



IWMA
International Water Mist Association

20th International Water Mist Conference (IWMC)

in Warsaw on 27th and 28th October 2021



Fire Protection on Land

High-pressure water mist system

Water Mist Fire Protection of Archives:
New Approach with Fire Laboratory

Bogdan Raciega, Engineering Team Leader
IWMC 2021 Warsaw, 27 October 2021



Delivering fire protection solutions for industry, buildings, occupants and property



Presentation AGENDA :

- ◆ ULTRA FOG Land Applications
- ◆ High pressure water mist system comparison with sprinkler
- ◆ The effect of water mist, performance, perceptions and advantages
- ◆ Baltic Fire Laboratory
- ◆ Archive fire test, full scale fire test
- ◆ Example installations
- ◆ Case study – Cracow archive fire, February 2021
- ◆ Conclusions & questions





ULTRA FOG
BULB
NOZZLE



ULTRA FOG
OPEN
NOZZLE



PUMP STATION
P35



MICRO PUMP
STATION



MASTER PUMP
STATION

OH 1

office spaces,
hotel rooms, hospitals,
libraries, restaurants
ceiling height up to 5m

OH 3

shopping centers,
storage facilities
ceiling height up to 5m

OH 4

cinemas, halls,
theatres
ceiling height up to 12m

OH 2

car parkings,
industrial process
ceiling height up to 5m

FM 5560

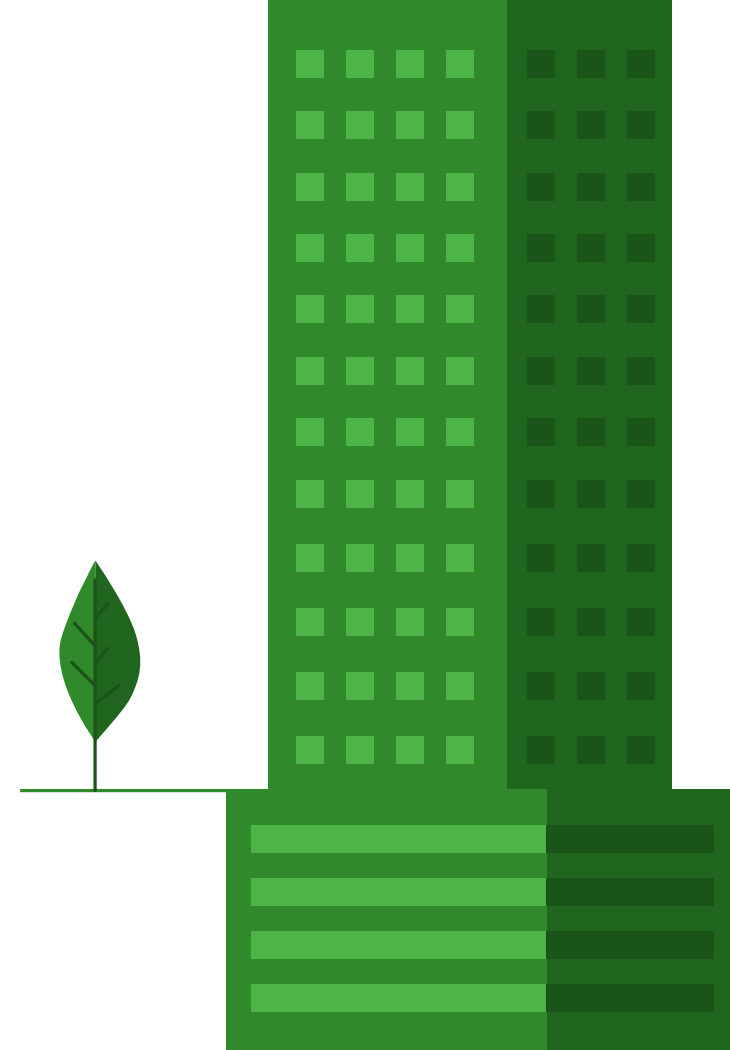
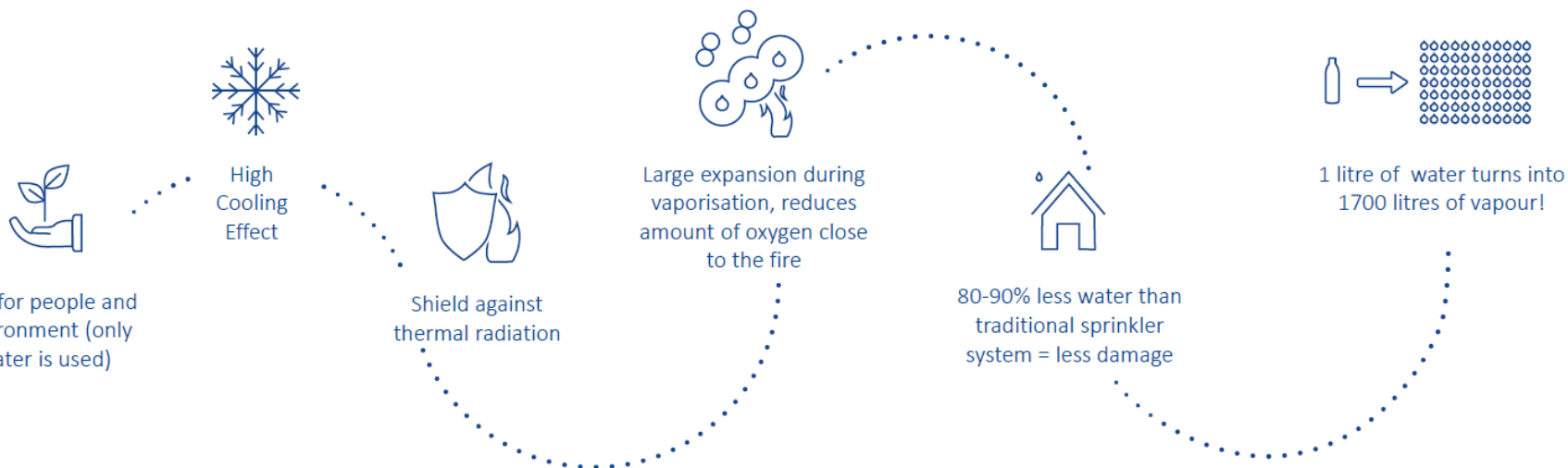
machinery space
ceiling height up to 5m

Ultra Fog's Land Applications

More Space to make money

There are many advantages in choosing the Ultra Fog® water mist system for high-rise buildings. Besides efficient fire fighting, giving the best possible protection, it gives you the freedom to design your building just as you want.

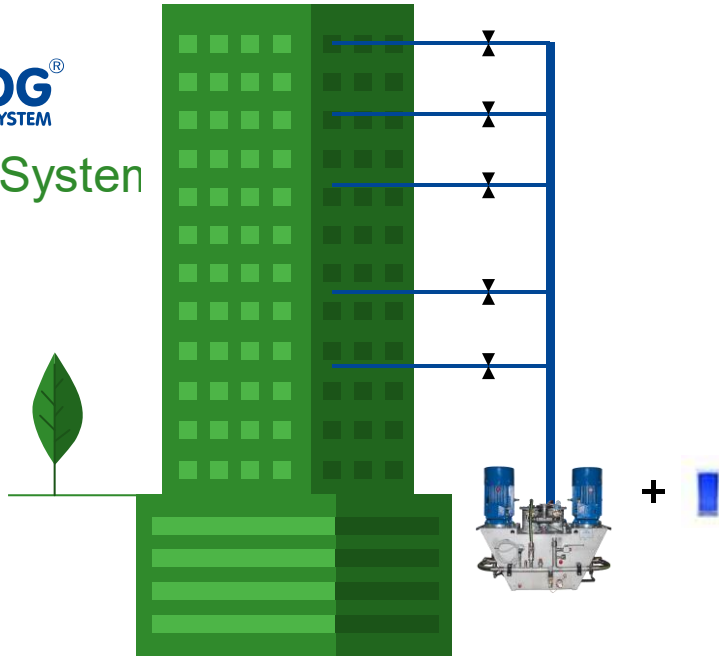
The Ultra Fog® water mist system takes up very little space, allowing you to use the space saved for money-generating activities.



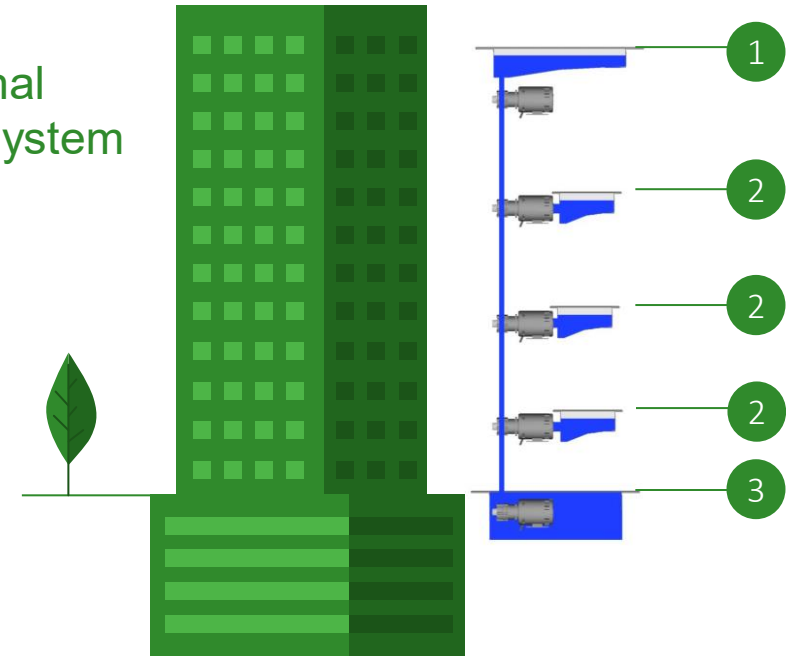
More Space to make money



ULTRAFOG[®]
FIRE EXTINGUISHING SYSTEM
Water Mist System



Traditional Sprinkler System



1. No need to place a large reservoir/swimming pool on top of the building; you can instead use the top floor for penthouse flats.
2. No need for sprinkler units on more floors of the building to prevent pressure loss; the space saved can be used for other money generating purposes.
3. No need for large water supply reservoir or for reservoirs to catch the water used by the system; the space saved can be used for an integral garage, for example.

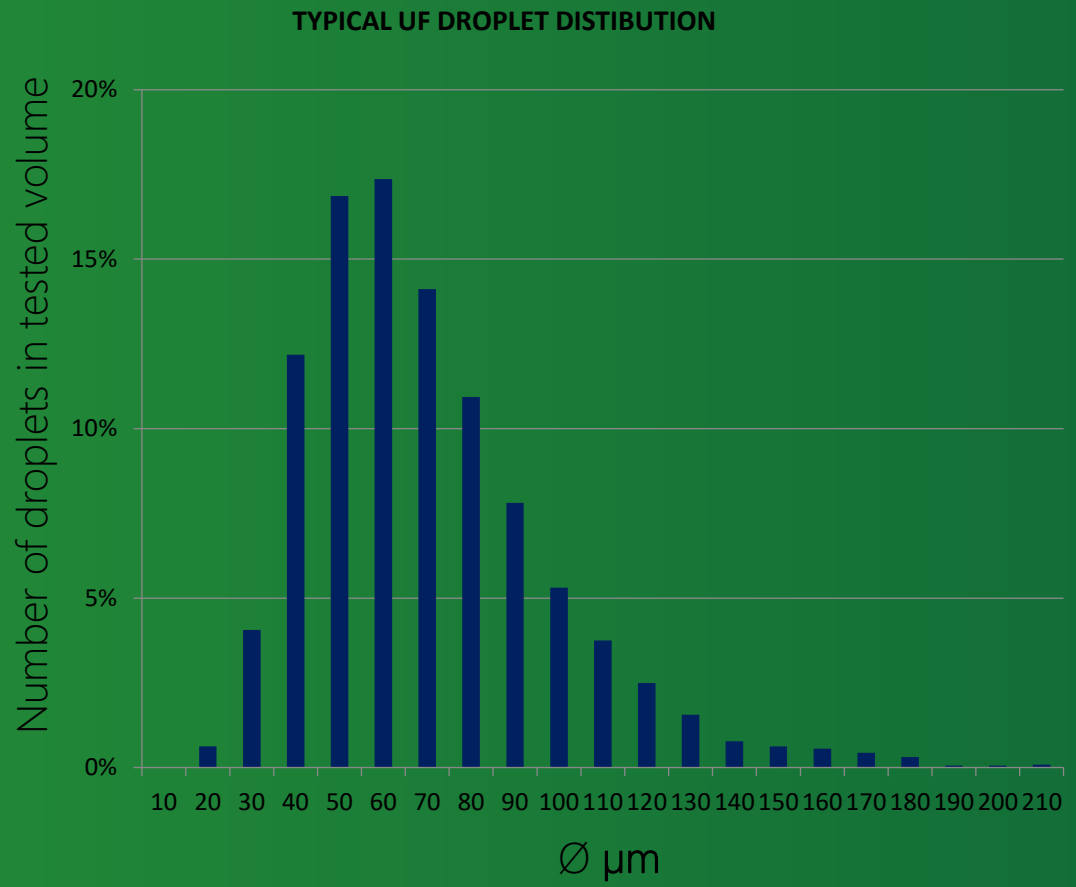
The effect of water mist

The very small water droplets allow the water mist to control, suppress or extinguish fires.

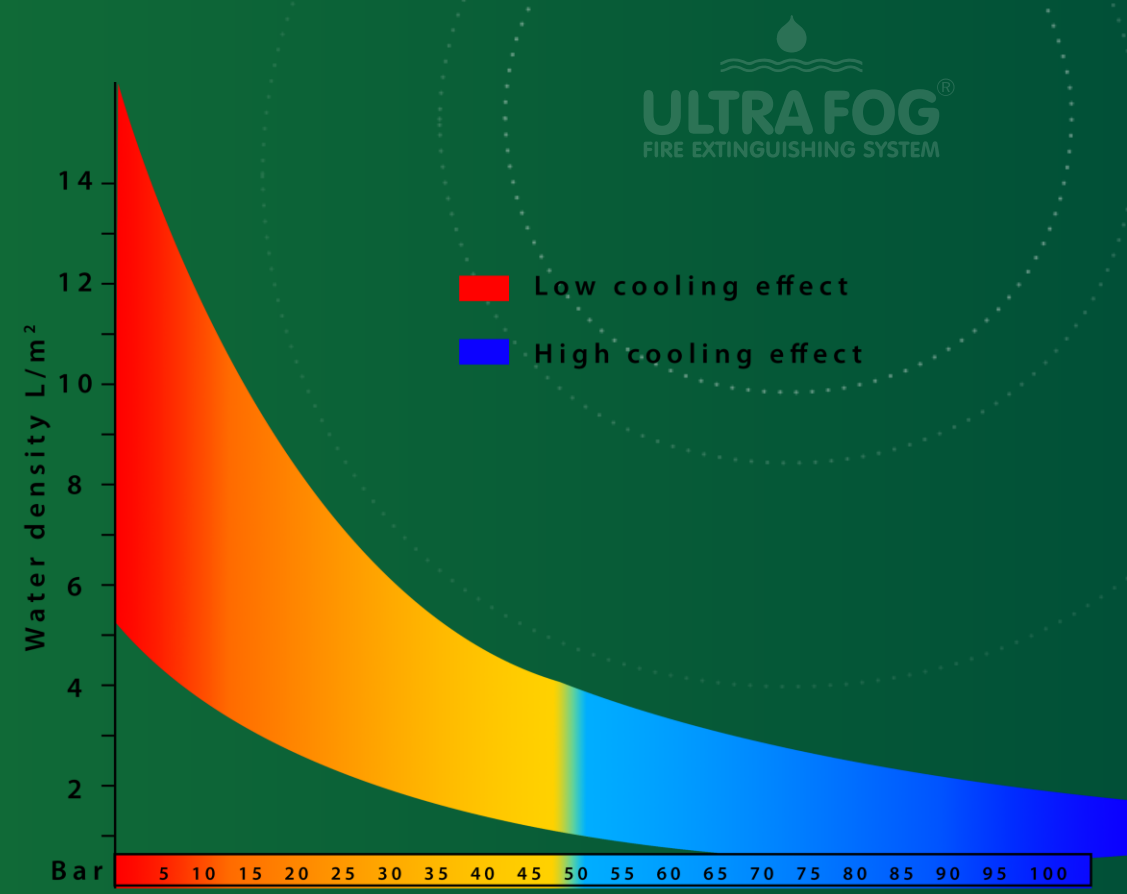


When the water droplets evaporate, they expand in the air further depriving the fire of oxygen, effectively creating a double extinguishing attack on the fire.

Typical droplet size & distribution



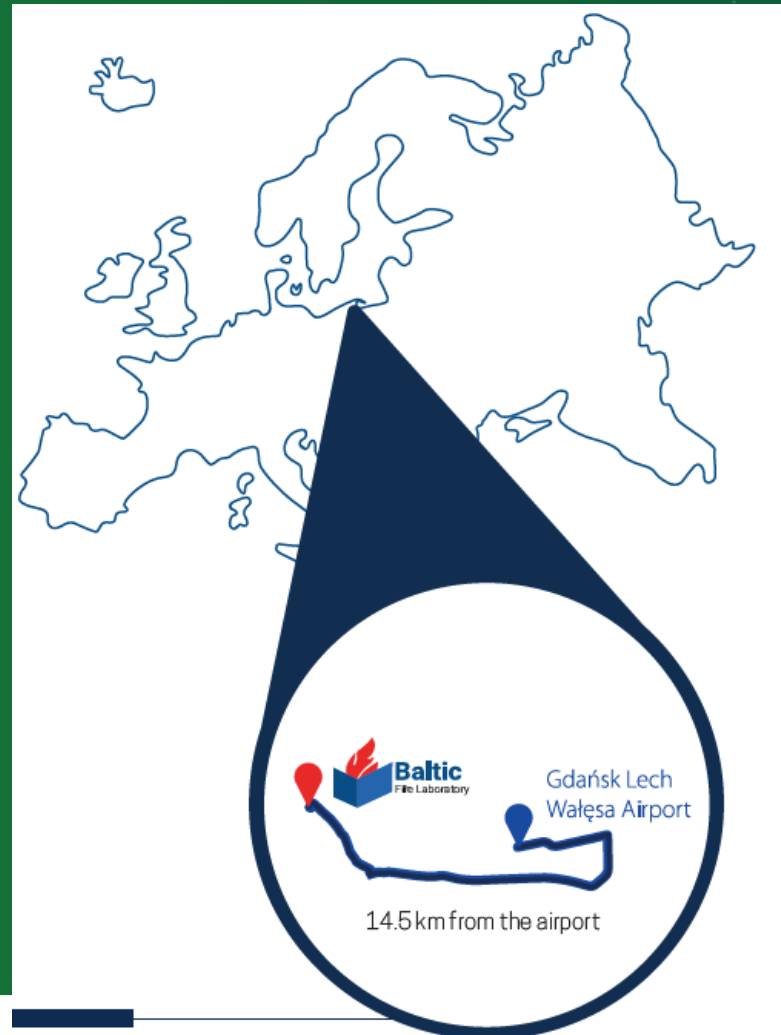
High colling effect




Baltic Fire Laboratory

Baltic Fire Laboratory was built in 2019 in Tuchom, near to Tricity (Gdańsk, Gdynia, Sopot), North of Poland, Central Europe.

The laboratory is situated:
18 km from Gdynia,
16 km from Sopot,
27 km from Gdańsk.





ONE OF THE **BIGGEST**
LABORATORY IN THE
WORLD FOR TESTING
FIRE EXTINGUISHING
SYSTEMS

15m
HIGH

TOTAL AREA OF
LABORATORY HALL

634m²



Baltic Fire Laboratory

The most significant technical asset of the Baltic Fire Laboratory are laboratory hall dimensions:

- 25m long, 25m wide and 14,4m high,
- 625m² of the testing area,
- 9500m³ of the volume of testing hall.

Moreover:

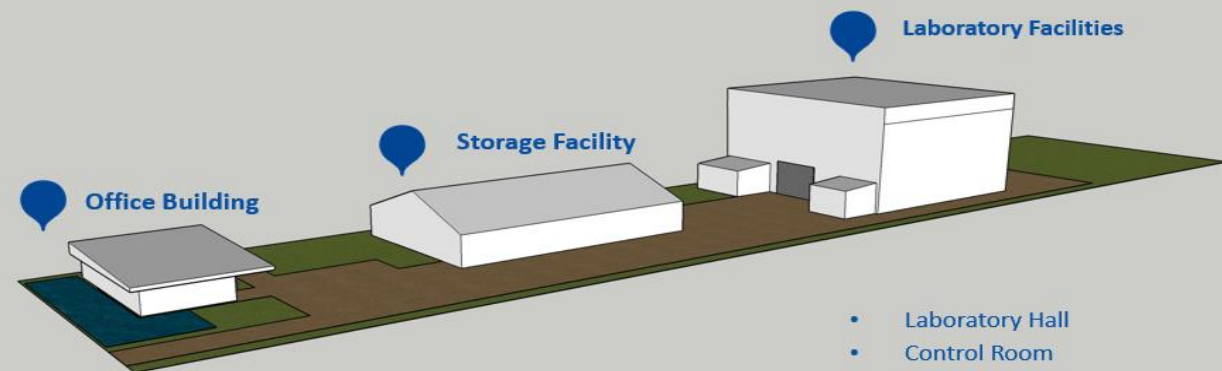
- movable ceiling with the dimensions of 22m x 22m, height from 0.5m to 12 m, divided into two parts, working independently or together
- Pump unit for customers use (Low-pressure pump: 1 to 16 bar, flow 800 L/min, high-pressure pump: 30 to 140 bar, flow 690 L/min)
- research equipment according to requirements of test methods,
- calibration of measurement equipment in accredited laboratories,
- data acquisition system (pressure, temperature, flow, time),
- visual recording, • experienced staff.



Baltic Fire Laboratory

Tests for firefighting systems

Science complex consist of:



- Laboratory Hall
- Control Room
- Pump Room & Machinery Room

Archives

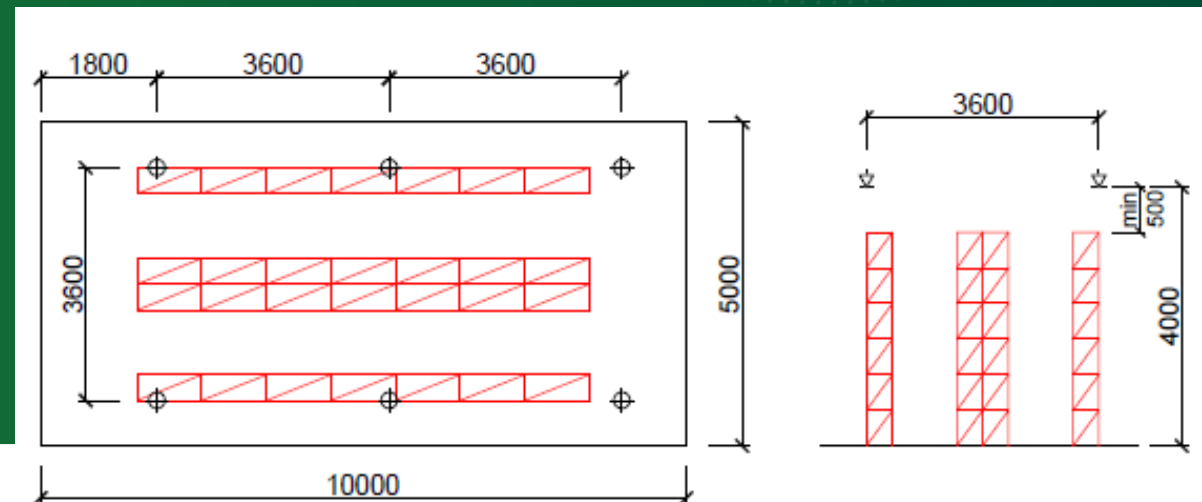
(Archive storage)

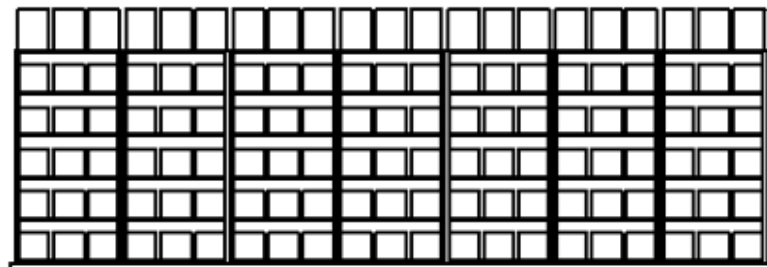
- Unique patented design with high performance for cooling effect and low consumption of water.
- Easy to install and test for both commissioning and maintenance.
- 603 nozzles are supplied with a star lock for easy mounting.



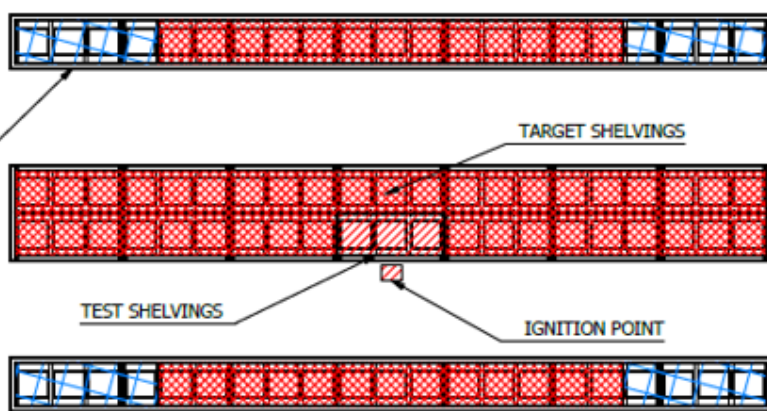
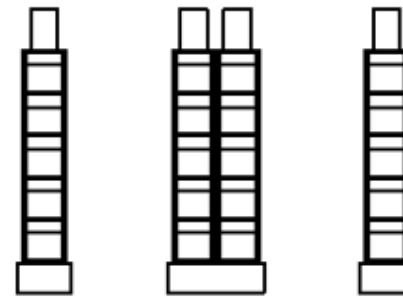
- 603 nozzle body can be supplied as threaded M20 with optional nut.
- Nozzle tools and spares are available for maintenance.
- Working pressure – 100 bar.
- Test Method BFL TP 02 Fire test of Archive, in according with EN-CEN/TS 14972 Annex B Standard INSTA 900-3: 2012
- Fire test report reference number: BFL 2020/TP02/001

Nozzle Type	Spacing (C-C)	Ceiling Height	Covering Area	Mounting	K Value (K=)
603-064-073-B	3,6m	4m	140m ²	Ceiling	1,37





PEDESTAL



SEE NOTE 1

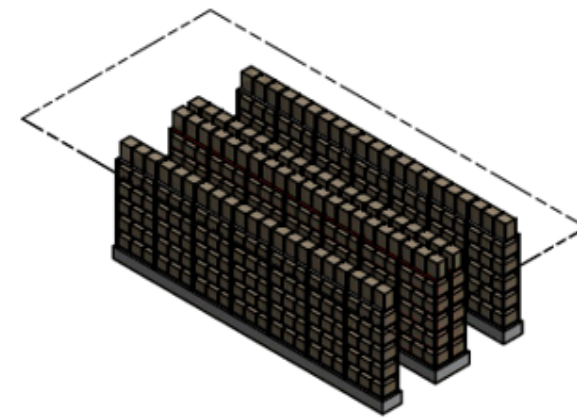
TARGET SHELVINGS

TEST SHELVINGS

IGNITION POINT

5000

10000



ISO VIEW (1 : 100)

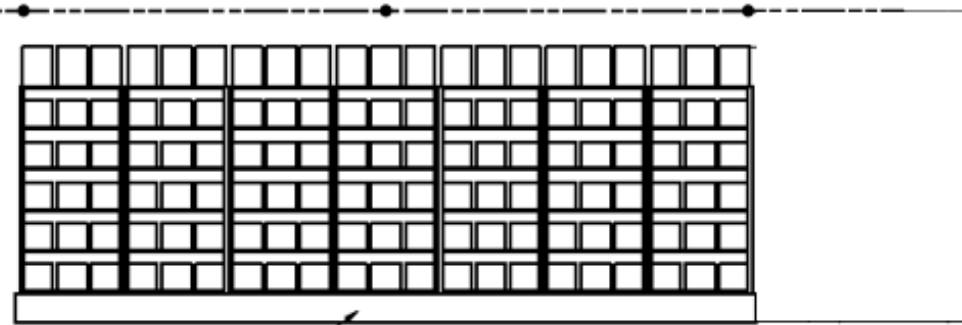
Archive mock-up
Scale 1:1

General
arrangement

NOTES:

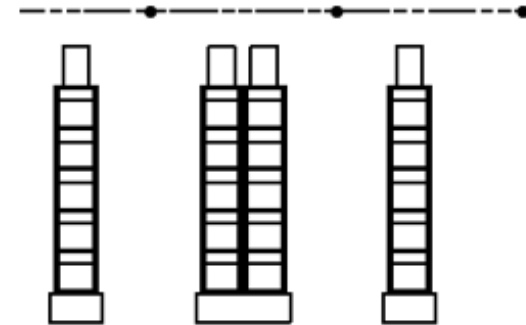
1. All shelvings shown as blue hatch () filled with empty carton boxes.
2. All shelvings shown as red hatch () filled with documentation.





PEDESTAL

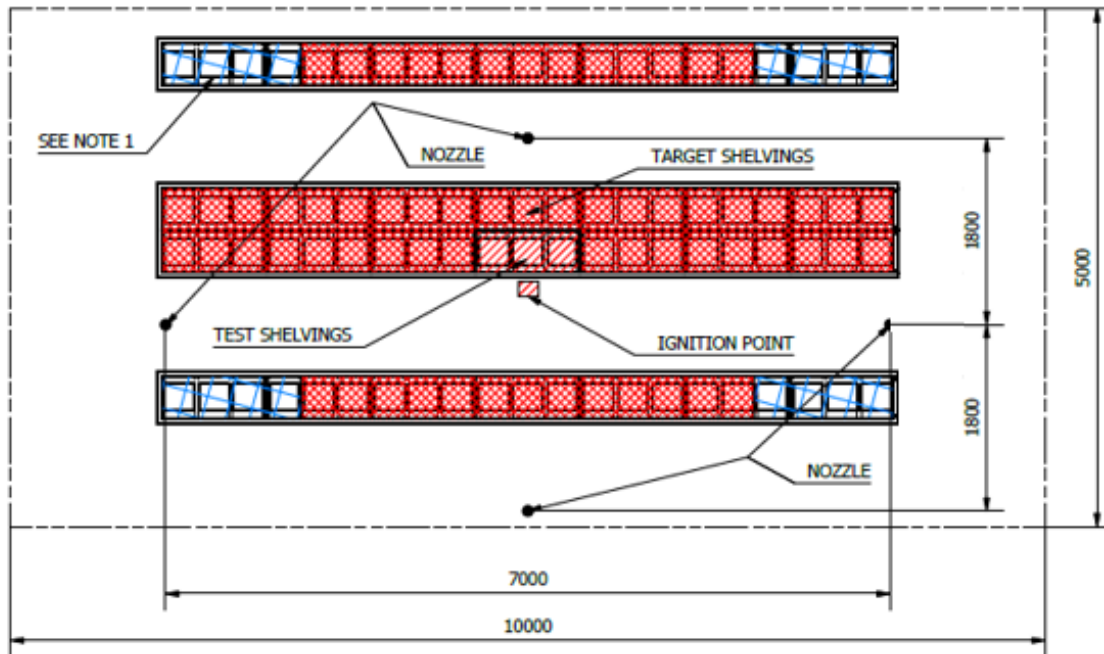
FRONT VIEW



SIDE VIEW



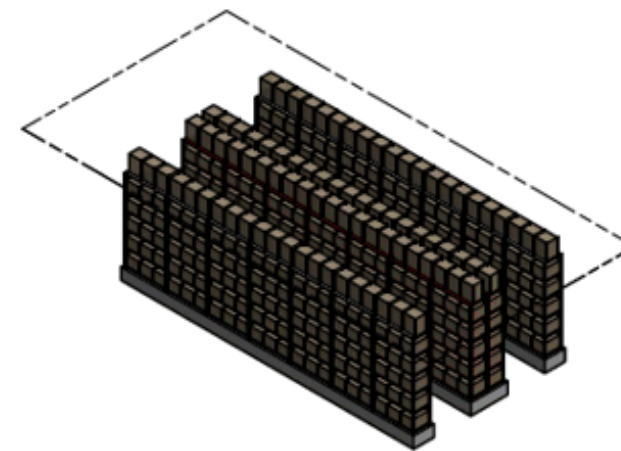
ULTRAFOG[®]
FIRE EXTINGUISHING SYSTEM



TOP VIEW

NOTES:

1. All shelvings shown as blue hatch () filled with empty carton boxes.
2. All shelvings shown as red hatch () filled with documentation.

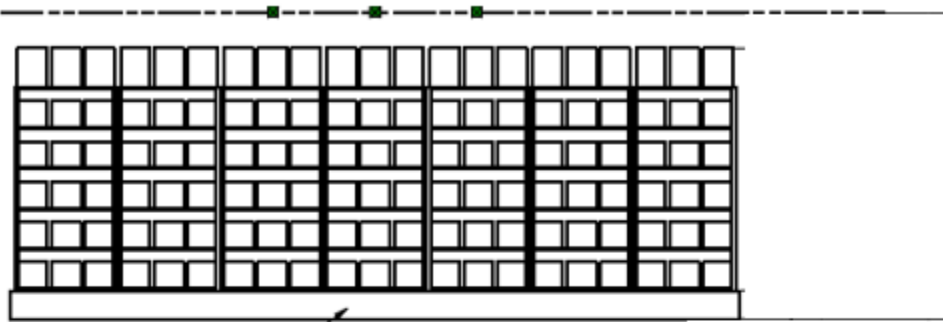


ISO VIEW (1 : 100)

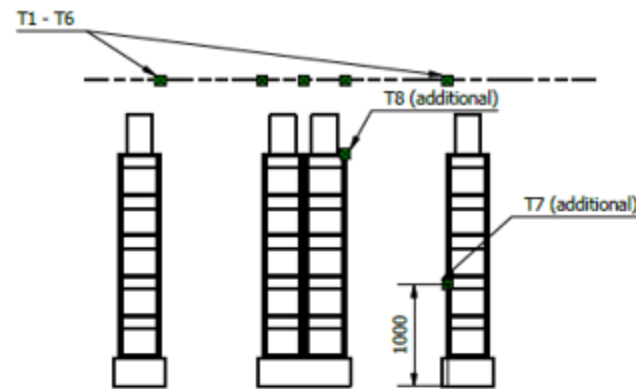
Archive mock-up
Scale 1:1

Nozzle
arrangement

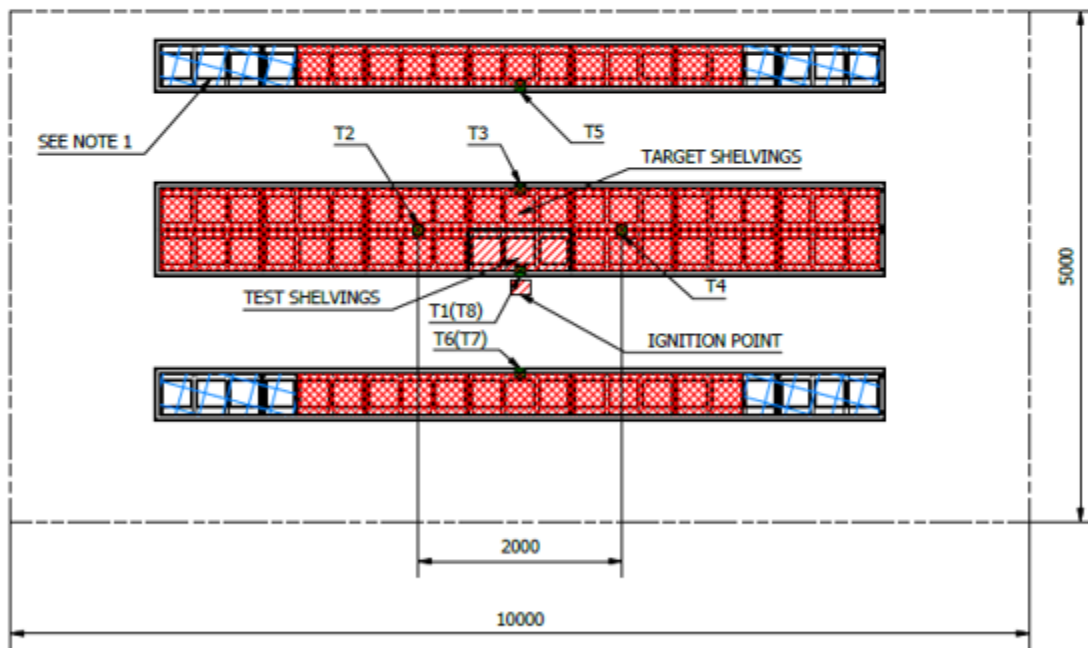




PEDESTAL
FRONT VIEW



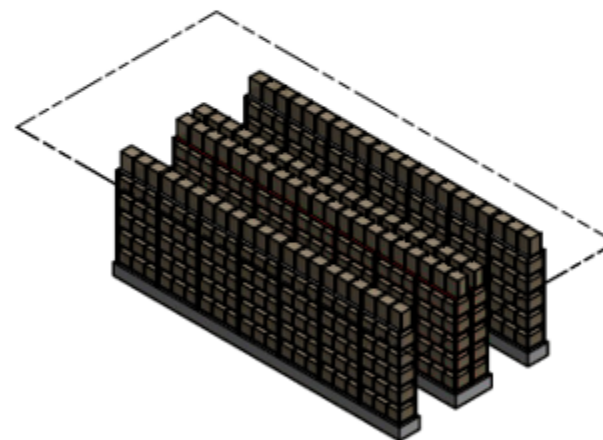
SIDE VIEW



TOP VIEW

NOTES:

1. All shelvings shown as blue hatch () filled with empty carton boxes.
2. All shelvings shown as red hatch () filled with documentation.



ISO VIEW (1 : 100)



Archive mock-up
Scale 1:1

Thermocouples
arrangement






ULTRA FOG[®]
FIRE EXTINGUISHING SYSTEM



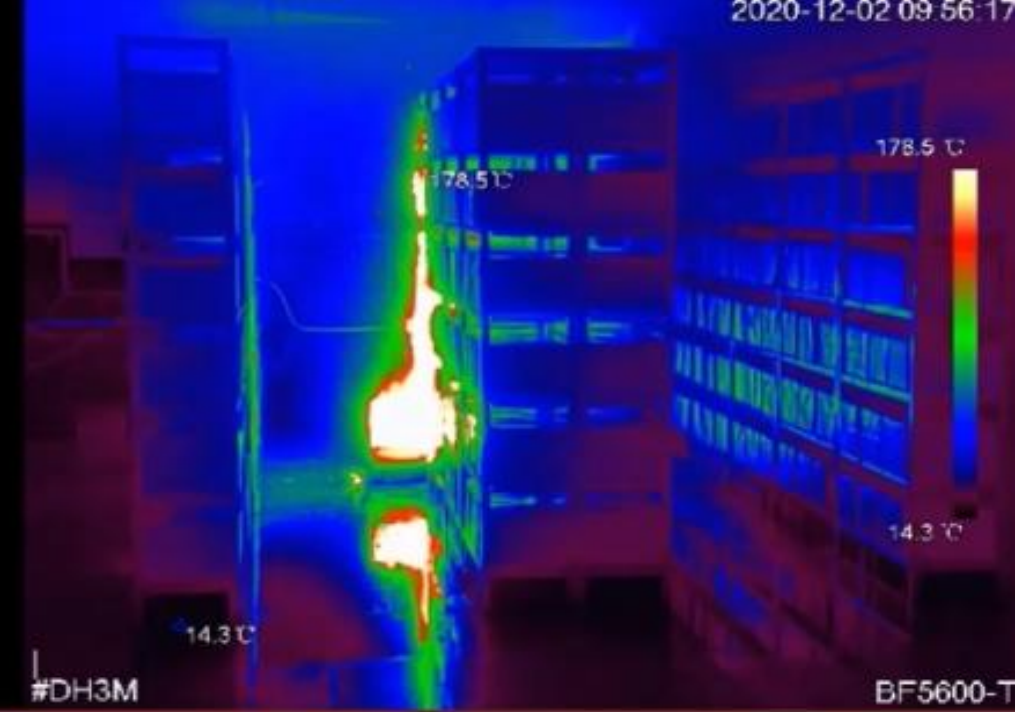


ULTRA FOG[®]
FIRE EXTINGUISHING SYSTEM






ULTRA FOG[®]
FIRE EXTINGUISHING SYSTEM



Results & observations :

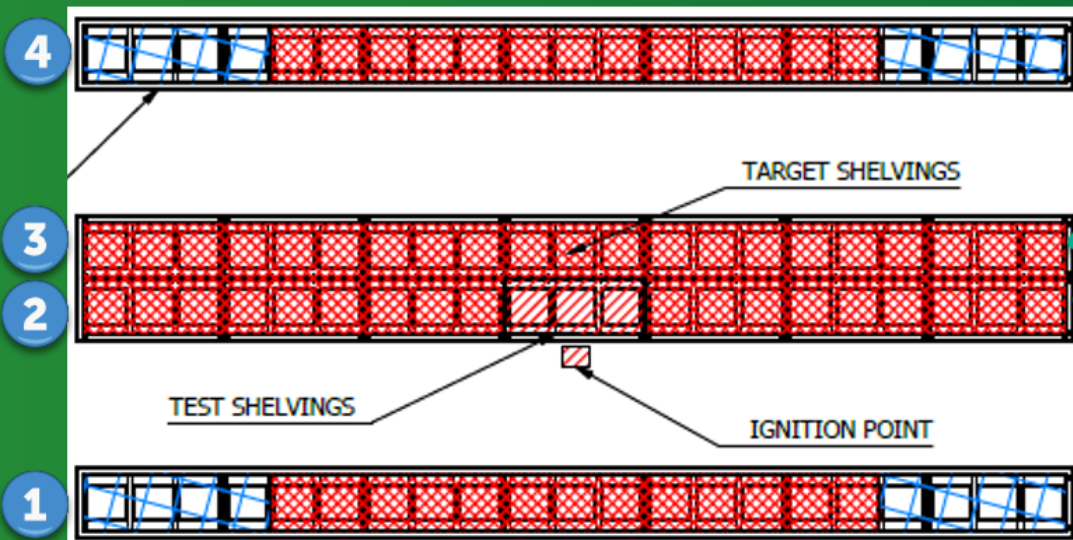
Activation time at the nozzles N1-N4 :

- Nozzle N1: 6 min 58s
- Nozzle N2: 10 min 17s
- Nozzle N3: 11 min 0s
- Nozzle N4: 11 min 3s

Highest temperature observed after activation : 113 C°



The two outer rows (Nos. 1 and 4) were not affected by flame, no visible signs of burning or charring, or any type of damage.

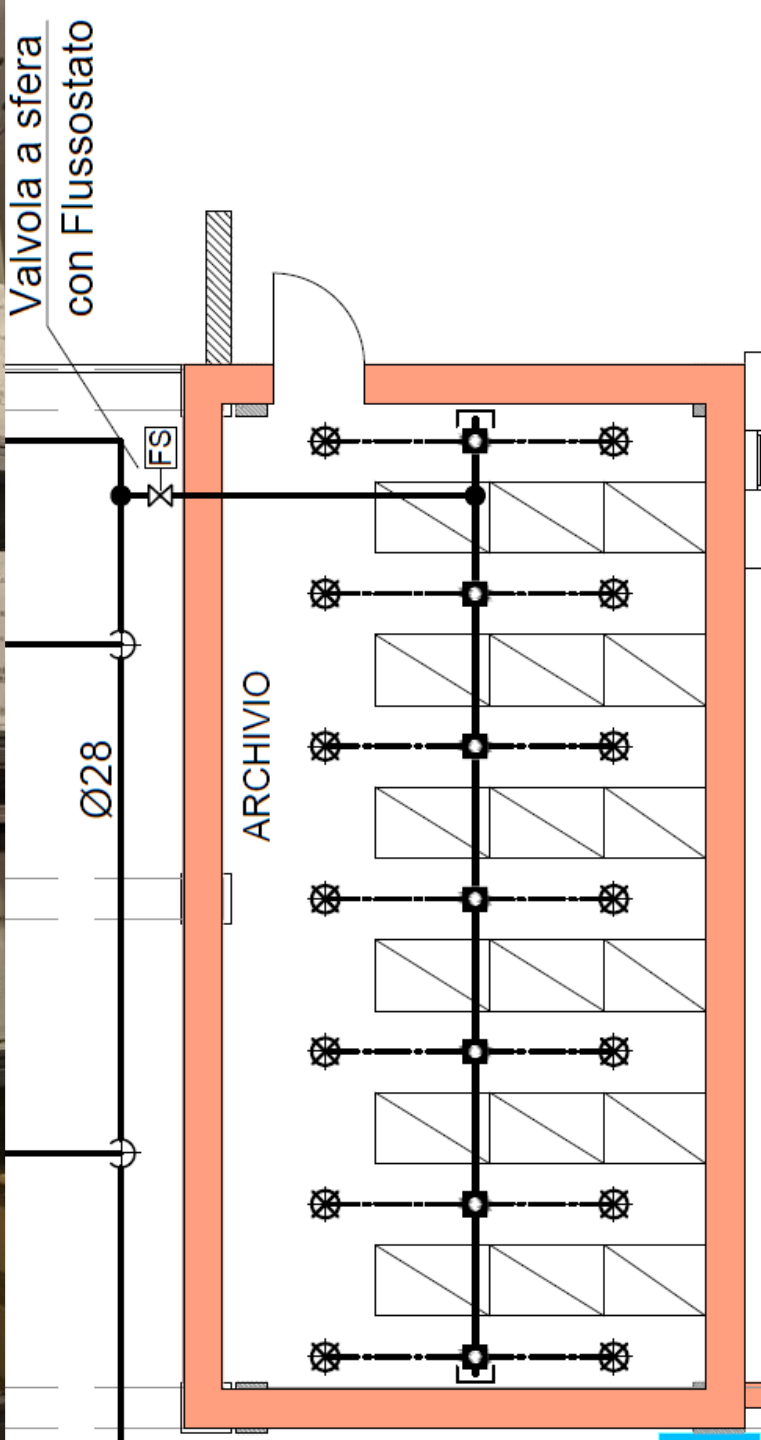


								50%
								20%
								10%
								5%
								1%

								50%
								20%
								10%
								5%
								1%

Description of Approximation percentage of damage of material in row 2 and 3 is presented





UltraFog Archive
(Archive storage)

Example instalation



Land

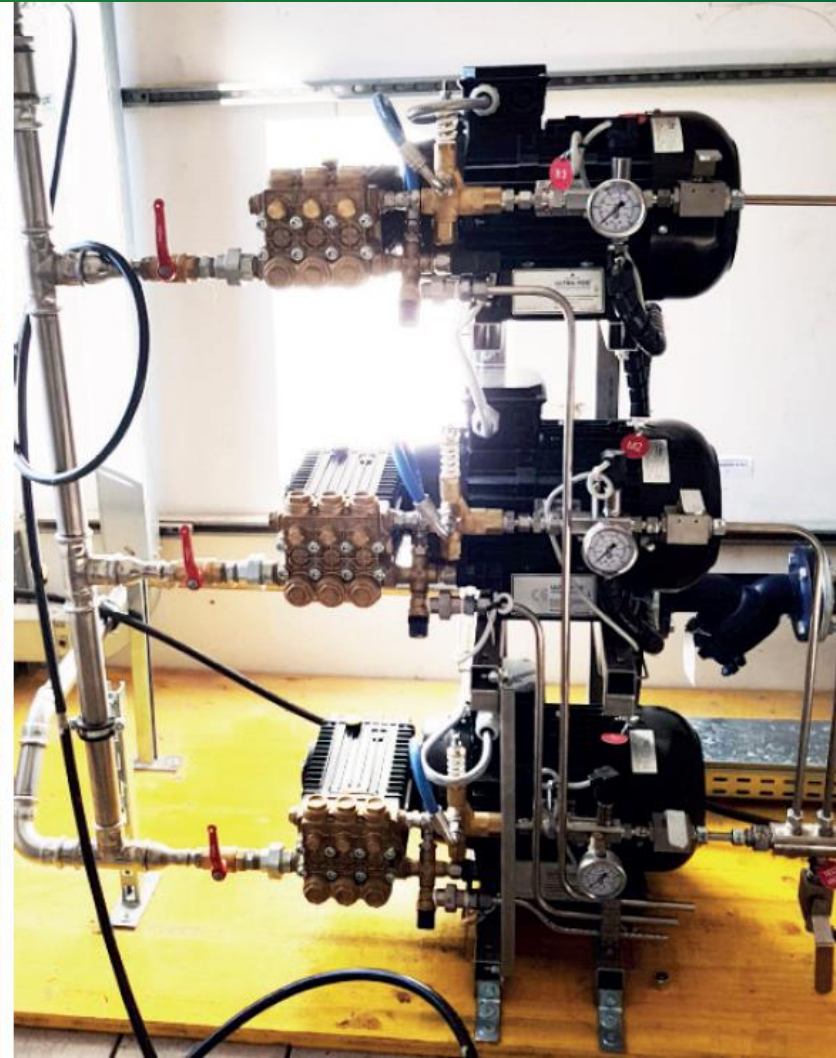
Example system instalation

Manica Lunga library protection



Example system instalation

Manica Lunga library protection



- Patented design

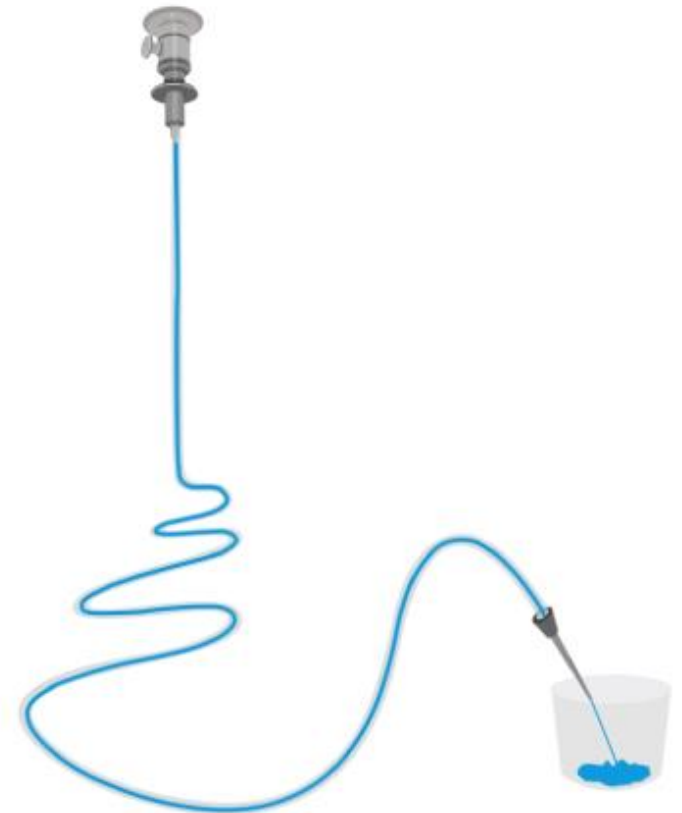
- Drain out all air from the sytem – instalation time savings

- Verify the automatic response of the watermist system – service time seavings

- Verify the flow rate from the nozzle

- Sample water from anywhere within the system to check the water quality

Ultra Fog Patented Test Tool



Cracow Archive Fire - facts :

- Two Archive buildings 26 x 18 [m] in fire
- 20km of archive documents in total
- New Archive facility delivered in 2018 year
- Fire duration including flames 6th – 12th Feb 2021
- Put out the fire activity 12th – 17th Feb 2021
- Night average temperature outside -8,5C
- Day average temperature outside -4,2C
- Strong wind, freezing rain





Cracow archive fire

Photos after the end of the fire action

Fire investigation – ongoing



Land

Source of information :

APPLICATION OF WATER MIST FOR FIRE PROTECTION OF THE ARCHIVE ROOMS – Resarch project
Bogdan Raciega - Main Shool of Fire Service Warsaw

Baltic Fire Laboratory – Test report - 2020/TP02/001

<https://www.gov.pl/web/kwpsp-krakow/pozar-archiwum-urzedu-miasta-krakow>

<https://www.gov.pl/web/kmpsp-krakow/pozar-w-archiwum-miejskim-ulna-zaleczu-w-krakowie>

https://twitter.com/krakow_pl/status/1358323725645590529

<https://krakow.wyborcza.pl/krakow/51,44425,26868472.html?i=3>



Ultra Fog Land Classification Testing and Approval

- FM 5560 (turbine and machinery spaces (260m^3 to $1320\text{m}^3</math>).$
- FM 5560 (Light hazard occupancies).
- IMO MSC/Circ. 265/84, for protection in public areas such as bedrooms, storage, corridors, restaurants and service areas.
- IMO MSC/Circ. 913, for local application in machinery spaces.
- Part 12 EN14972 Fat Fryer & Galley Hood.
- CEN/TS 14972 OH1, OH2, OH3, OH4.
- CEN/TS 14972 - Annex B, for warehouse up to 12,5m.
- CEN/TS 14972 - Annex B, for HHP (1 to 4) warehouse.
- SP method 4912 fire suppression system on vehicle (Buses, Coaches, Vans and Cars).
- Archive / Library CEN TS 14972 annex B, ref fire report BFL2020/TP02/001 and BFL2020/TP02/009
- INSTA 900-3 Nordic residential sprinkler.
- Tunnel: Uptun, Aplus guideline full scale fire test.
- UNI 11565:2016 – rollingstock protection.

Our manufacturing is quality assured according to EC Directive 96/98 EC MED and according to ISO 9001. Certified according to Lloyd's Register. Our test procedures began in 1991 and are constantly being renewed in order to include new fire protection applications, new standards and regulations, and improved nozzle performance.





Questions ?



Dziękuję 😊 Thank you!

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