

19th International Water Mist Conference IWMC 2019
23-24 October 2019 - Berlin

WATER MIST IN TALL BUILDINGS

Case study: «Unipol Sai – New Headquarter – Milan»



Ing. Giuseppe G. AMARO

Ing. Giulia AMARO



Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



SPRINKLER

VS

WATER MIST



- Cooling of flames and gases by evaporation
- Depletion of oxygen by evaporation
- Attenuation of radiant heat

Ing. Giulia AMARO



Sprinkler vs Water Mist
Water Mist: advantages

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

RENAISSANCE AT ST. PANCRAS INTERNATIONAL - LONDON



ZOOFENSTER SKYSCRAPER - WIEN



WARSAW SPIRE TOWER - POLAND



DONAU CITY TOWER - WIEN



NÄSINNEULA TOWER - FINLAND



NH EUROBUILDING - MADRID

Ing. Giulia AMARO

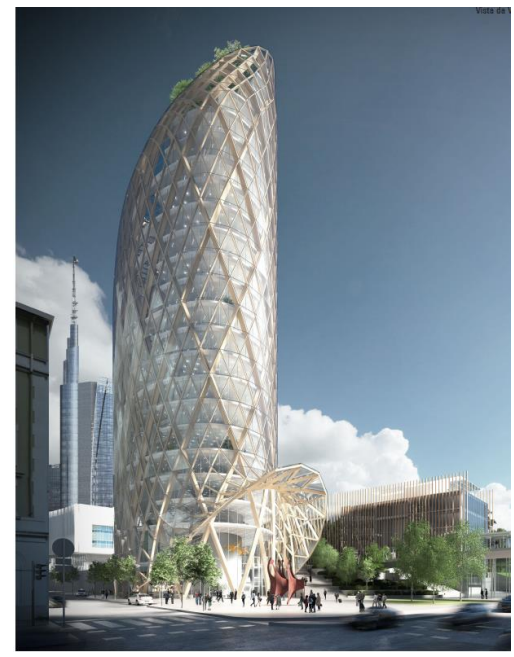


Water Mist
International application

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

UNIPOL SAI TOWER - MILAN



PIEDMONT TOWER - TURIN



BONNET TOWER - MILAN



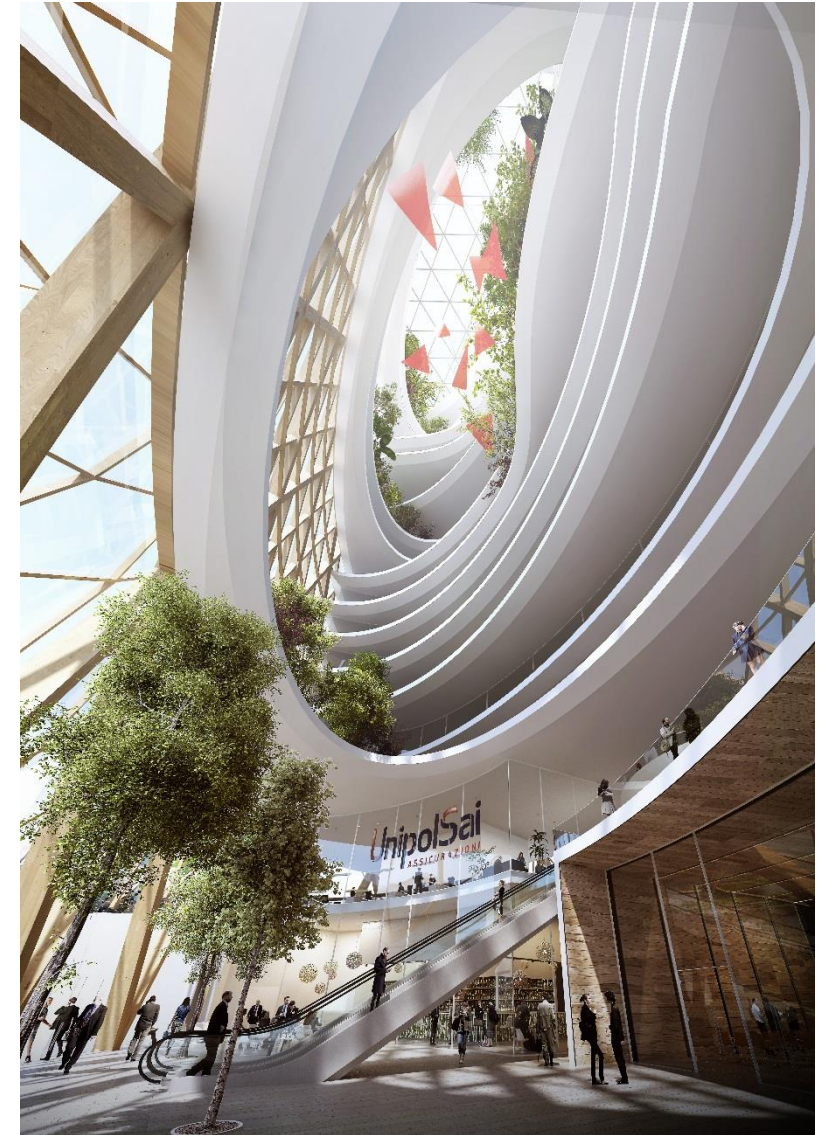
Ing. Giulia AMARO



Water Mist
Italian application

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Ing. Giulia AMARO



Case Study: Unipol Sai

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

UNIPOL SAI - KEY PLAYERS

CLIENT



CONTRACTORS



DESIGNERS



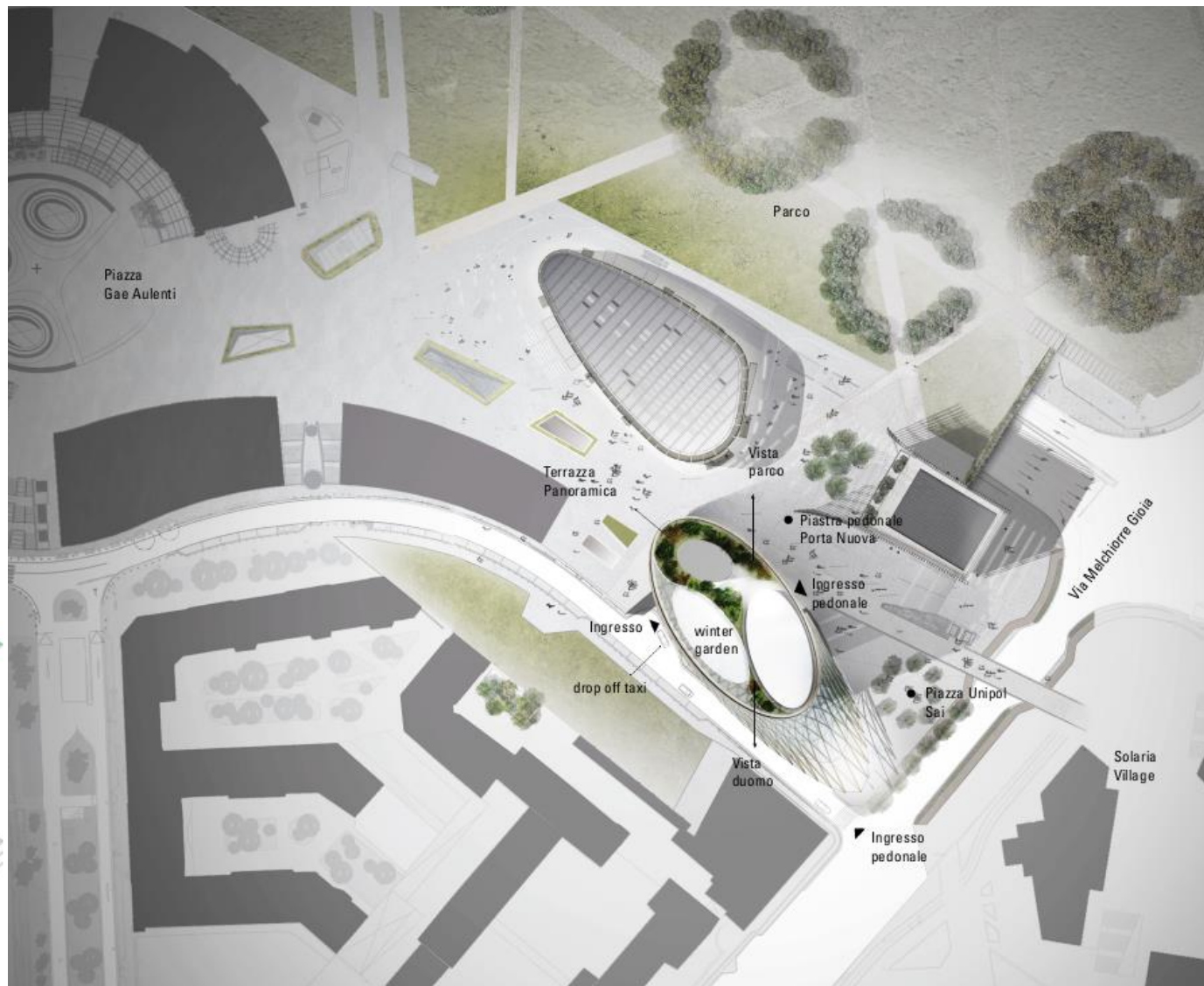
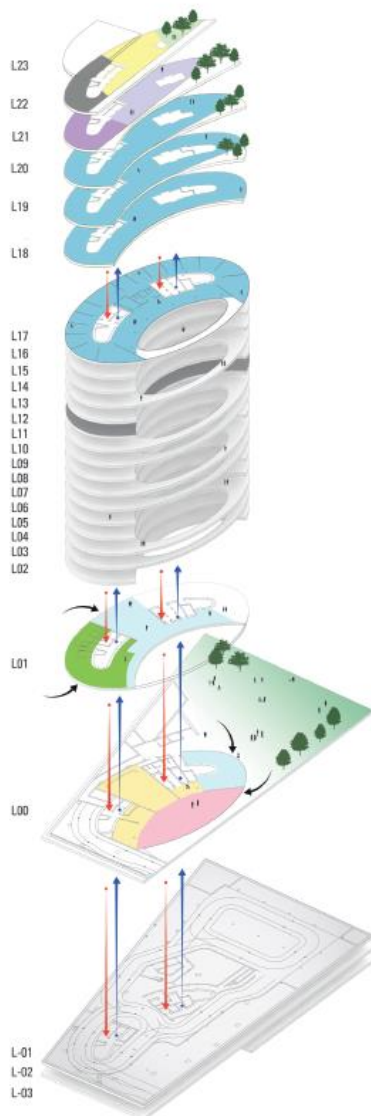
Ing. Giulia AMARO



Case Study: Unipol Sai
Key players

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

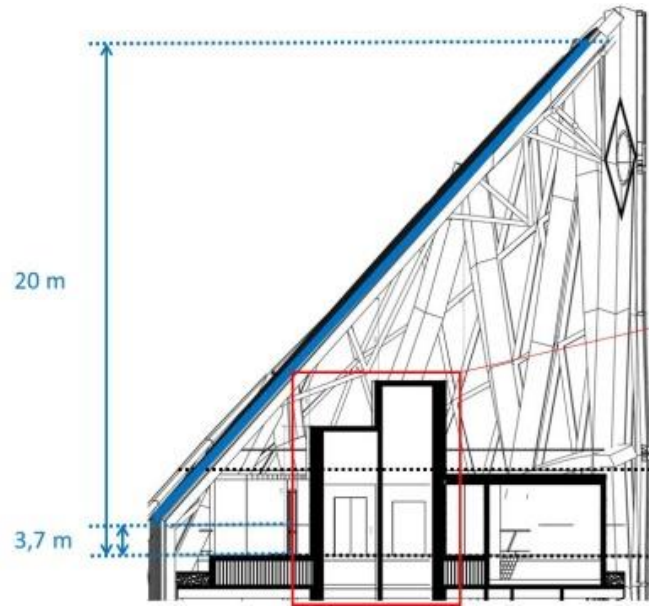


Ing. Giulia AMARO

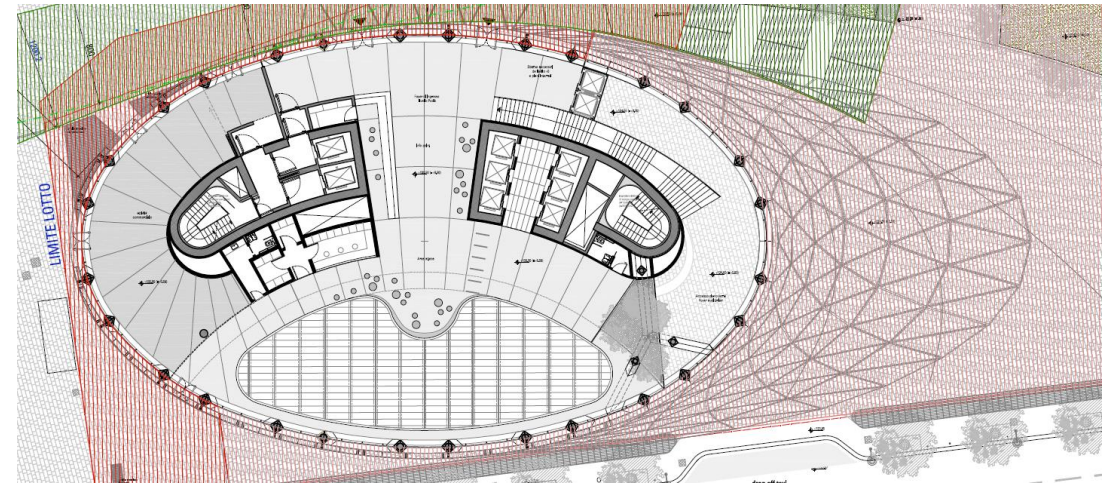
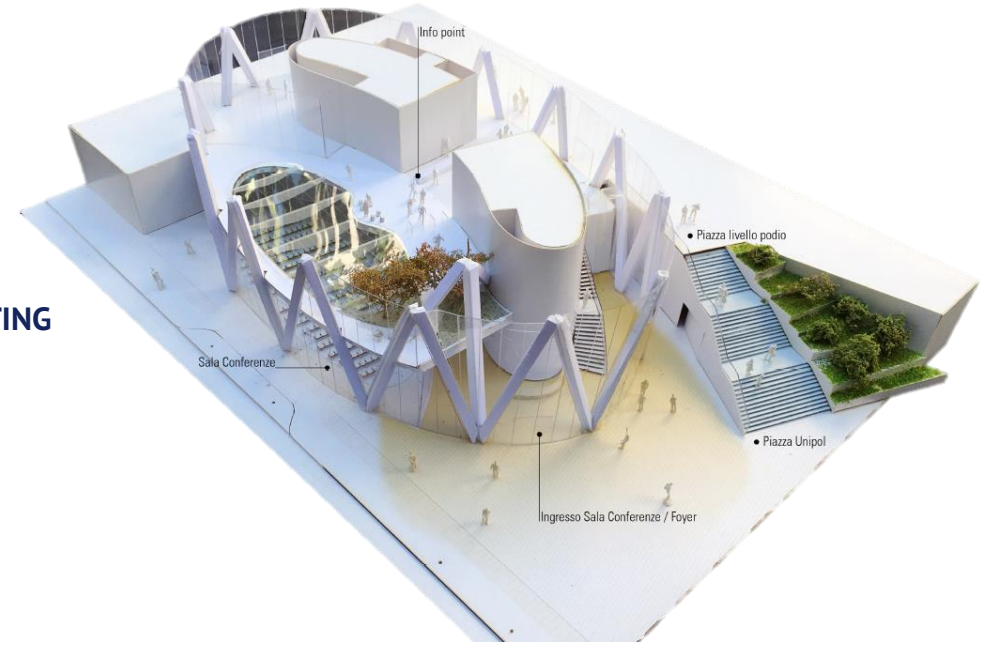


Case Study: Unipol Sai Spatial layout and Floor usage

19TH IWMC 2019 WATER MIST IN TALL BUILDINGS



FIRE FIGHTING ELEVATOR



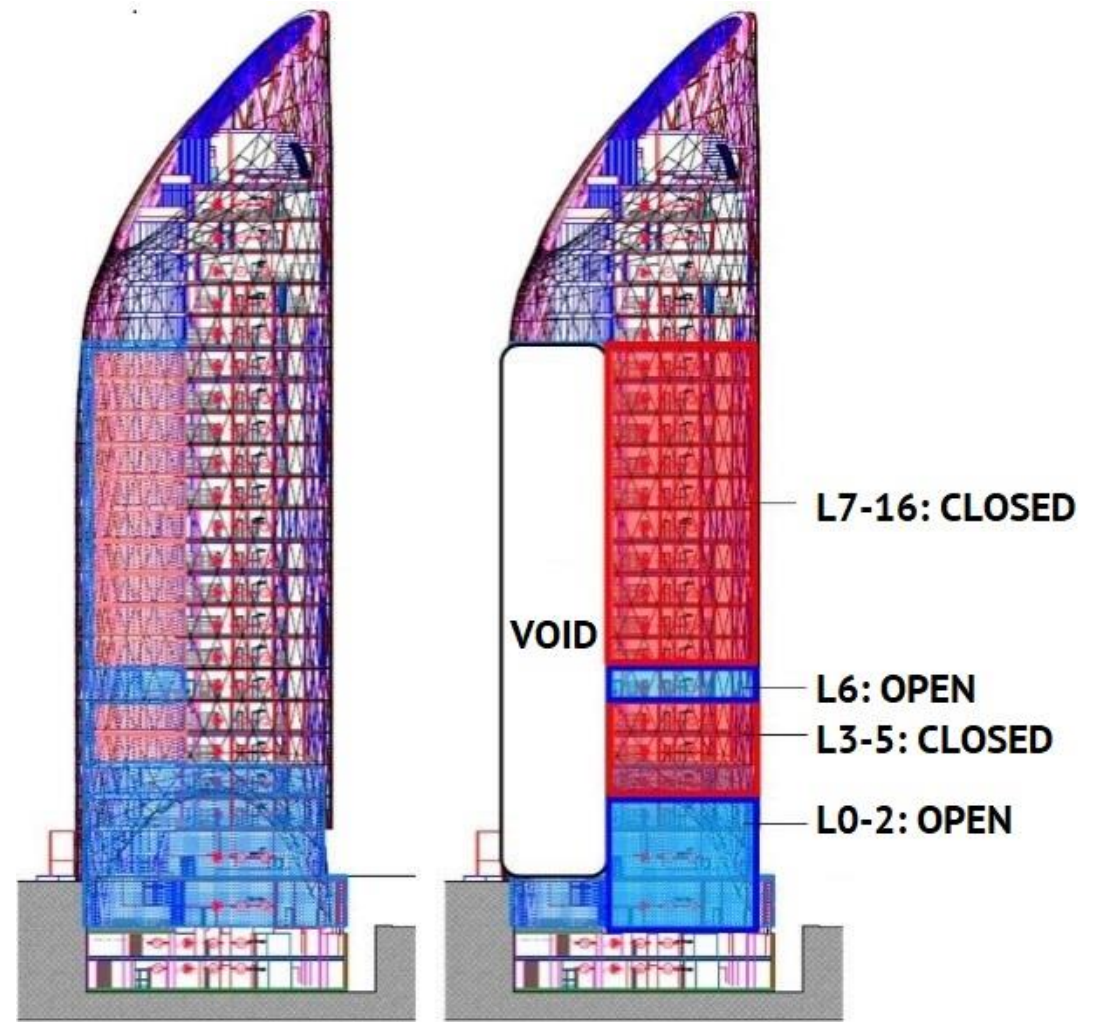
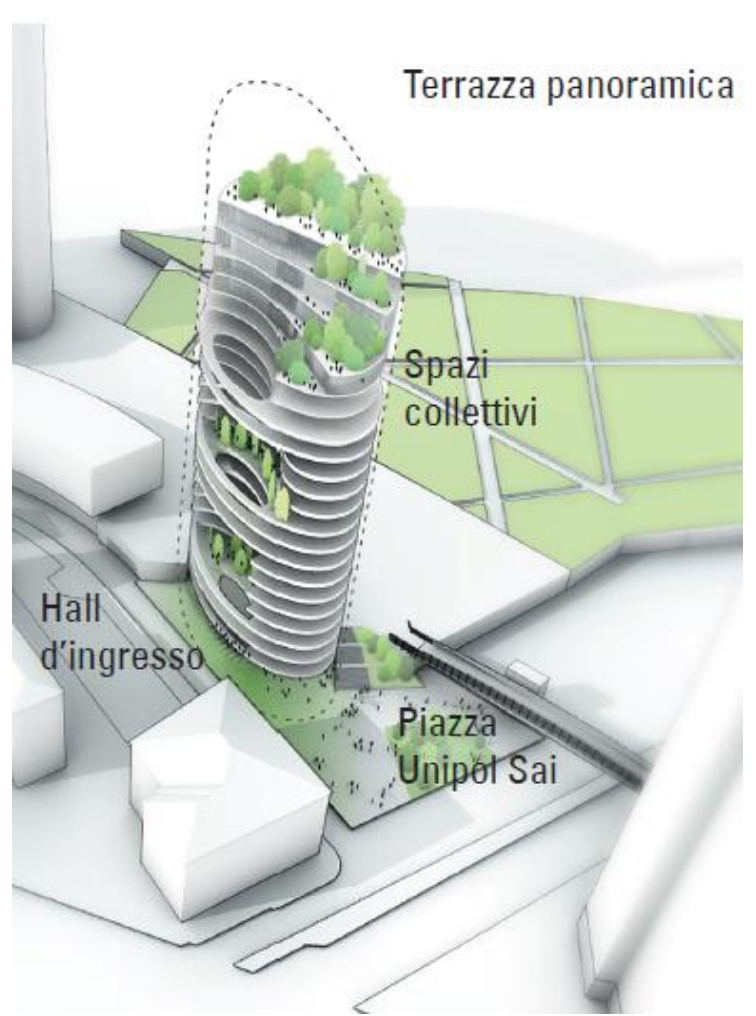
Ing. Giulia AMARO



Case Study: Unipol Sai Firefighting accessibility

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Ing. Giulia AMARO

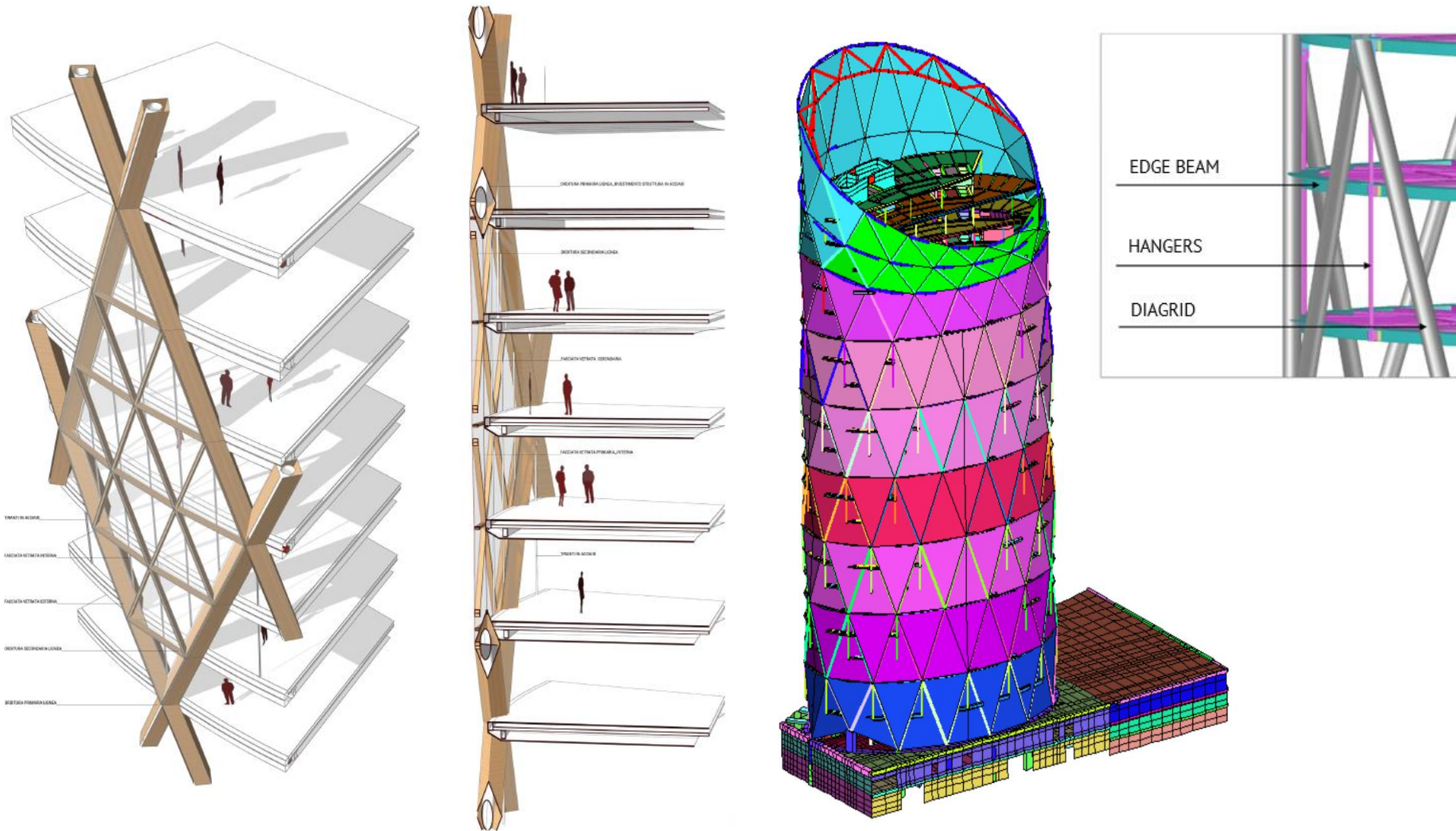


Case Study: Unipol Sai

Water mist in unique spatial layout

19TH IWMC 2019

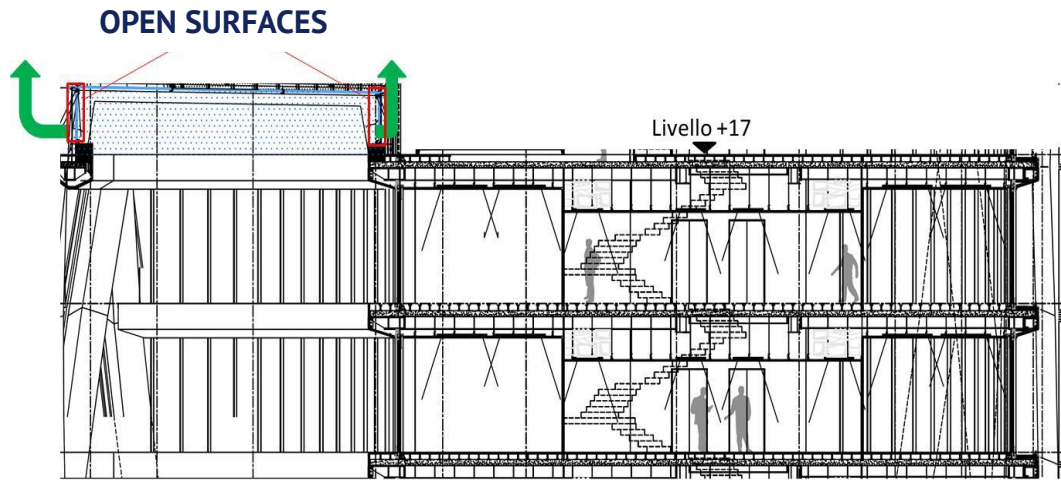
WATER MIST IN TALL BUILDINGS



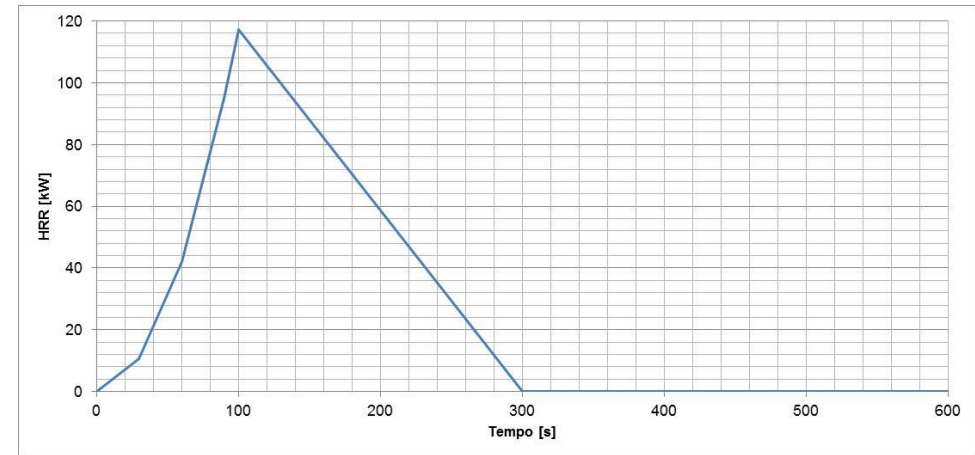
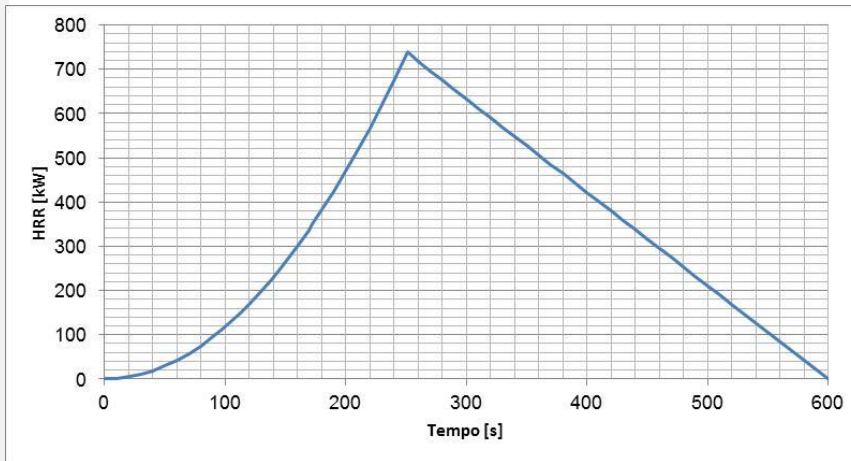
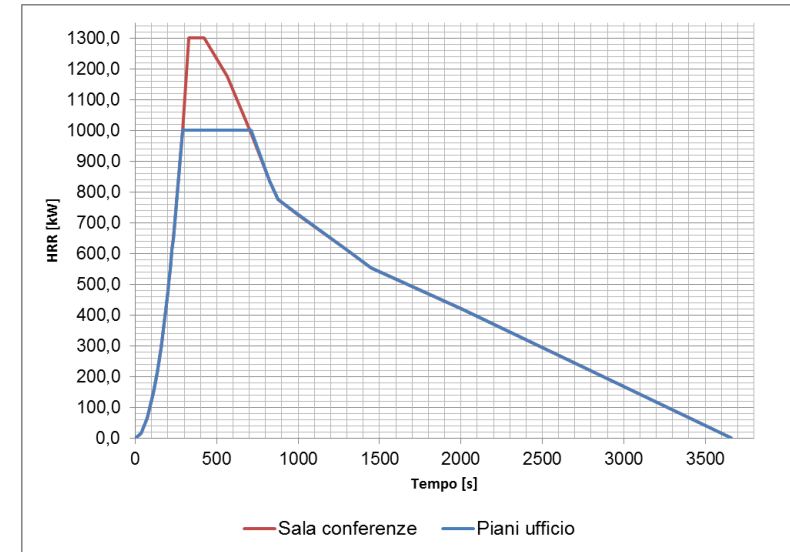
Ing. Giulia AMARO

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



VOID VENTILATION SCHEME



Ing. Giulia AMARO



Case Study: Unipol Sai
Effect of water mist

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Ing. Massimo FERRETTI



Case Study: Unipol Sai
Water mist system benefits

19TH IWMC 2019

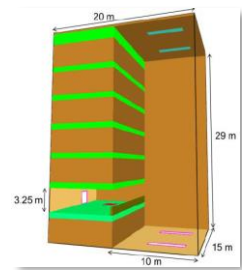
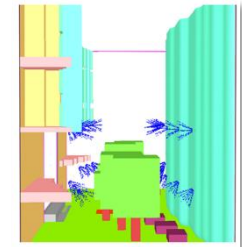
WATER MIST IN TALL BUILDINGS

«Of course, using **high pressure water mist** as fire suppression technology throughout the entire building complex!.»

Critically important to consolidate all different **type approvals**, **full-scale fire tests reports** and **integrated numerical simulations** covering all the different occupancies in the building, and present them in a structured manner for the local AHJ approval.



Fire consultant



19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Fire consultant

Dossier based on:

Local rules on fire prevention

International standards on land-based water mist systems

- UNI CEN/TS 14972:2011 “Fixed Fire fighting systems – Water mist systems”
- NFPA 750 “Standard on Water Mist protection Systems”
- VdS 3188 “Guideline for planning and installation”
- FM (Factory Mutual) Approval 5560 “Water Mist systems”
- UL (Underwriter laboratories) standard 2167 “Standard for Water Mist nozzles for fire protection service”.

Standard fire test protocols and type approvals for water mist systems

No standard fire test protocols and detected performances for water mist systems (paying more attention on the set goals and validity limits)

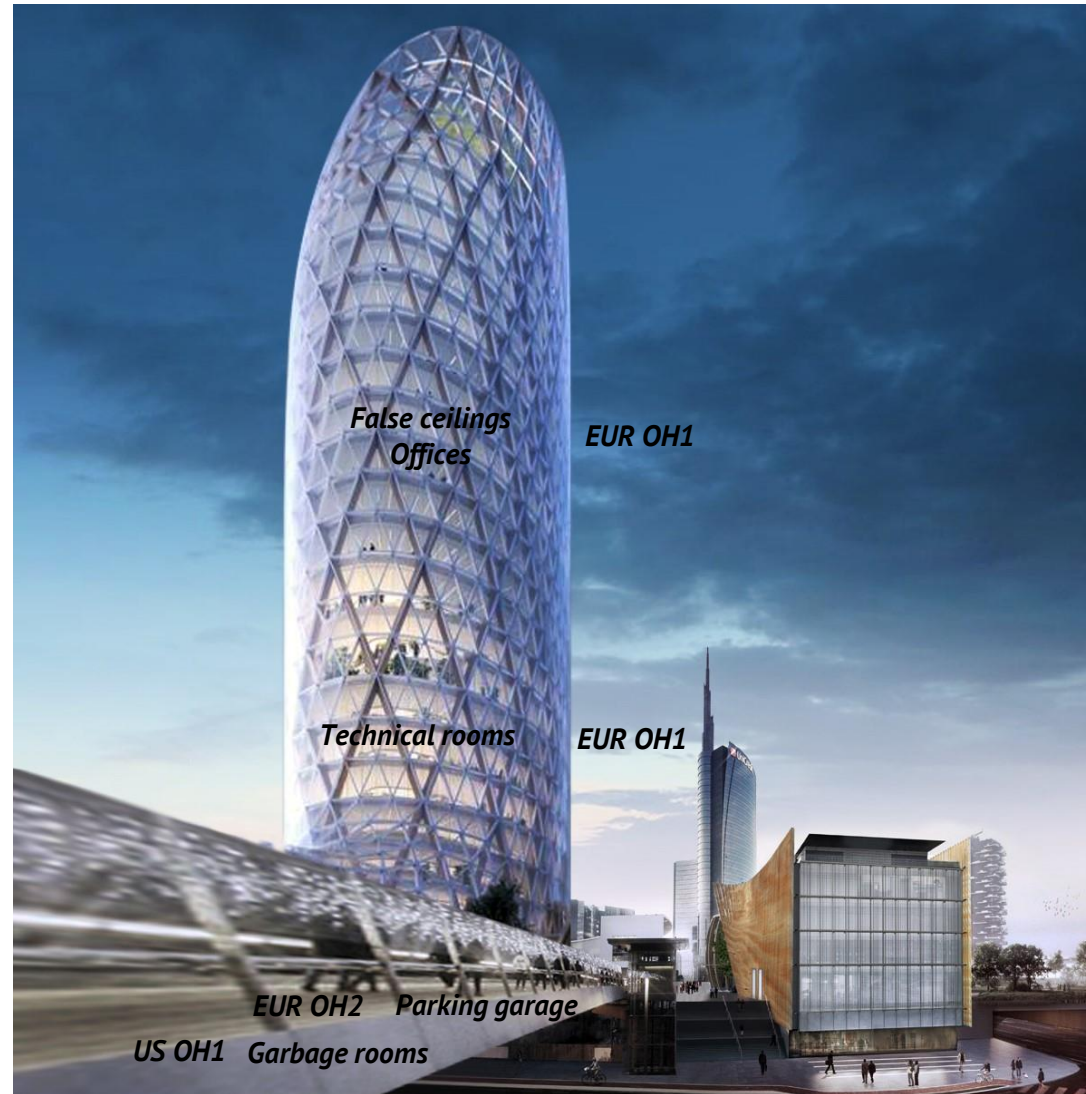
Dossier integrated with:

Case-history of water mist protection in similar buildings

Fire dynamic simulations

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



*Main
occupancy classifications*

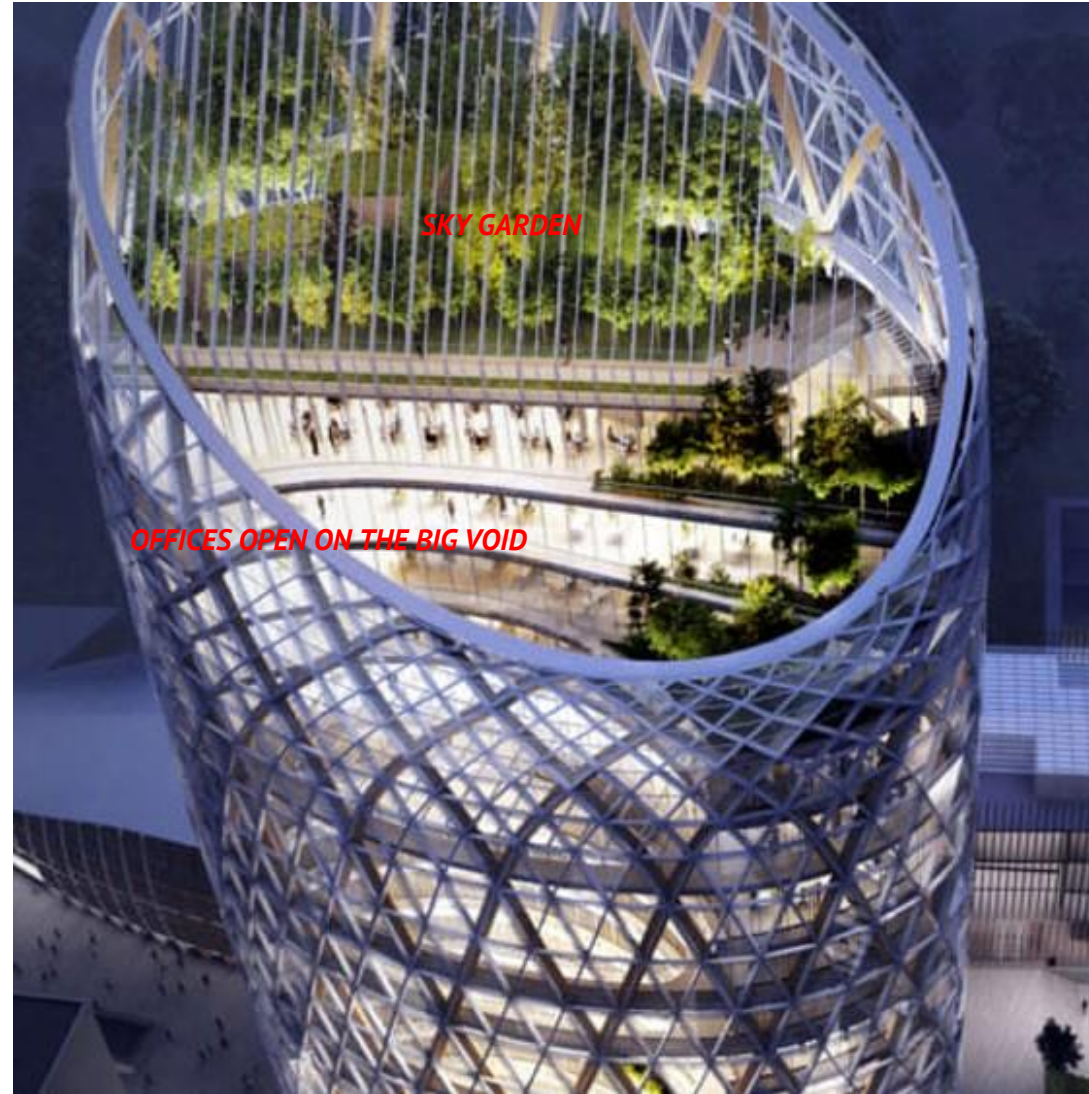
OH1 & OH2

Based on standards

Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



*Specific
occupancy classifications*

OH1 & OH2

*Based on fire consultant
evaluations*

Ing. Massimo FERRETTI

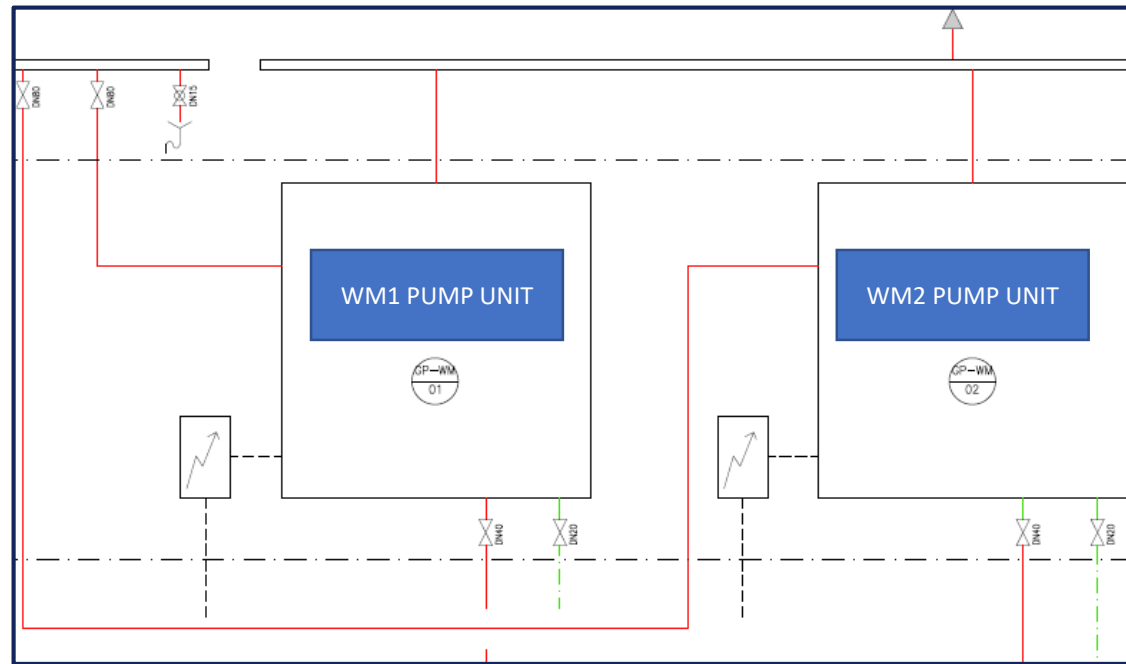
19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

Occupancies	HI-FOG® System	Type Approvals / Fire Tests / FDS
Parking garages	HI-FOG® 1000 sprinklers (dry system)	VdS OH2 approval
Offices	HI-FOG® 2000 sprinklers (wet system)	VdS OH1 approval
False ceilings	HI-FOG® 2000 sprinklers (wet system)	VdS OH1 approval
Technical rooms	HI-FOG® 2000 sprinklers (wet system)	VdS OH1 approval
Garbage rooms	HI-FOG® 2000 sprinklers (wet system)	UL OH1 approval
Sky garden	HI-FOG® 1000 sprinklers (wet system) & HI-FOG® 1000 spray heads	HI-FOG® full-scale fire tests at CNPP, integrated and verified by numerical simulations
Offices open on the big void	HI-FOG® 2000 sprinklers (wet system)	VdS OH1 approval, integrated and verified by numerical simulations

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

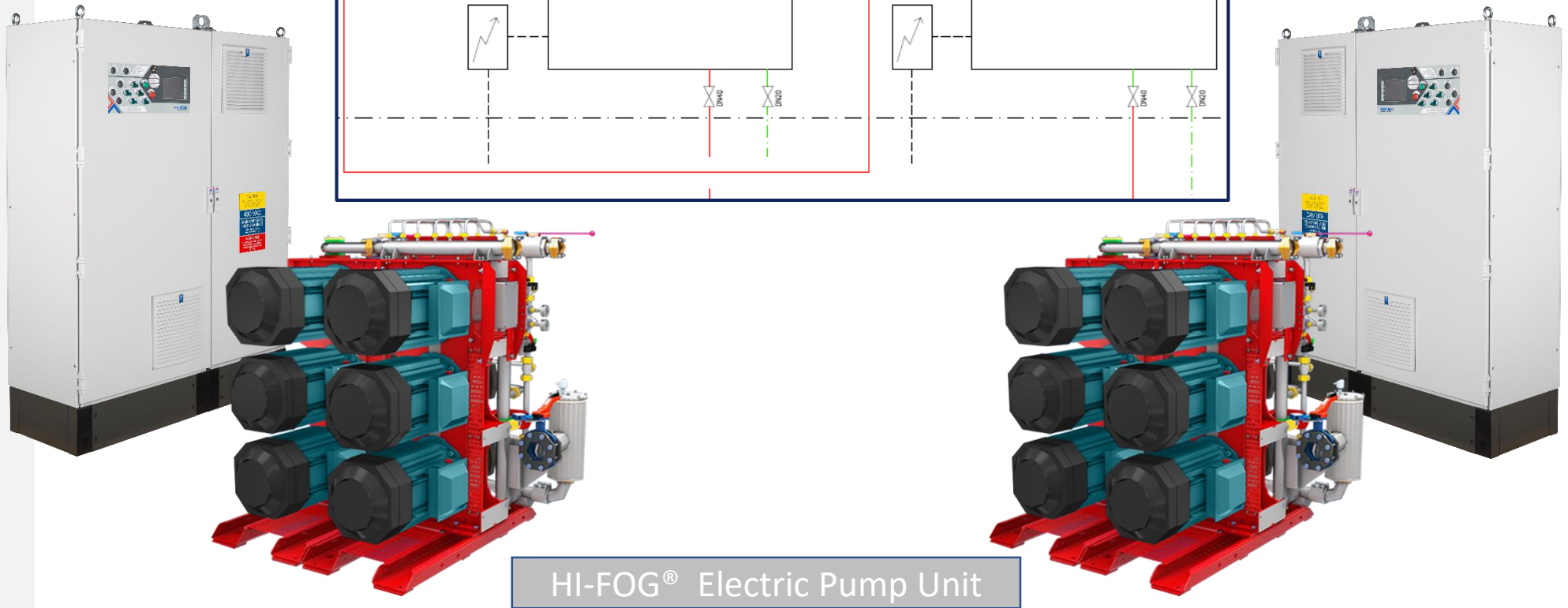


2 x HI-FOG® EPU

Working pressure 140 bar

Installed in the basement

Protecting all the complex



HI-FOG® Electric Pump Unit

Ing. Massimo FERRETTI

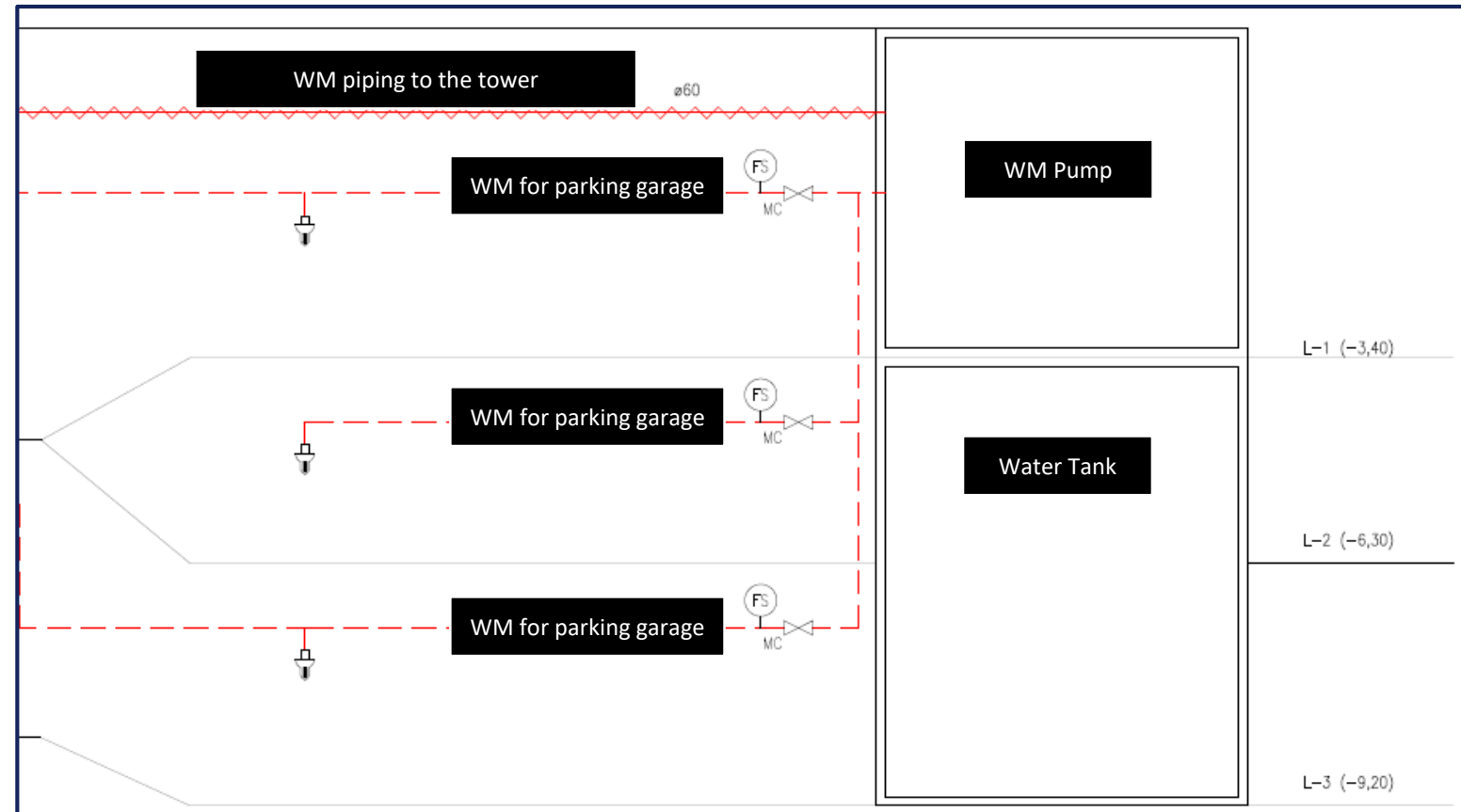


Case Study: Unipol Sai Water mist pressurization units

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

PARKING GARAGE PROTECTION



Ing. Massimo FERRETTI

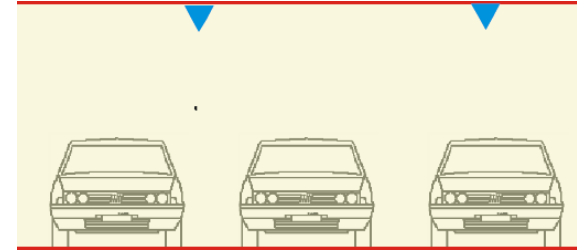
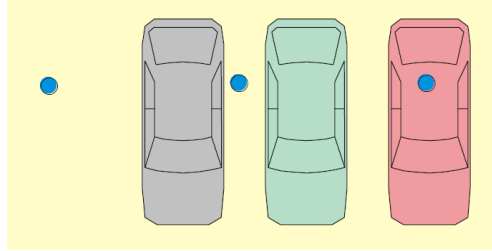
19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

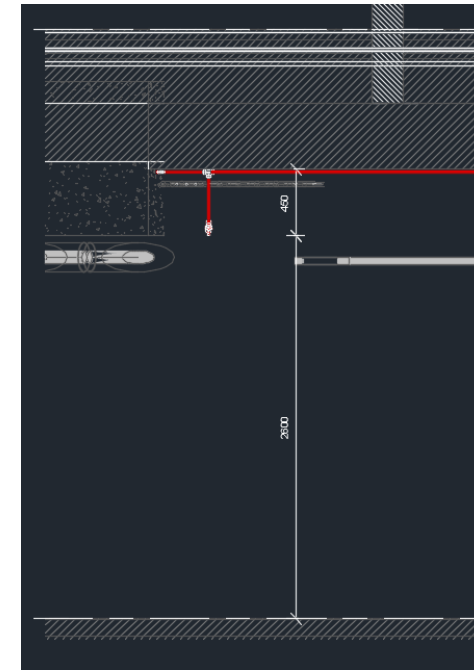
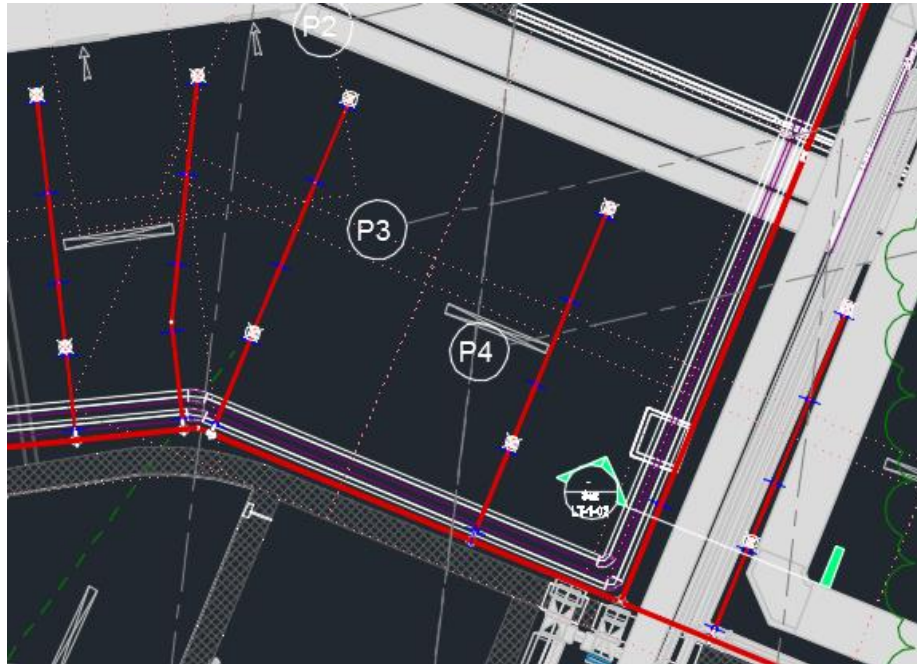
VdS OH2

PARKING GARAGE PROTECTION

Tests at VTT



Installation according to approvals and tests



Ing. Massimo FERRETTI

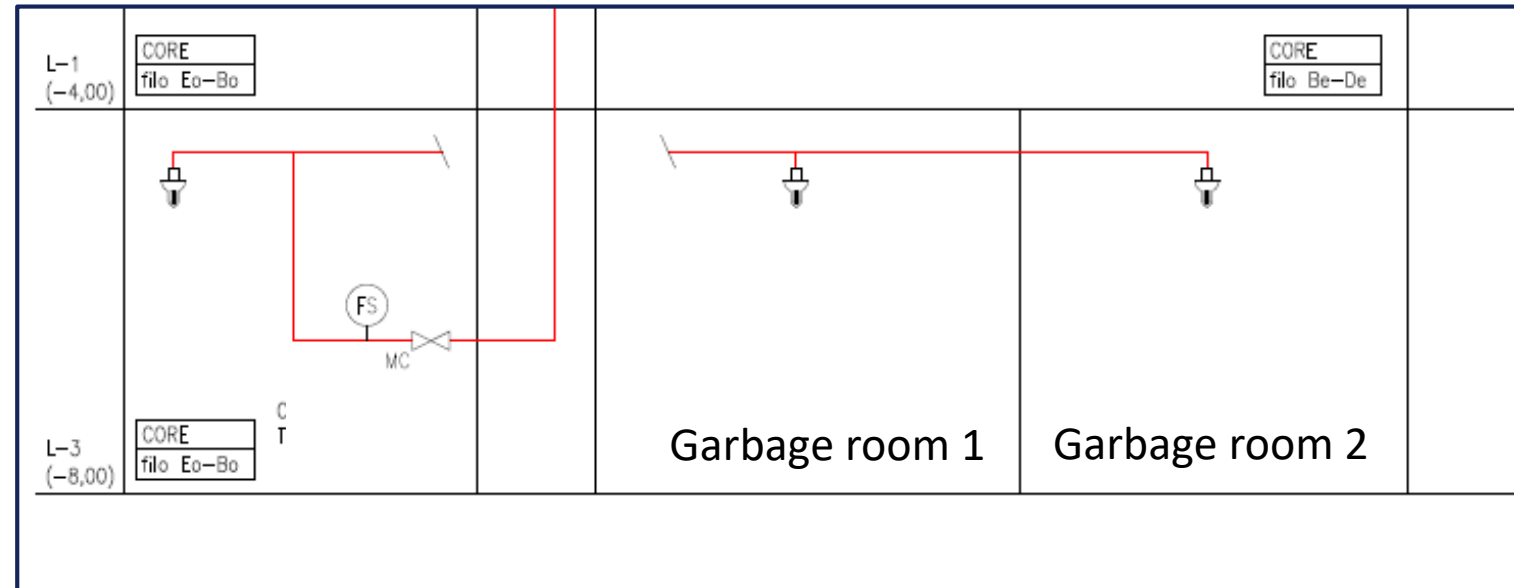


Case Study: Unipol Sai
HI-FOG® system for parking garages

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

GARBAGE ROOMS PROTECTION



Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

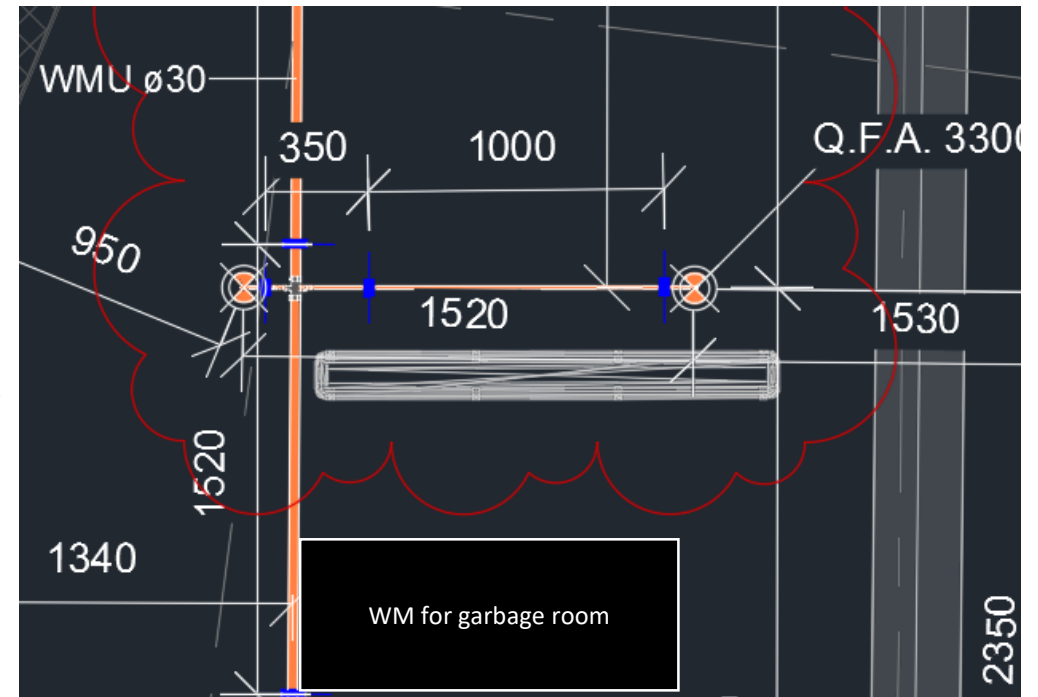
UL OH1

GARBAGE ROOMS PROTECTION

Tests at
SP & VTT



Installation
according to
approvals and
tests



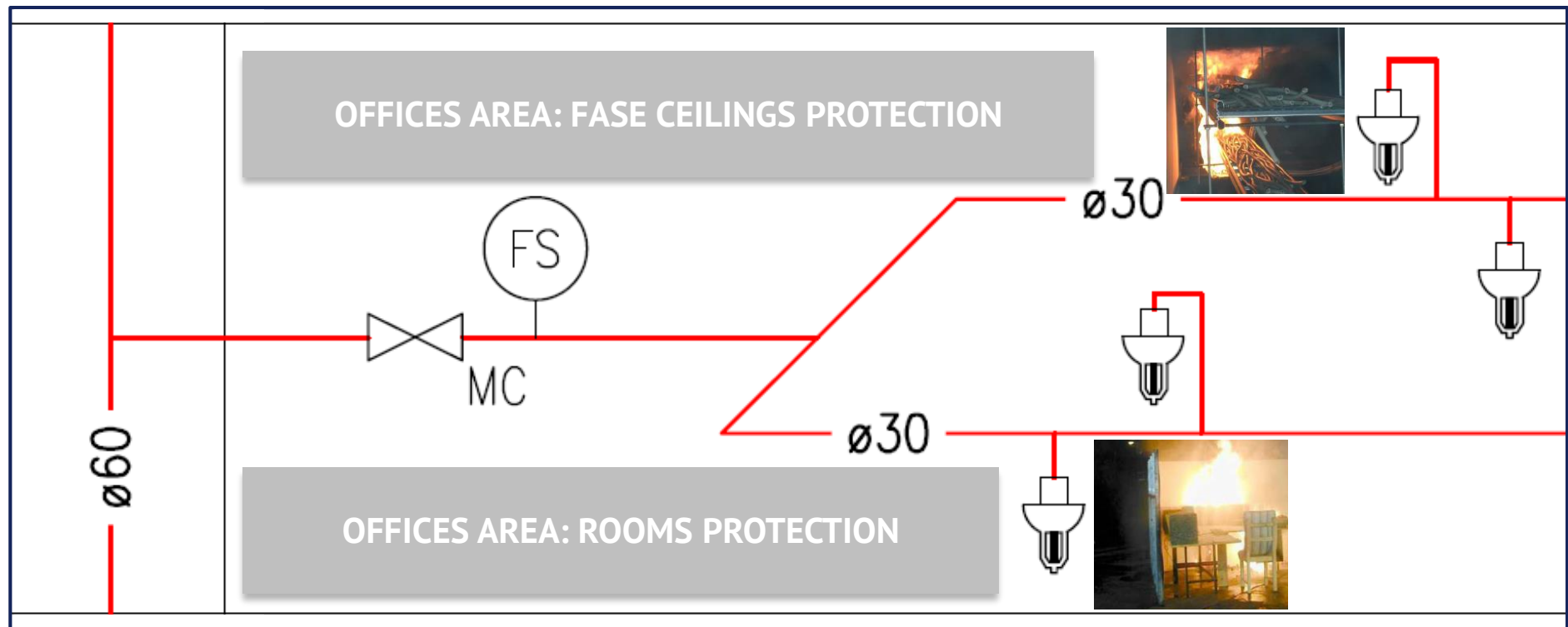
Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

VdS OH1

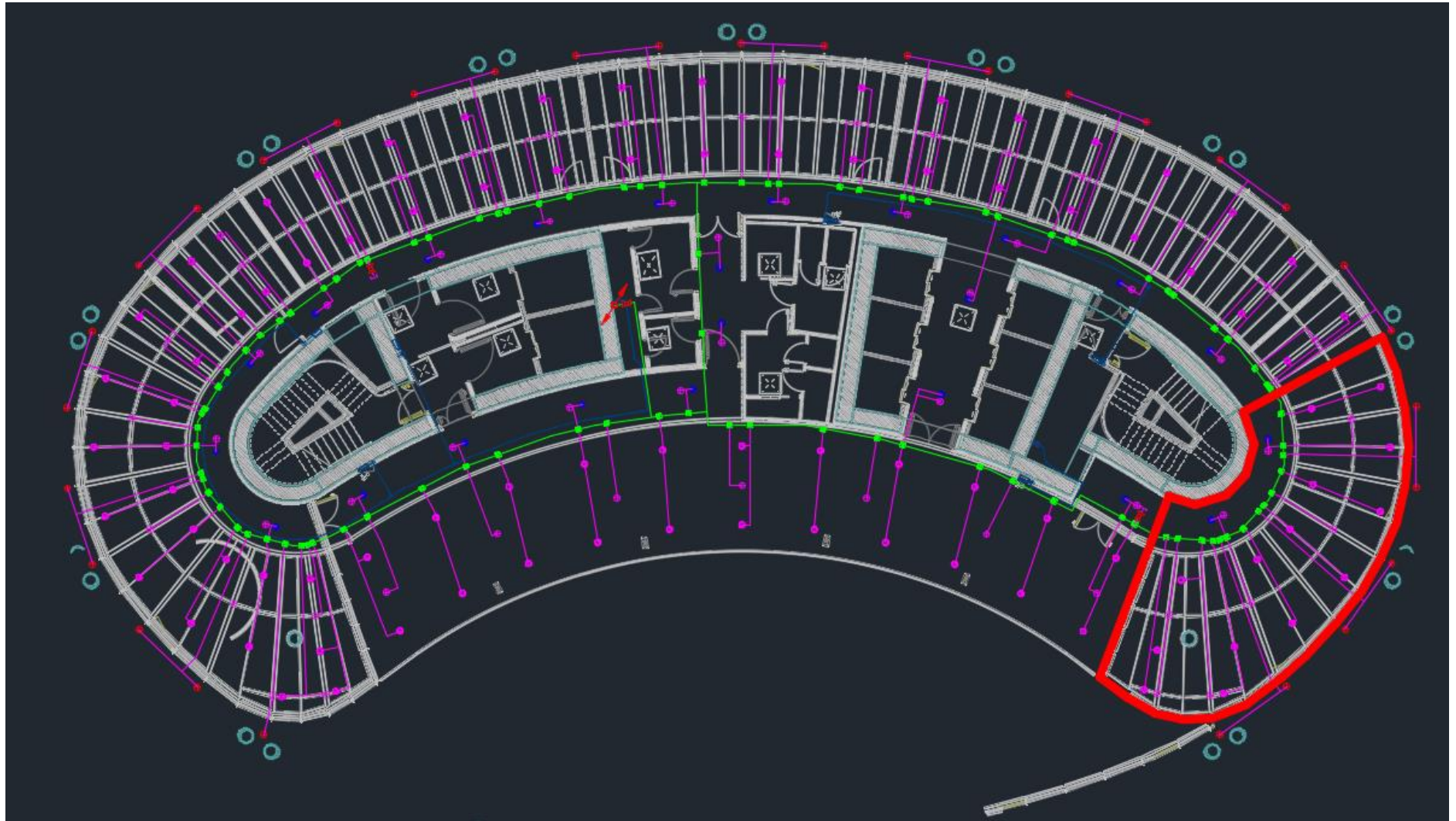
Tests at VTT



Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Ing. Massimo FERRETTI



Case Study: Unipol Sai
Water mist system layout

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

Offices

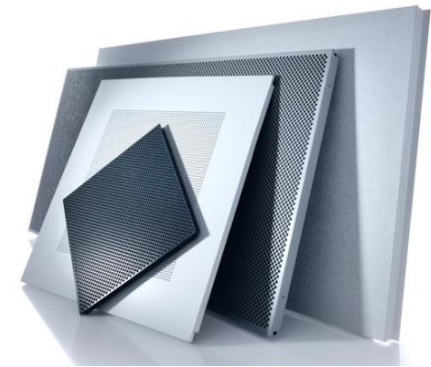
Standard fire test protocols and type approvals for water mist systems

- “Fire test protocol for office occupancies of OH1” Annex A.3 UNI CEN/TS 14972:2011
- VdS Test Assembly and Requirements - OH1 (False Floors and False Ceilings)
- VdS OH1 approvals

Spacing of sprinklers based not only on the fire tests and approvals but also on the type and size of ceiling panels (radiant system).



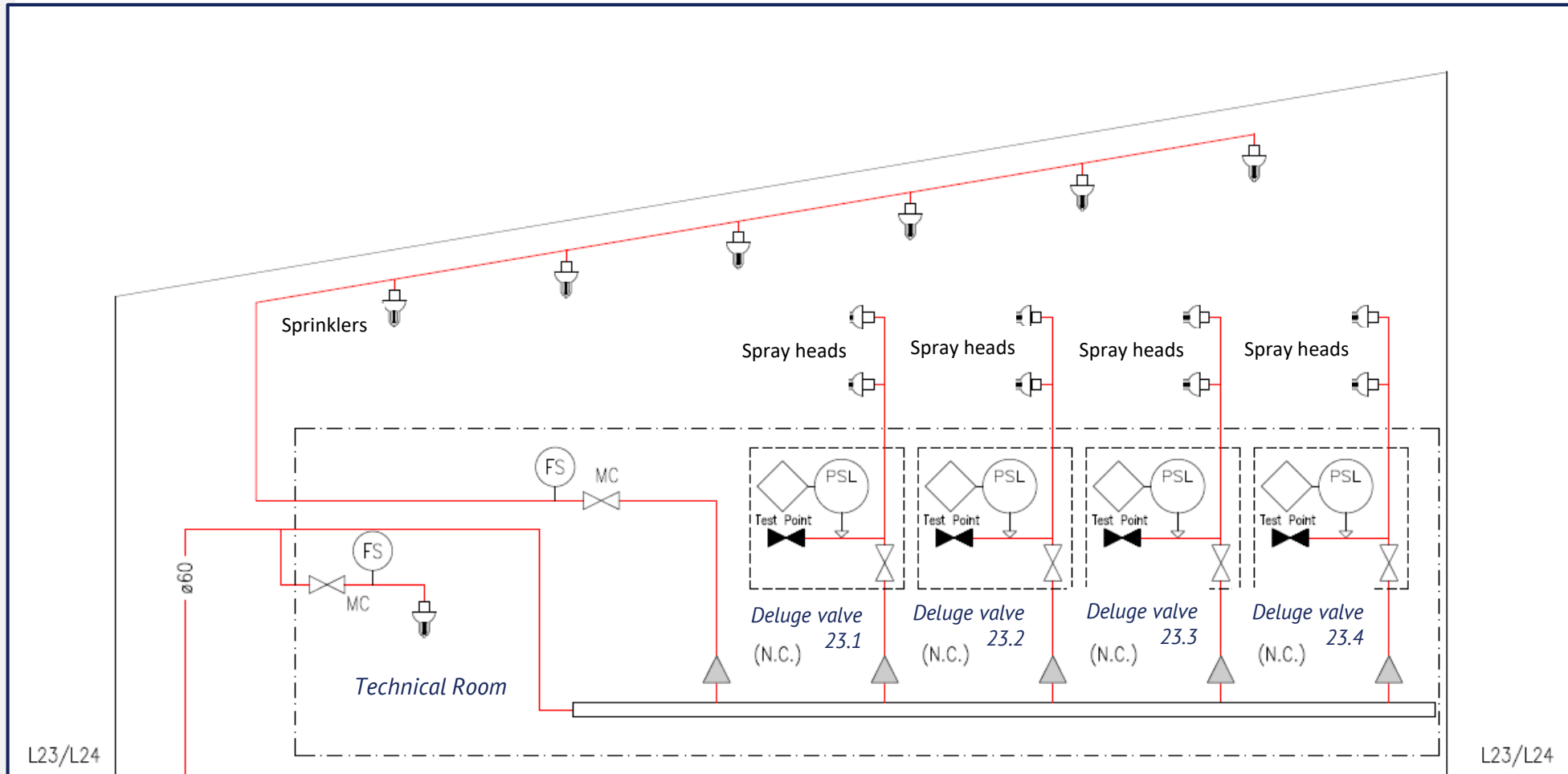
Fire consultant



19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

SKY GARDEN PROTECTION

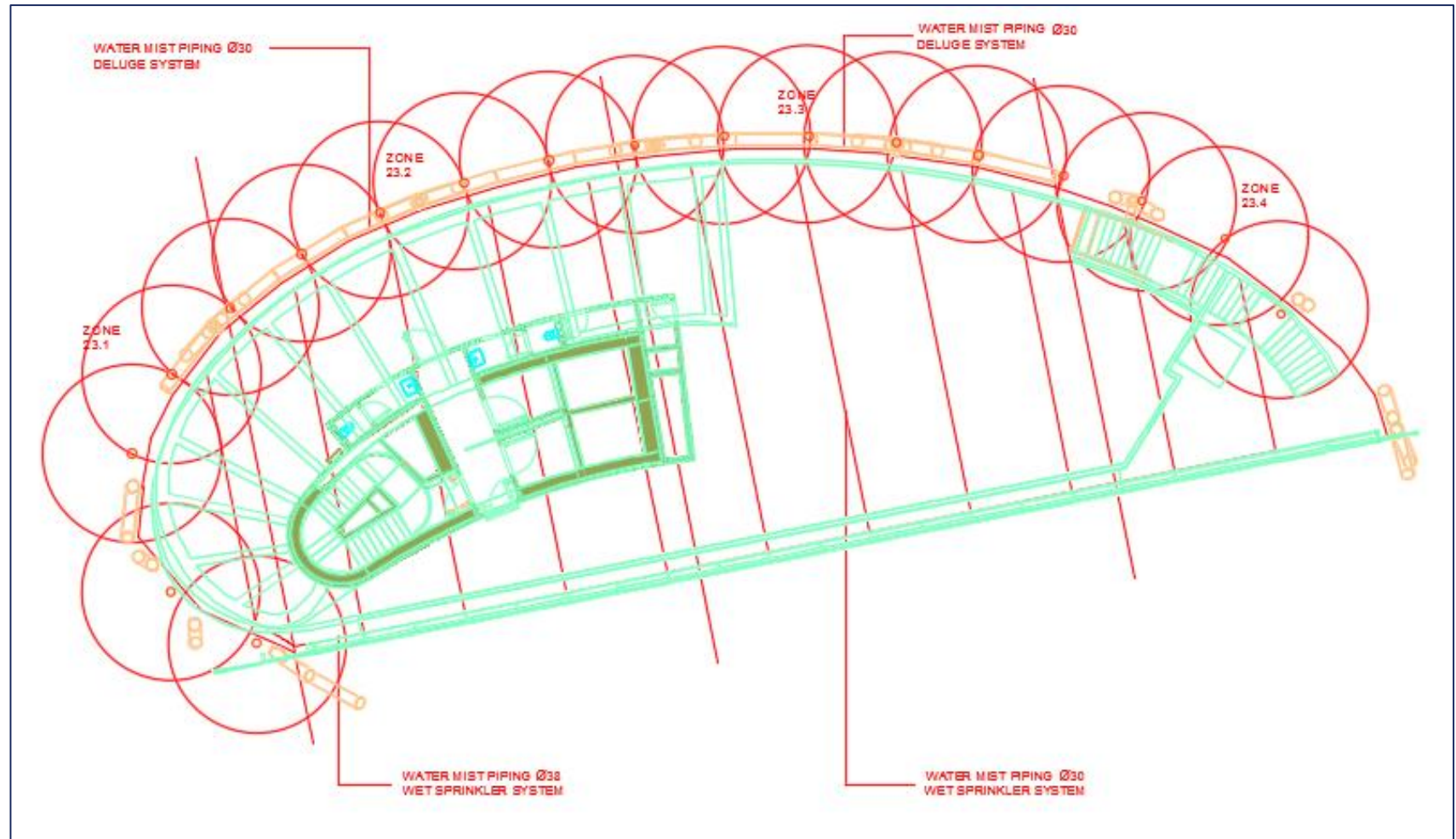


Ing. Massimo FERRETTI

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

SKY GARDEN PROTECTION



Ing. Massimo FERRETTI

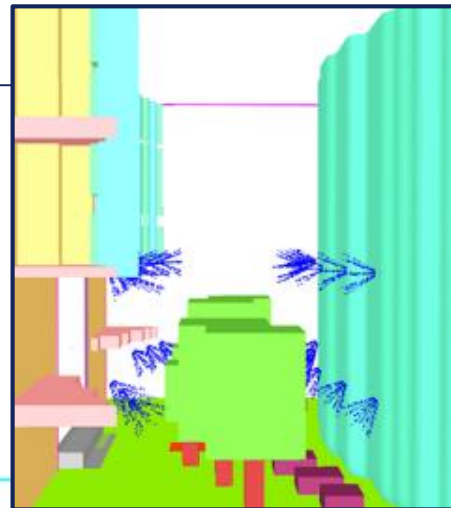
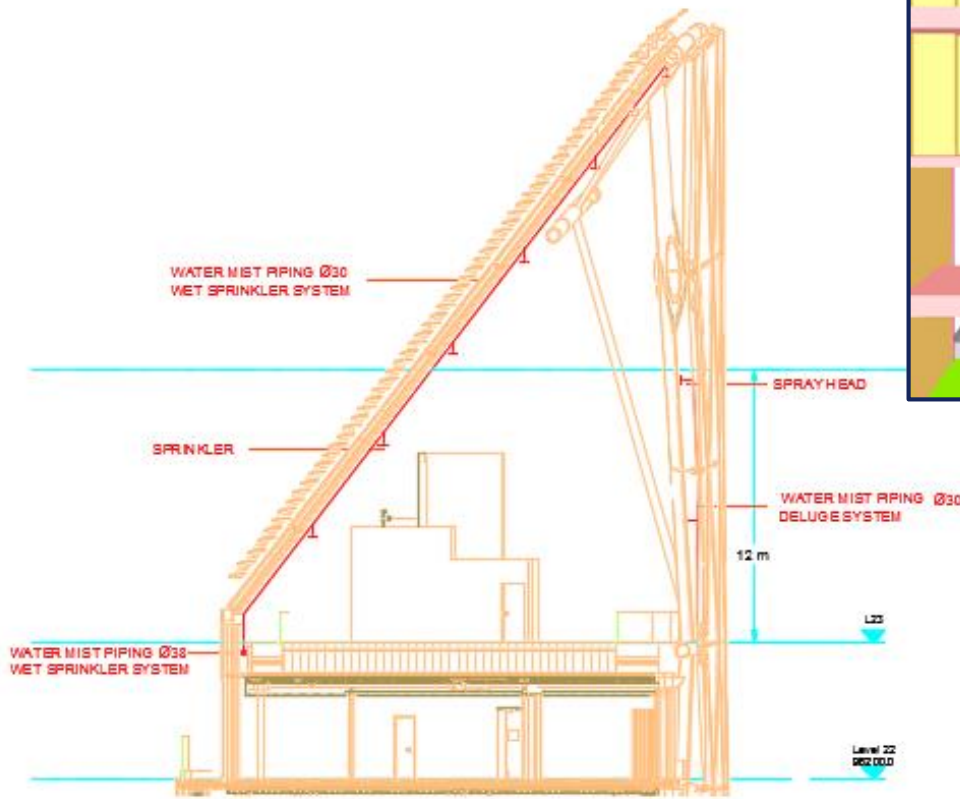
19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

SKY GARDEN PROTECTION



Tests at CNPP



Simulations

Ing. Massimo FERRETTI



Case Study: Unipol Sai
HI-FOG® system for the sky garden

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS



Fire consultant

Sky garden

No standard fire test protocols for water mist systems

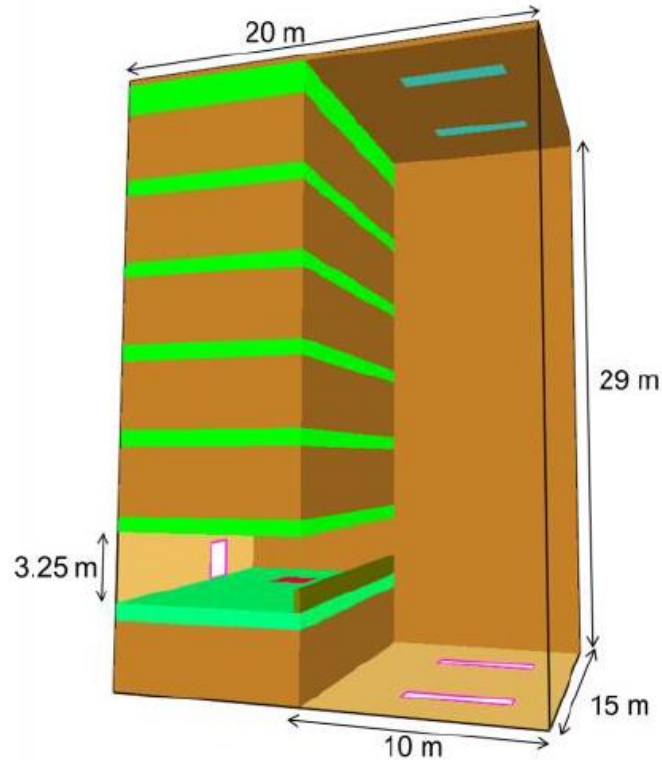
- Specific tests for evaluation of the performance of water mist system for protection of occupancies with high ceilings
- Case studies of similar occupancy based on the fire tests above and integrated simulations

Spacing of sprinklers based not only on the fire tests and case studies above but also on the layout of anchoring structures

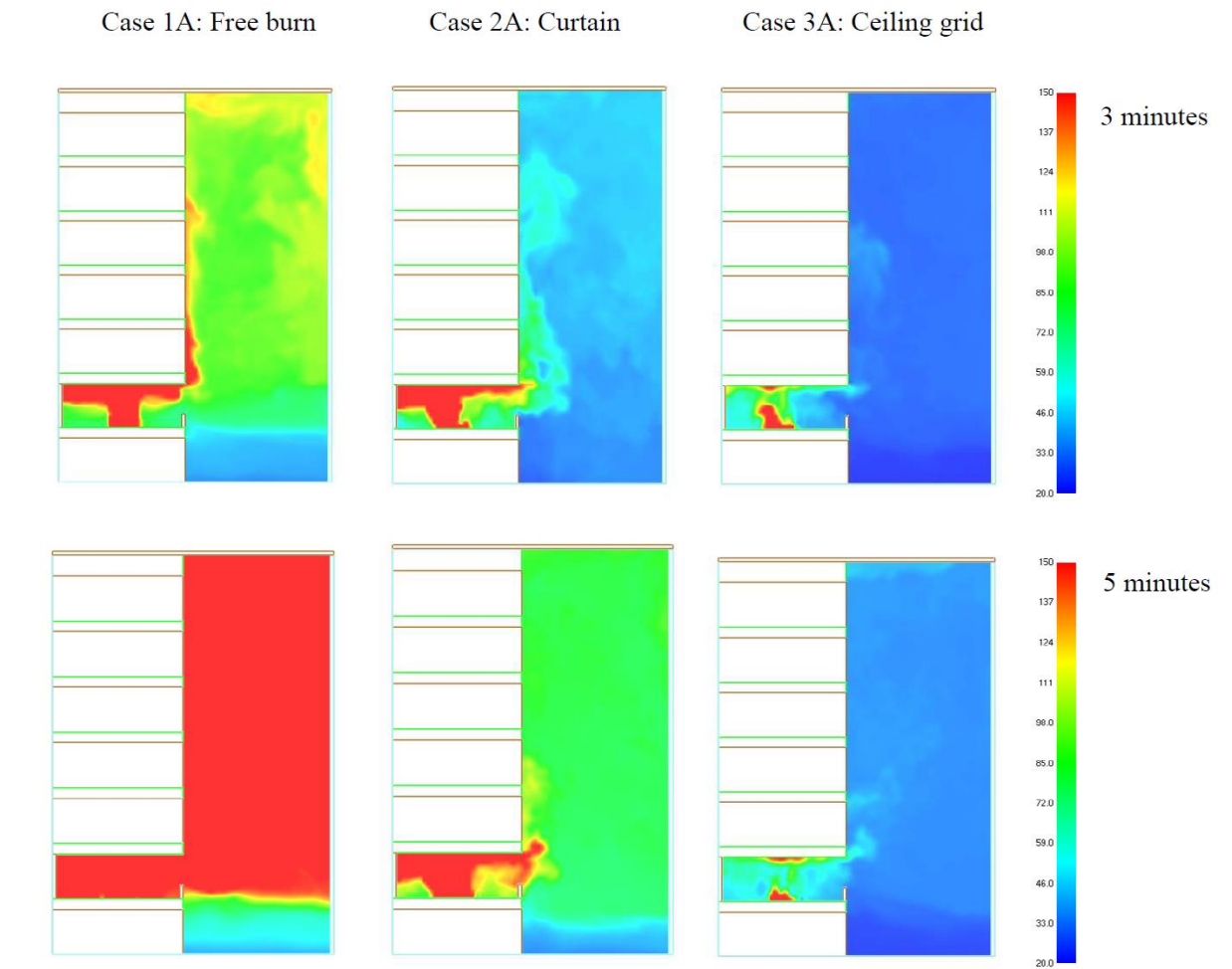
Installation of sprinklers below **glazed walls** is a critical factor and requires attention to avoid false activations by sun, evaluating the right temperature glass bulb!



WATER MIST IN TALL BUILDINGS



Simulated building



OFFICE OPEN ON THE BIG VOID

19TH IWMC 2019

WATER MIST IN TALL BUILDINGS

- **Water mist systems are a firefighting solution for new application challenges related to modern architectural configurations of tall buildings**
- **UNIPOL SAI tower is an example of challenging architectural configuration, where the definition of the firefighting strategy led to choosing the water mist system for protection of all areas of the building complex**
- **The water mist system provides optimal architectural, structural and engineering solutions to maintain the highest fire protection performance over time with the same expected safety level as traditional sprinkler systems**
- **Clearly, following accurate design and installation, proper actions, methods, procedures and highly qualified workers must be implemented and then assured during the building occupancy by a quality Fire Protection Management System**

Ing. Giulia AMARO



Ing. Massimo FERRETTI



Conclusions

19th International Water Mist Conference IWMC 2019
23-24 October 2019 - Berlin

WATER MIST IN TALL BUILDINGS

Case study: «Unipol Sai – New Headquarter – Milan»



Ing. Giuseppe G. AMARO

Ing. Giulia AMARO



Ing. Massimo FERRETTI