



EUSEBI IMPIANTI

14th International Water Mist Conference
22nd & 23rd October 2014, Istanbul, Turkey

Protection of Critical and Innovative Buildings with Water Mist High Pressure Systems

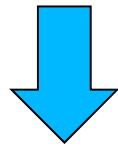


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Water Mist in Turkey

From **sea** (IMO)
cabins, restaurants, gym,
galleys, machinery spaces

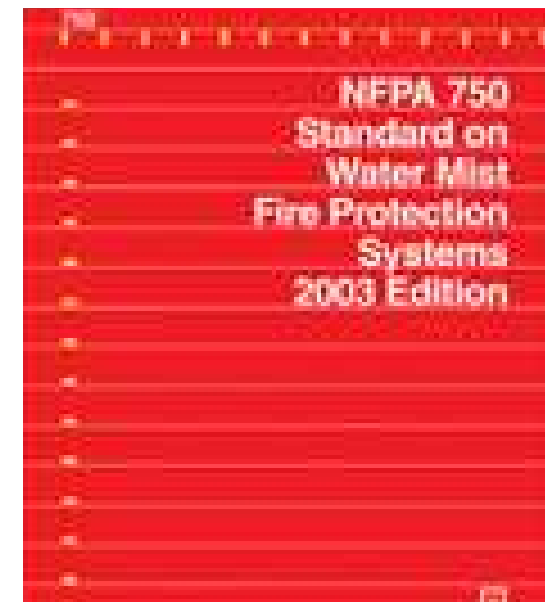


to **land** (NFPA 750)

NFPA 750 - Water Mist Fire Protection Systems



- Standard to: design, approve, install, do maintenance & tests of water mist systems
- Latest Edition: 2010
 - Ch. 5 System Components & Hardware
 - Ch. 7 Installation Requirements
 - Ch. 8 Design Objectives & Fire Test Protocols
 - Ch. 9 Calculations
 - Ch. 10 Water Supplies & Atomizing Media



Water Mist in Turkey

- Our experience with past FF projects addressed us to think that many buildings and infrastructures in Turkey could have been protected with water mist. Right in Istanbul we know several buildings are planned or built:
- Towers, skyscraper buildings, new landmarks of Istanbul.
- Concert Hall Istanbul
- Santralistanbul Museum of Contemporary Arts (Istanbul): museum and exhibitions center
- New Metro Lines

Water Mist in Turkey

Many **Hotels, museums, theatres, concert hall** located in historical buildings and not, should be protected with an high pressure water mist system because this is a superior FF system if compared with traditional water/foam and gas based FF systems, as currently used in Turkey but also in other countries.

It is important to spread knowledge of the water mist technology for daily applications, where dedicated and extensive testing has demonstrated their effectiveness. :

- existing water mist test protocols;
- approvals and certificates;
- “ad hoc” testing and application.

Listing and Approvals for the Water Mist technology

- Factory Mutual (Class Number 5560) LH, Machinery spaces, GT, other
- Underwriters Laboratories, UL 2167 (Nozzle Tests, Residential, OH1,OH2)
- VDS (Cable tunnels, OH1, OH2 (car parking), OH3 (storages), transformers, etc.)
- Gost Russia
- Chinese Standard CCC
- IMO (type approvals for applications equivalent to LH, OH)
- CEN TS 14972 (OH1, DFF fryiers)

● HPWM in Civil Applications

High-Rise Buildings

- Buildings with heights from 160 m to 250 m and higher (due to ground space high prices), 30 to 80 floors and more
 - Offices
 - Residential properties
 - Commercial activities : restaurants, stores, entertainment venues (casinos, etc.)



● HPWM in Civil Applications

Historical Buildings: Museums, Hotels, Libraries

- Various types of hazard in the same, complex building
- Installation of the FF system: Damage to Historical Wooden Furniture During Installation
- Pumping station, gas (inert or HFC) cylinders storage
- Damage to areas of historical interest
- Engineering: piping lay-outs, nozzle proper positioning

• Common HPWM in Civil Applications

Historical Buildings

- Guest Rooms
- Corridors
- Escape Routes
- Wardrobes, Offices,
- Warehouses, Storages,
- Technical Spaces



- HPWM in Civil Applications

LH Non-storage and non-manufacturing occupancies

Residential occupancies

Schools and educational institutions

Offices (certain areas)

Prisons

• HPWM in Civil Applications

OH occupancies

Hospitals

Libraries

Restaurants

Offices and meeting rooms

Laboratories, data processing

Car Parks



- HPWM in Civil Applications

OH occupancies

Broadcasting studios, Railway stations

Cinemas and theatres , Concert Halls

Department Stores, Shopping Centre

Clothing , paper and wood storages not over OH3



The Choice of The Fire Fighting Means

- Fire Temperature Control (steel frame collapse)
- To minimize:
 - the smoke generation
 - Property loss
 - Occupants safety
 - Fire and rescue services safety
 - Environmental damage
- **Reliable and Effective (98% as a minimum)**





The Choice of The Fire Fighting Means

Traditional FFS:

- Gas extinguishing Systems (inert gases, HFC)
- Sprinkler or Foam Systems

New FF Technologies:

- Aerosol
- Sprinkler Equivalent Water Mist Systems
- Total flooding and Local applications can be realized for particular protections





Two HPWM applications:

Bibliotheca Hertziana

Based in central Rome, close to the famous Spanish Steps;
It is one of the institutes in the humanities and social sciences section
of the Max-Planck-Gesellschaft (MPG) Institute.

It was opened in 1913: It is one of the oldest institutes of the MPG and
first to be dedicated to the humanities.

Bibliotheca Hertziana owes its existence to the generosity of Henriette
Hertz (1846–1913), who gave a well-stocked specialist library and an
extensive photographic collection;

Henriette Hertz wanted to create an institute that was dedicated to “the
study of art and culture, from the Renaissance on up, especially in
relation to Rome as the nucleus of European culture”, and that would
serve as a meeting place for scholars from all over the world.



Two HPWM applications:

Biblioteca Hertziana

- excellent library,
- comprehensive photographic collection,
- outstanding databases on Roman seventeenth-century painting and architectural drawings of the early modern era;
- Hertziana's one of the world's most renowned research institutes for Italian and, more specifically, Roman history of art.
- the institute remains a top destination for art historians from all over the world.



Main Design Aspect to choose EI HPWMM



Main Design Aspect to choose EI HPWM

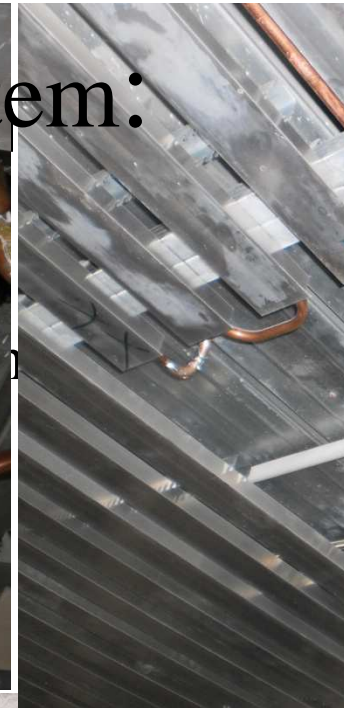


- damage caused by the extinguishing agent. HPWM uses densities of 1/5 compared to standard sprinkler systems
- Water Mist systems when operated at same flow rates of sprinkler systems demonstrate superior performance in term of:
 - damage reduced with factor 5
 - average temperatures reduced with factor 4
 - real protection to fire brigades and on escape routes

4.



Main Design Aspect for the FF System:



Main Design Aspect for the FF System:



Main Design Aspect for the FF System



- No availability of more than 4 m² as technical space for Fire Fighting pump or other hardware for different fire fighting systems:



Comparison of HPWM to standard sprinkler in the Bibliotecha Hertziana

Sprinkler System 5 lpm/m² Water Mist System 1 lpm/m²

Water Density: **1 lpm/m²**

Protected area per spk: 12 m² (3,5 x 3,5 m)

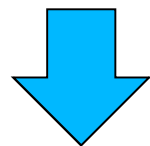
Nozzle type: water mist High Pressure

Bulb: 57°c

K-factor= 1,4

Pressure: min pressure at nozzle 100 bar

Certifications: **IMO A 800(19)**





Listing and Approvals



video



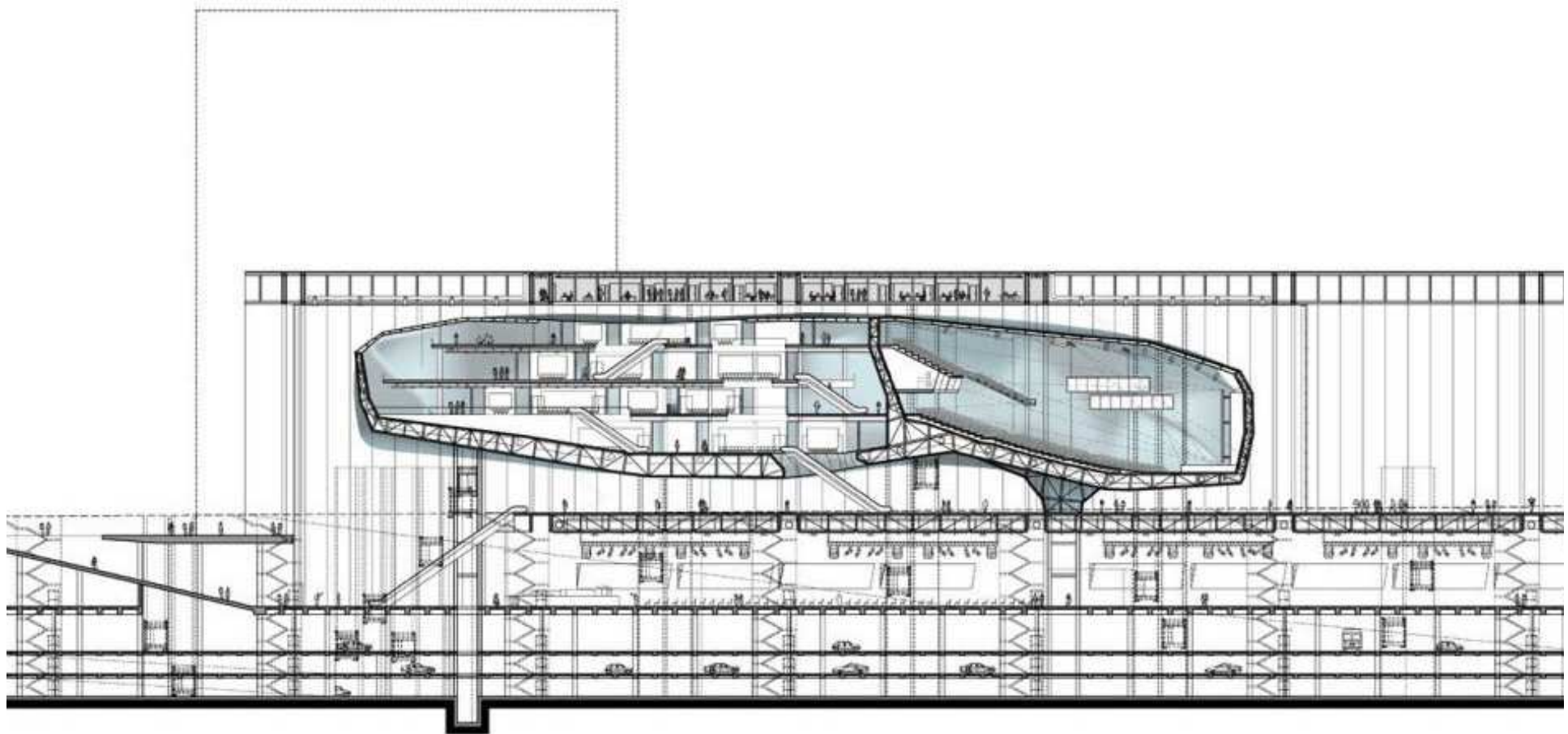
← Fire development

1° and 2° nozzle activation





Fuksas' Cloud



IE AA



Two HPWM applications:

Fuksas' Cloud

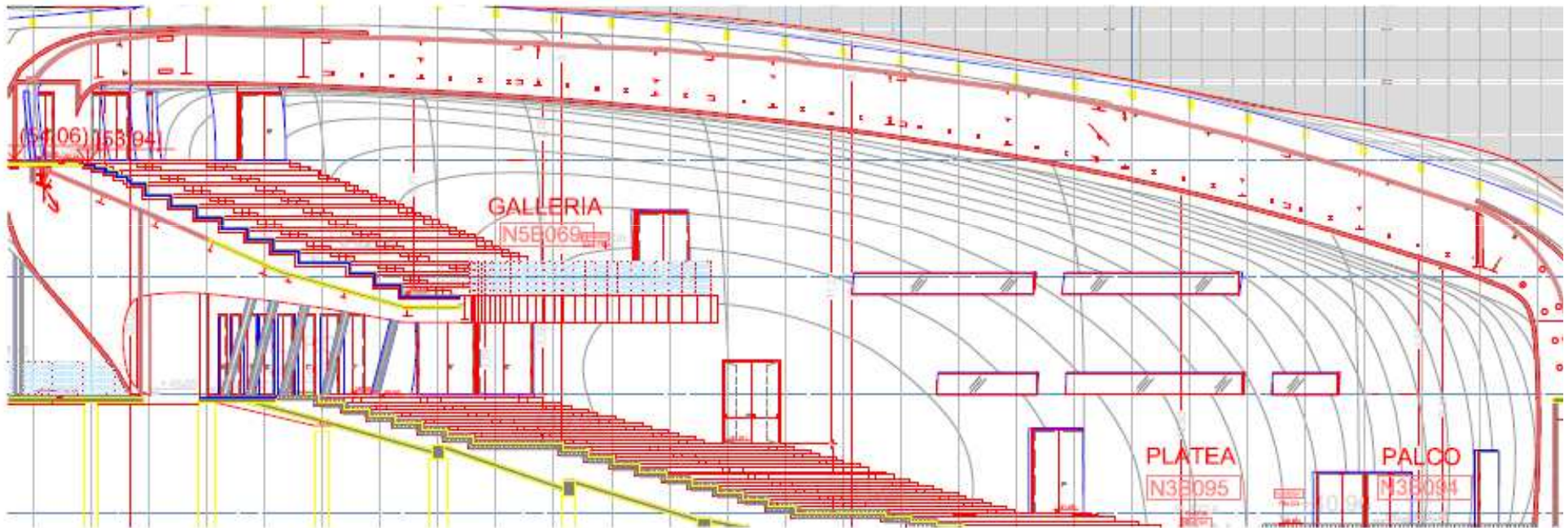
Based in central Rome, at EUR, is a congress center: intended to accommodate various types of events, from exhibitions to performances and conferences.

Nick-named The Cloud because of the nebulous shape inside the building, the innovative structure is made of fibre glass and silicone hung on a steel frame. It was designed by Rome-born architect Massimiliano Fuksas.

This will contain an auditorium for 1,800 people (1900 m²), conference and congress halls with seating for 6,000, restaurants, a five-star hotel (The blade) with 400 rooms, 3,300 m² of commercial area and an underground car park. The whole complex is designed with the latest energy-saving materials and using renewable sources for heating and air conditioning.



OH4- 14 meters





Two HPWM applications:

Fuksas' Cloud

The congress centre was planned at the height of the economic boom to provide the city with its first large, high-quality congress and conference centre to attract business tourism, some of it away from Milan in the north.

The cloud is covered with transparent innovative material and is floating in the Theca.



OH4 as for EN 12845

Cinemas and theatres, Concert Halls, Exhibition Halls, Recording Studios

After FDS simulations the auditorium has been found with too much fire load due to internal construction and furniture materials. A FF system was needed to give Fire Protection and:

- allowing visitors and guests to safely evacuate the premises
- preventing fire from spreading to nearer areas and glass
- preventing smoke from spreading to escape routes, etc...
- reducing fire and extinguishing agent damage
- increasing Fire Resistance of civil buildings with a steel frame
- protecting escape routes with or without side glasses.

OH4 scenario

CEN TS 14972 : Water Mist Systems

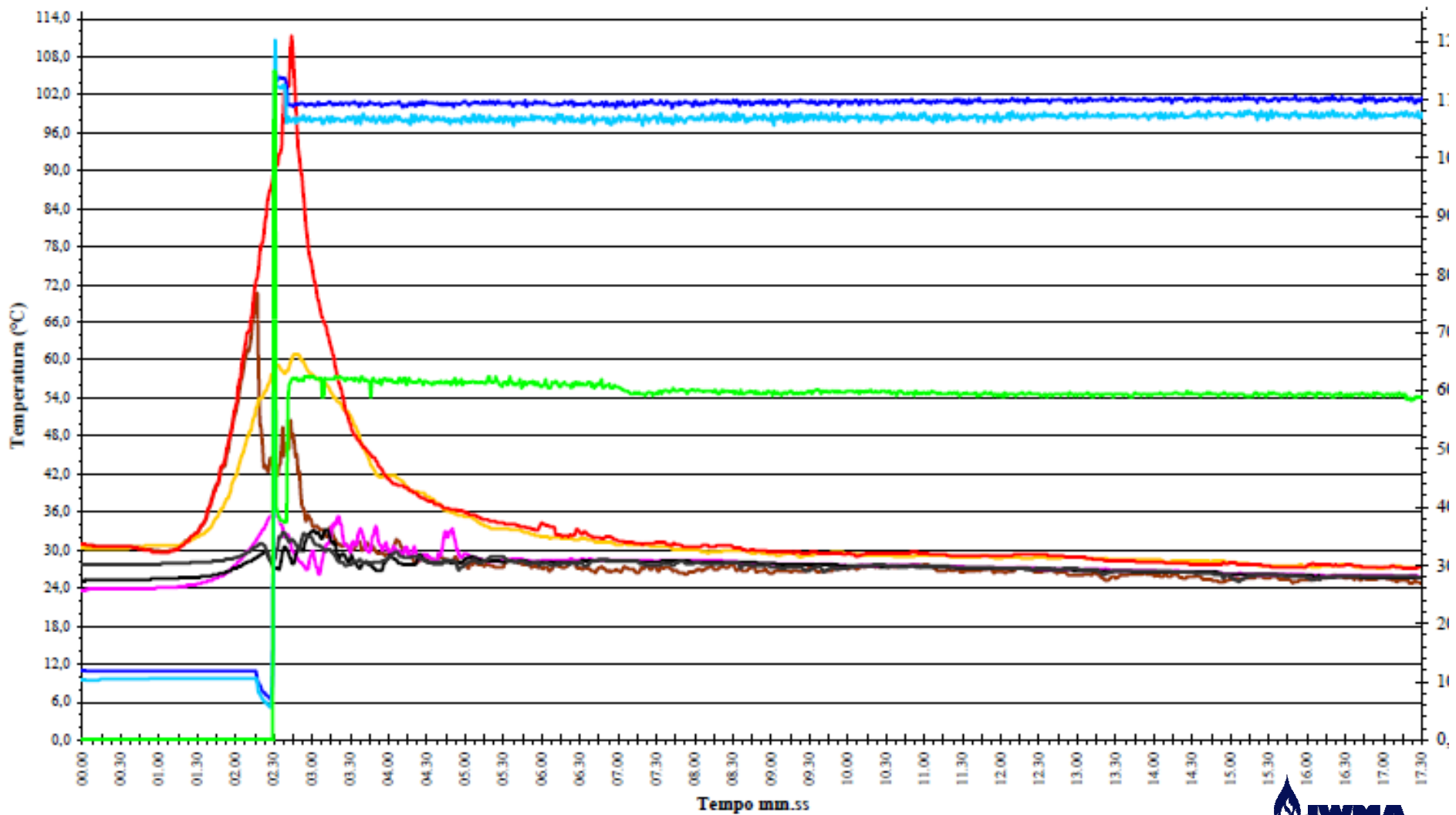
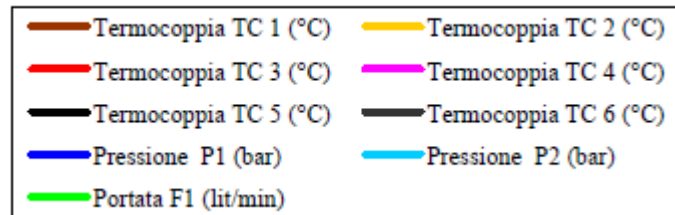
Evaluation of test results: damage and ceiling average

Sprinkler System 5 lpm/m² (on 360 m² area)

Water Mist System 31lpm/m²



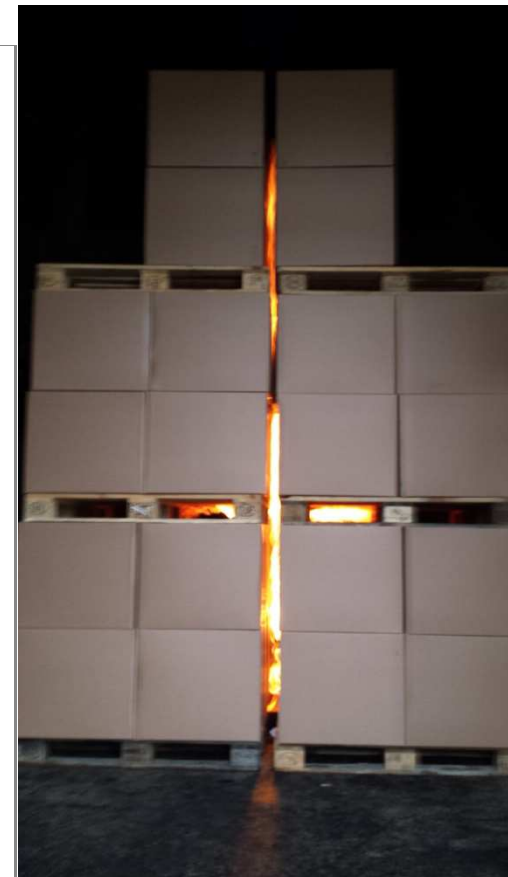
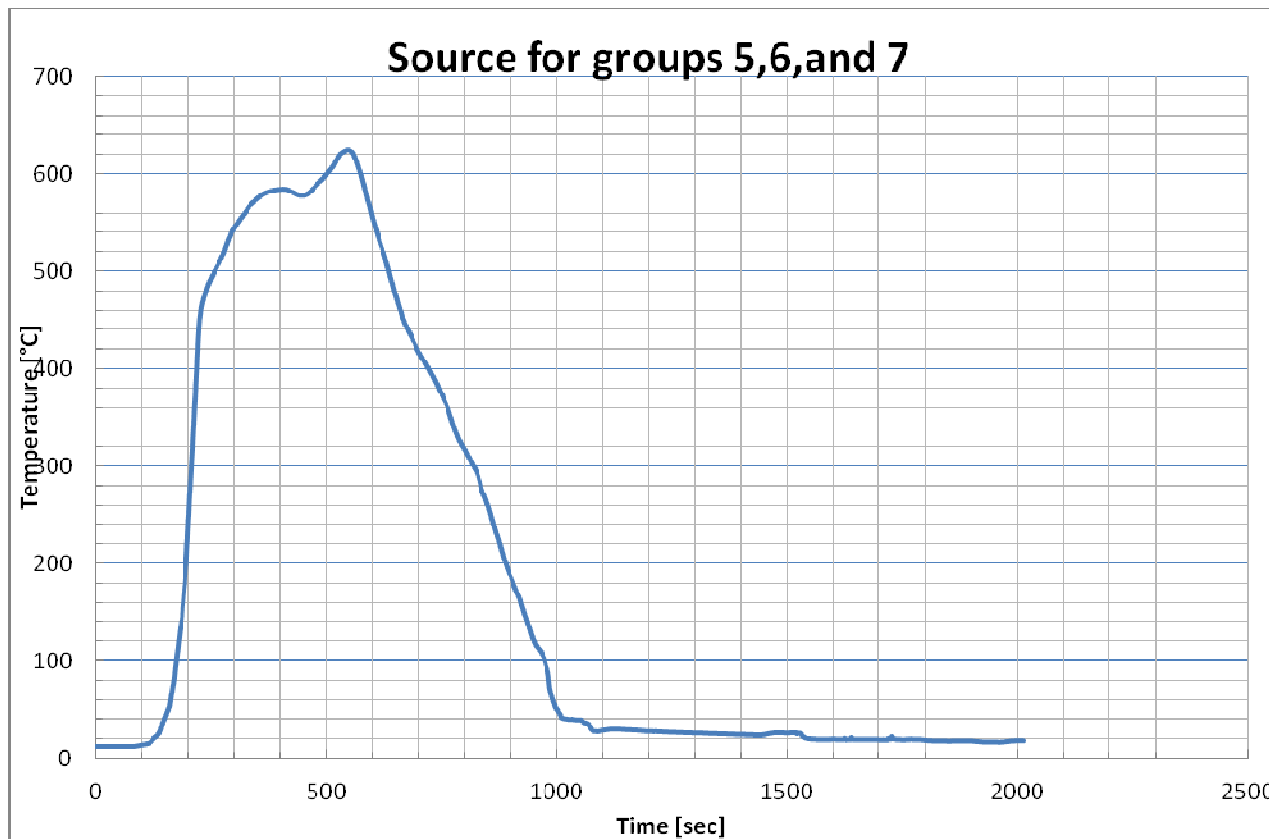
OH4 scenario





New HH applications (storages):

High Pressure water mist systems have demonstrated that they can be **sprinkler equivalent** and in many cases (water curtains, high ceilings) to have **better performances**. Recently manufacturers are working on applying these systems in storages:.....





Conclusions and Remarks

- Water Mist is a significant improvement with respect to Standard Water Fire Fighting Systems;
- Major aspects:
 - Substantial reduction in water consumption
 - Reduction in piping diameters up to 10 times (water or gas based)
 - Less space for pumping room;

Conclusions and Remarks



- *Ei Mist Vs standard sprinkler systems:*

- at least 50 m² less for the pumping station area (sprinkler needs multiple stations)
- less number of nozzles but slightly higher cost of the materials
- reduced amount of special components: pressure reducers, control valve
- low impact of civil works for water storage basins
 - with same pumping station also HP hose reels can be supplied
- reduced maintenance cost in a 20-25 years period

The final evaluation is that considering civil works, components, installation, start-up, maintenance) in 20-25 years there's a saving and more compact and reliable FF system (hose reel included).



Thank you for your attention!

QUESTIONS??



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