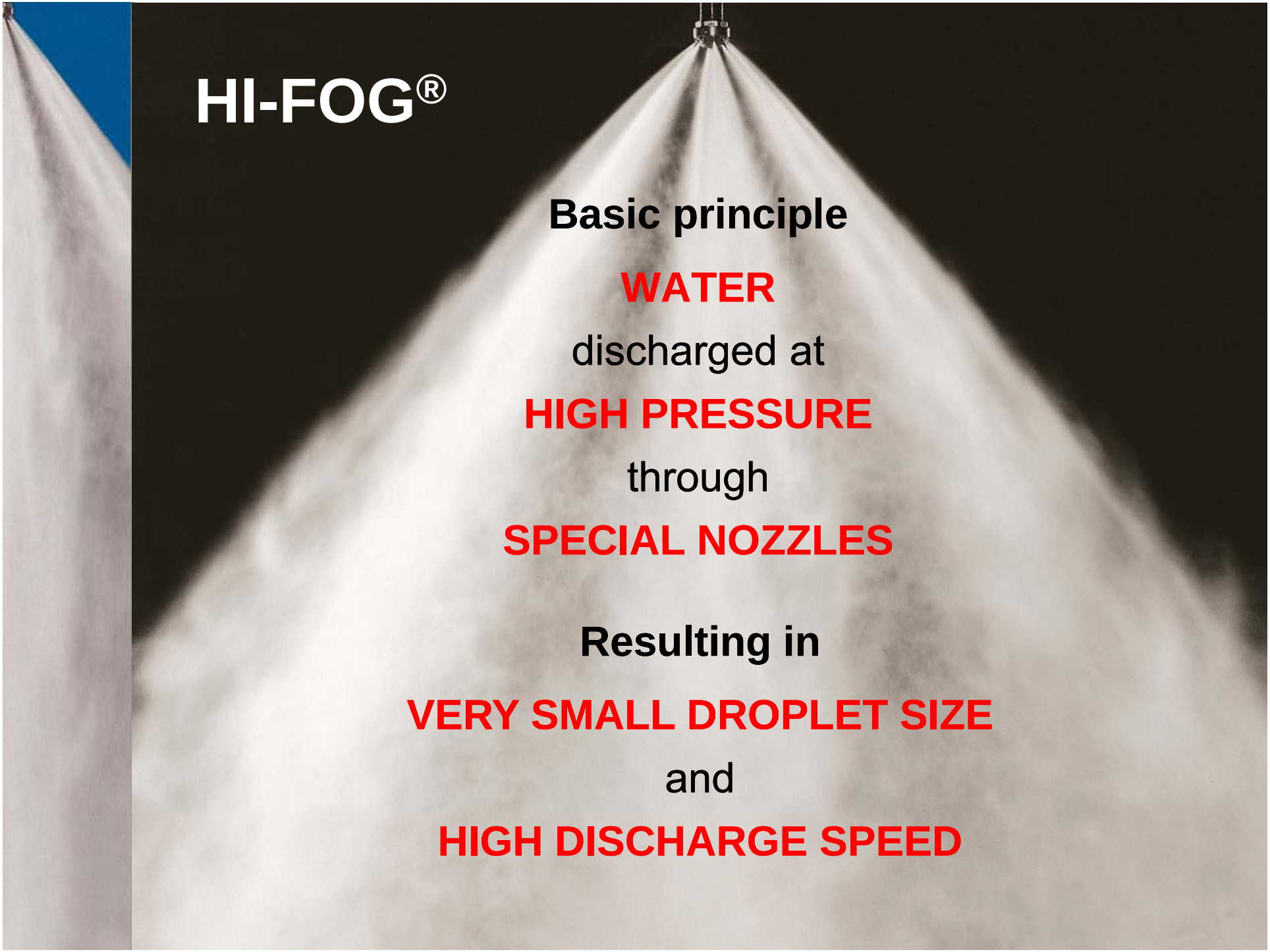
1401 S Carpenter Ave
Iron Mountain, Mich 49801
906 774 - 0202 x38
https://imeco.us/

MARIOFF
A UTC Fire & Security Company

Commercial Marine Applications

- Class “A” Machinery Space Total Flooding - IMO MSC/CIRC 1165
- Class “A” Machinery Space Local protection - IMO MSC/CIRC 913
- Accommodations and service spaces - SOLAS II + FSS Ch 8 w/Res A800
- Galley Deep Fat Fryers and Exhaust Ducts - SOLAS II
- RoRo Decks and Special Category Spaces - IMO MSC.I1/CIRC 1172

HI-FOG®



Basic principle

WATER

discharged at

HIGH PRESSURE

through

SPECIAL NOZZLES

Resulting in

VERY SMALL DROPLET SIZE

and

HIGH DISCHARGE SPEED

HI-FOG®

is the

HIGH PRESSURE WATER MIST FIRE PROTECTION SYSTEM

DEVELOPED

PATENTED

DESIGNED

MANUFACTURED

and

SUPPLIED

by

MARIOFF

A UTC Fire & Security Company

Based on IMO regulations

Type approved by classification societies and administrations

Approvals

ABS Type Approval Program

Search Results

Please click on the highlighted text below for more details.

Product Search

Company Information	Additional Company/Plant Detail	Confirmation of Type Approval
Marioff Corporation Oy P.O. Box 86 Vantaa FIN-01301 Finland Tel +358 9 8708 51 Fax +358 9 8708 5399 mailto:info@marioff.fi Website www.marioff.com	Plant of Manufacturer Marijot Oy Moreenitie 4 FIN-04250 Kerava, Finland	This product does not have a Confirmation of Type Approval.

>>	Click here to view more details
Product	Water Mist, Fire Fighting System
Model	Hi-Fog MT-4
Intended Service	For protection of Machinery Spaces of Category A, Class 1, 2, & 3 and Cargo Pump Rooms with a height not exceeding 11.0 meters. The MT-4 system does not cover bilges. A separate bilge system is required.
Description	For Model MT-4 the Marioff Documentation reference is MO/ES/20/DIOM/IMO/05, Version 1.1 dated June 2005; Dry-type manual water mist fire fighting system employing open Hi-Fog sprinkler heads, with nozzles. The system is of the wet type up to the control valve. Under normal operation positive displacement pumps supply fresh water at high pressure to the Hi-Fog sprinkler heads.
Ratings	System working pressure at nozzles 50 bar minimum
Service Restrictions	Each shipboard installation is to be in full compliance with the approved Marioff documentation MO/ES/20/DIOM/IMO/05, Version 1.1 dated June 2005 including: 1) The Hi-Fog nozzle configurations, see attached table, and dimensioning listed in the aforesaid Marioff documentation are to be adhered to, summarized as follows: (a) Total Flood application nozzle 5S 1MC 8MC 1000, vertical pendant with a max. 4 meter spacing between nozzles and used at maximum ceiling height 11 metres (b) Total Flood application nozzle 4S 1MC 8MB 1000, vertical pendant with a maximum 4 meter spacing between nozzles and used at maximum installation height 5 m vertical distance between levels (c) The horizontal spacing from the nozzle to the edge of the protected area is 1.25 m - 4 m. 2) The system is to be available for immediate use and capable of continuously supplying water for at least 30 minutes. 3) Unit Certification is not required for this product.

Approvals

U. S. Department of Homeland Security
United States Coast Guard

Certificate of Approval

Coast Guard Approval Number: 162.135/11/0 Expires: 21 September 2010

WATER MIST NOZZLES
Total Flooding Water Mist System

MARIOFF CORPORATION, OY
Virnatie 3
P.O. Box 86
FIN-01301 Vantaa
FINLAND

Hi-Fog MT 4 System for total flooding protection of machinery spaces and cargo pumprooms

Total flooding water mist system for the protection of spaces up to 3,300 cubic meters in volume, in accordance with SOLAS regulations II-2/10.4.1.1.1, and II-2/10.9.1, the FSS Code chapter 7 and MSC/Circ. 1165. Approval includes bilge area protection using 3S 1MB 4MB 1000 nozzles at a minimum pressure of 32.5 bar with a 2.5 m maximum spacing for bilges up to 1.5 m in height. Systems may also be divided into sections for local application protection of high hazard areas in accordance with MSC/Circ. 913. May be supplied by electric motor or diesel engine driven pump units. Nozzle selection and spacing shall be in accordance with chapter 7 of Marioff design, installation, operation and maintenance manual MO/ES/20/DIOM/IMO/05, Rev. 1.2.

Identifying data: VTT test reports RTE583/02, dated March 2002; RTE 2580/05, dated July 2005; and RTE 2184/05, dated June 2005. Marioff design, installation, operation and maintenance manual MO/ES/20/DIOM/IMO/05, Rev. 1.2 dated September 2005. U.S. Coast Guard letter dated September 21, 2005. Bilge system nozzles covered by report No. RTE 10602/97, dated February 1997 and USCG letter dated 21 March, 2006.

Follow-up: Factory Mutual

This change amends certificate dated September 21, 2005 to include bilge protection system.

*** END ***

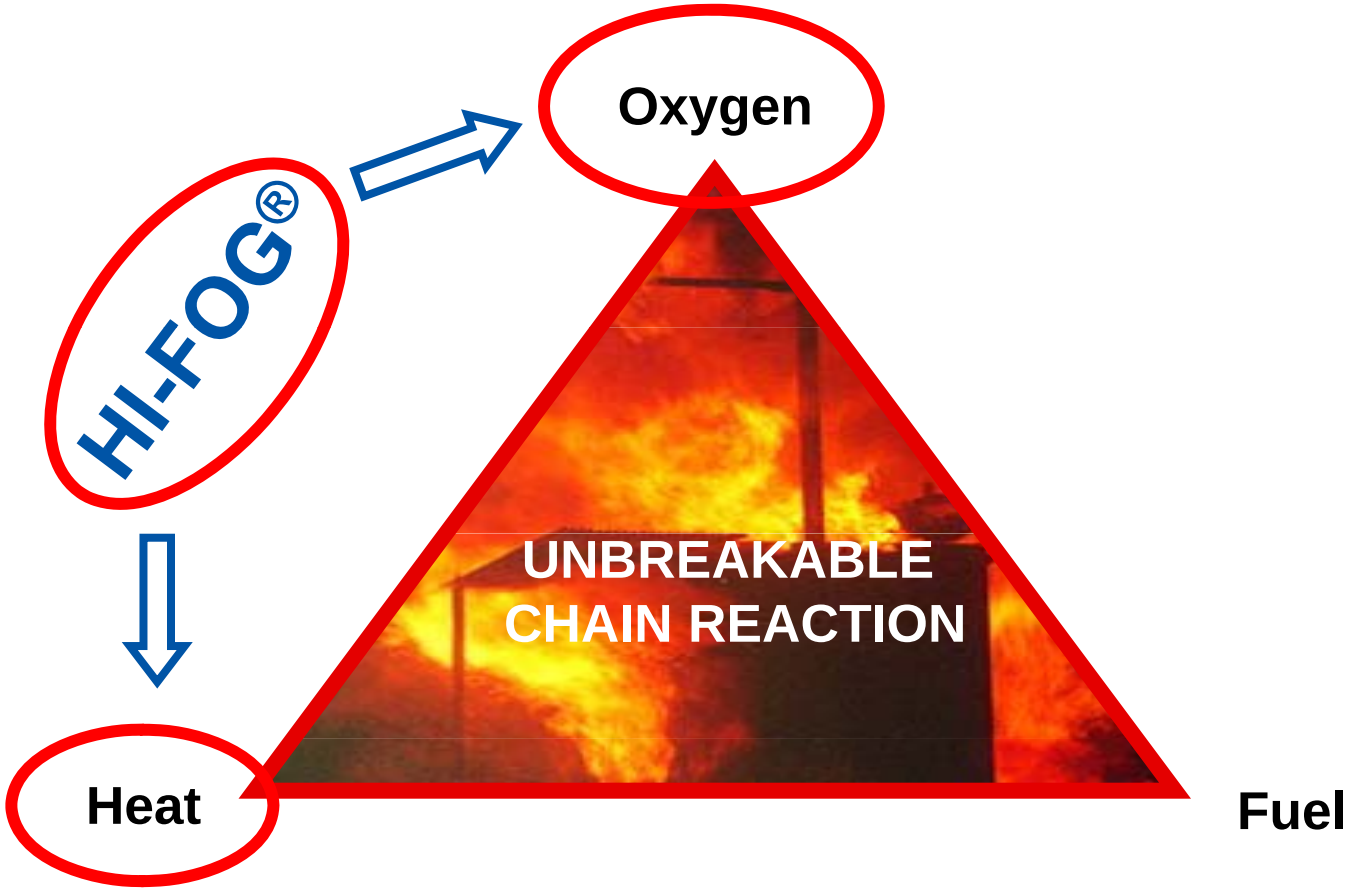
THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 21st DAY OF MARCH 2006, AT WASHINGTON D.C.

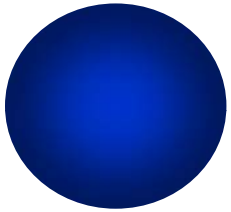
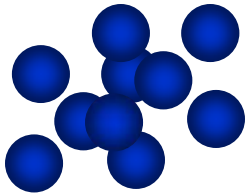
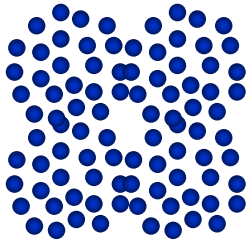
J. G. LANTZ
Chief, Lifesaving and Fire Safety Standards Division
BY DIRECTION OF THE COMMANDANT

DEPT. OF HOMELAND SECURITY, USCG, CGHQ-16030
(REV. 3-03)

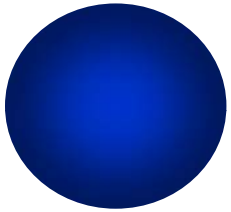
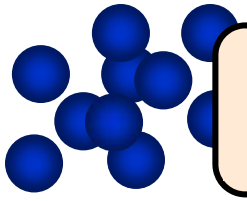
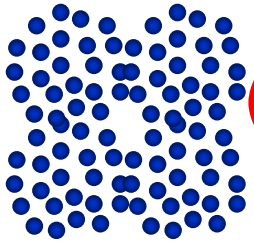
How Does HI-FOG® Work?



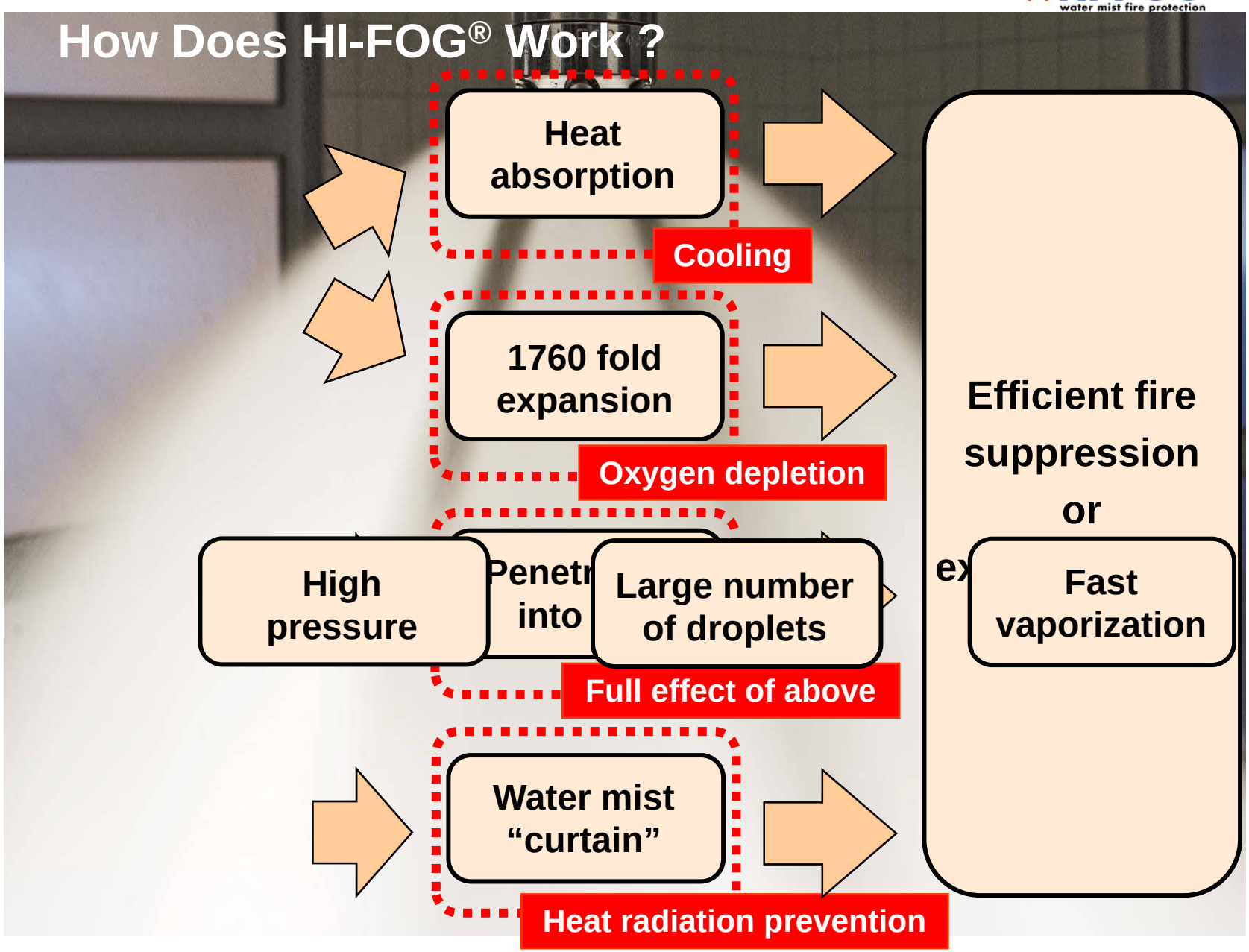
How does HI-FOG® work?

	Drop size ($D_{v,50}$)	No. of drops	Surface area	Vaporisation
 Sprinkler	>1000 µm	1	1	1
 Class 2/3 Mist	300 µm	40	10	0.1
 **HI-FOG®**	**50** µm	**8000** ⇒	**400** ⇒	**0.003**

HI-FOG® (comparison to other waterbased systems)

	Drop size (average)	No. of drops	Surface area	Vaporisation
 Sprinkler	>1000 µm	1	1	1 sec
 High pressure		Large number of droplets		Fast vaporization
 HI-FOG®	50 µm	8000	400	0.003 sec

How Does HI-FOG® Work ?



Deluge Sprinklers (seawater)

Up to 8 LPM per Sq Meter (Accommodations)

10 LPM per Cu Meter (Machinery Spaces)

Extensive damage from seawater

Foam gone wrong

AFFF FOAM – 3% or 6% in seawater

up to 6.5 LPM of liquid per Sq Meter (bilges)

extensive cleanup – highly corrosive to equipment

HALOCARBONS

(representative data)

Concentration 8.7% for extinguishment (USCG)

Evacuation of space before discharge (USCG)

Lowest Observable Adverse Effect Level = 10.5%

Decomposition to hydrogen fluoride at 1500 F for certain products

Watermist Systems

< .5 LPM per Sq Meter (Accommodations)

< .5 LPM per Cu Meter (Machinery Spaces)

Minimal or No damage to space or equipment

HI-FOG® Machinery Space Systems

Unique features

Water based, no additives
Allows loss of media
Fresh water
Supplied by a pump unit

⇒

Unique benefits

Harmless to people
No need to seal the space
No need to shut off vent
No post-fire clean-up
No downtime for recharging

<u>Immediate activation</u>
Minimal damage – No downtime

Don't wait, activate!™
HI-FOG®

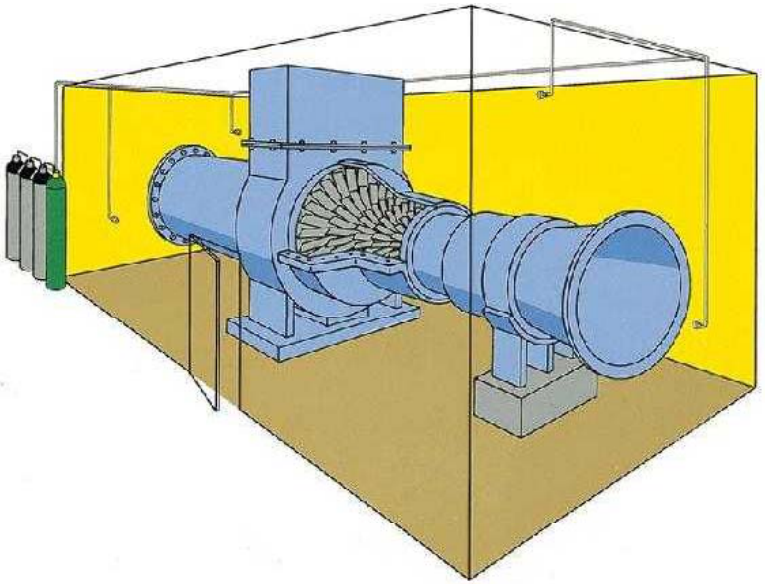
HI-FOG® Machinery Space Systems

Added benefits

- **”Green” technology**
- Prevents reignition by cooling
- Damage control team can enter the space upon extinguishment
- Can be full-scale tested and demonstrated after installation
- Recharge with water for low maintainance costs
- Protection can be expanded to other spaces with minimal cost

Gas Turbine Enclosures

- Spray heads mounted on end walls parallel to turbine axis
- No casing distortion
- Self-contained or integrated
- FM approved
- Tested to IMO and NRL standards



HI-FOG® in Machinery Spaces Summary

A **safe** alternative to CO2

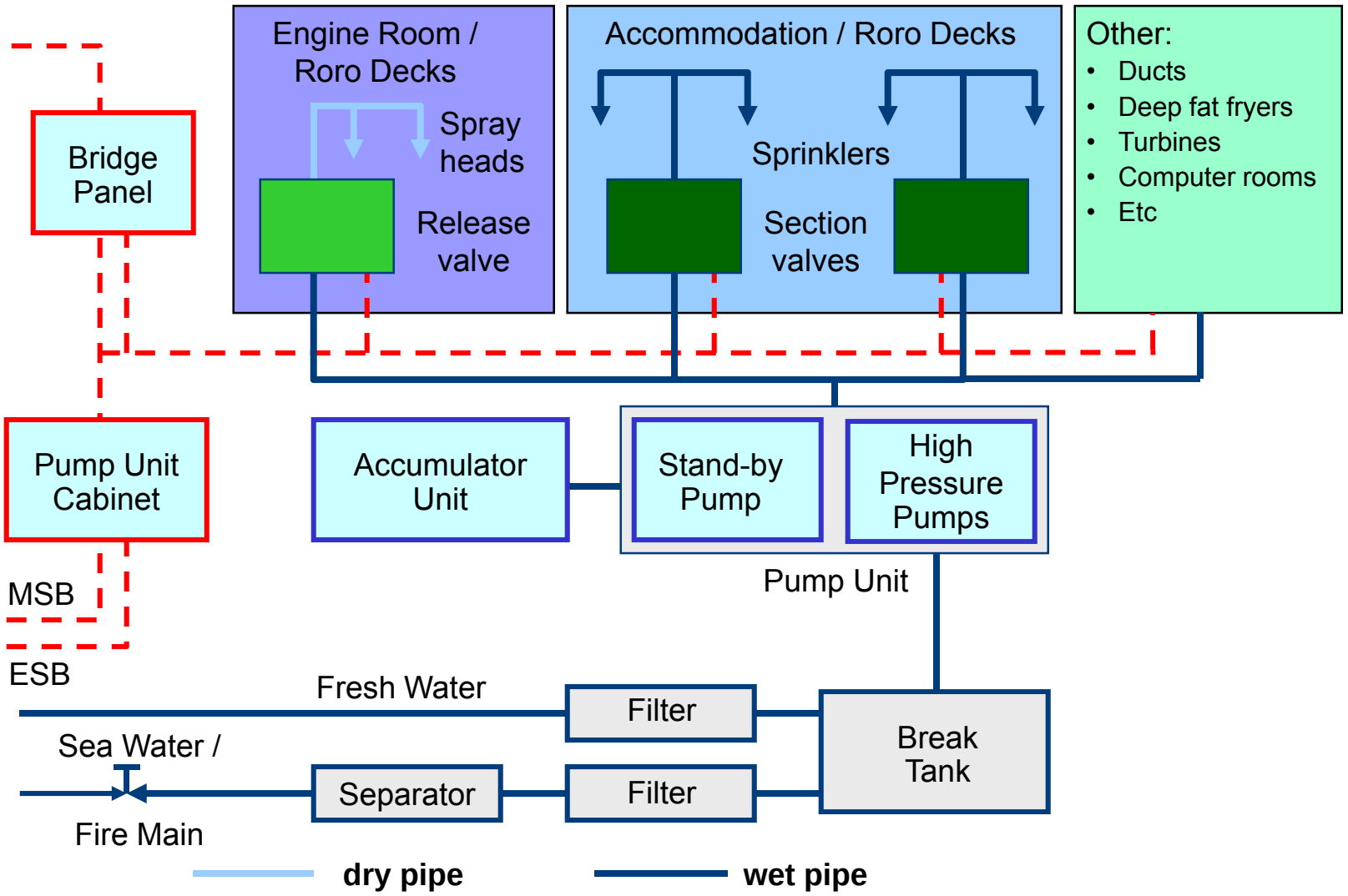
A **harmless** alternative to inert gases

A **clean** alternative to foam

An **environmentally friendly** alternative to halon

A SAFE, FAST AND EFFICIENT FIRE PROTECTION SYSTEM

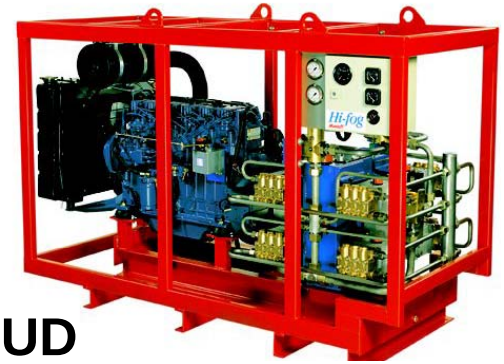
System Principle



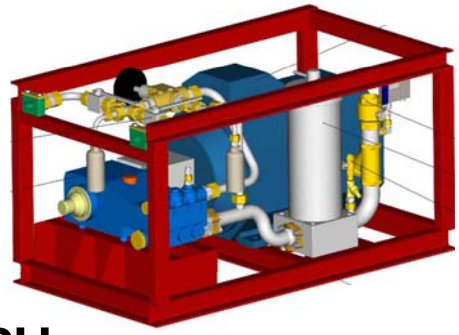
HI-FOG Pump Units

SPU

GPU



SPUD



MLPU

KAU

US Navy Applications

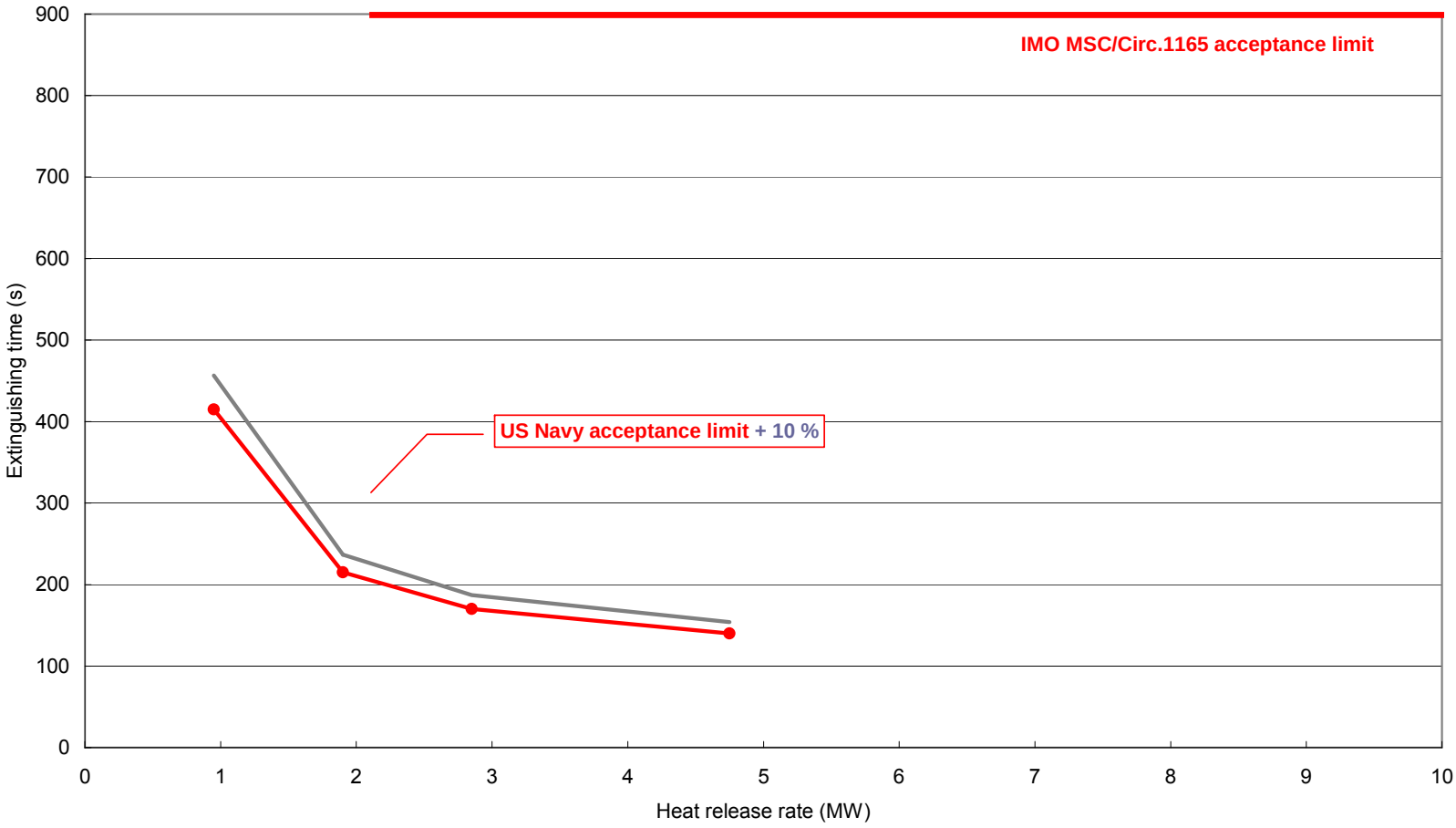
- Machinery Space Total Flooding
  - ABS-NVR
  - Naval Research Laboratories Test Protocol
- Gas Turbine Enclosures
  - GE Marine
  - Naval Research Laboratories

Requirements - SOLAS (IMO) vs. US Navy

- **SOLAS II**
  - Extinguishment times (sec)
    - 2mw to 10mw fire = 900 sec
  - Thermal management (after 1 minute of watermist deployment)
    - Average temp on thermal couple tree < 100C
  - System requirement guidelines
    - SOLAS II
    - IMO MSC/Circ 1165, 913, 1172
    - NFPA 750
    - Ship's specification
    - Shipyard requirements
  - Redundancy
    - Seawater backup
    - Connected to main + emer bus
    - Addition electric motor

- **US Navy requirements**
  - Extinguishment times (seconds)
    - 1mw fire = 415 sec
    - 2mw fire = 170 sec
    - 5mw fire = 140 sec
  - Thermal management (after 1 minute of watermist deployment)
    - Average temp on thermal couple tree < 60C
    - Max temp on any one thermal couple < 90C
  - System requirement guidelines
    - Ship's specification
    - Shipyard requirements
    - ABS –Naval Vessel Rules
  - Redundancy
    - 2 pumping units
    - Closed loop piping

SOLAS vs. US NAVY NRL extinguishment requirements



For your specific water mist application contact

A Systems Integrator

1401 S Carpenter Ave
Iron Mountain, Mich 49801
906 774 - 0202 x38

https://imeco.us/

fog@imecogroup.com

A UTC Fire & Security Company