

**Efficiency of water mist turbines
in stationary fire prevention systems
for hangars and recycling centres**

**25th Oct 2017 – Rome
Dr. Ing. Francesco Fritz**

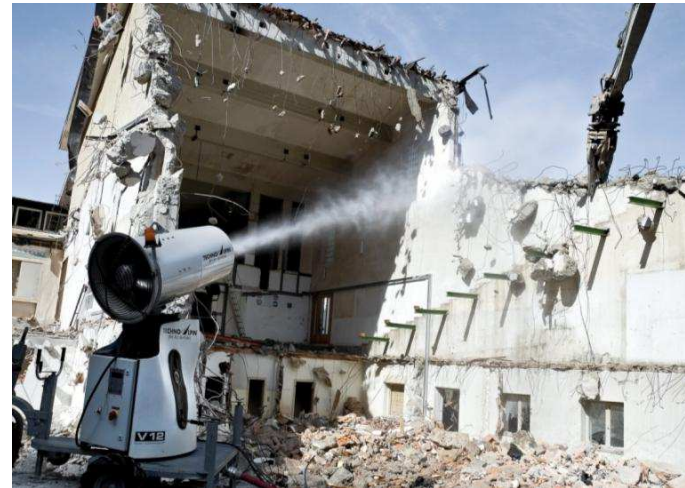




WHO IS EMICONTROLS?



worldwide leader in turbine based systems



WHAT IS A FIREFIGHTING TURBINE?

Firefighting Turbine



Machine spraying watermist (or any fluid) up to 70-80m distance

The watermist has much higher cooling and extinguishing power than the traditional water based firefighting







fire fighting systems













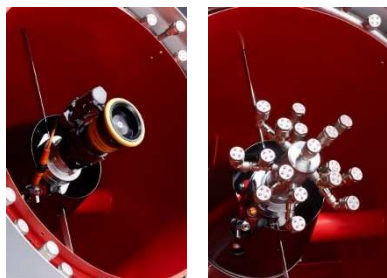
Benefits of Turbine Aided Firefighting – TAF™

-  **quick knock-down** of flames and fire
-  **reduced employment** of water and foam
-  **gentle application** of foam on fuel surface
-  **surrounding** effect on objects



TAF **TURBUNE AIDED FIREFIGHTING**

TAF[®] - Turbine Aided Firefighting



- **High Water mist flow**
from 300 l/min to 1.500-4.800 l/min
- **Medium**
Water, salt water, Foam, Retarder, Gel
- **High manoeuvrability**
(360° rotation; -20°/+50° tilting)
- **Power:** electric or oil-hydraulic

Adjustable spray pattern



Fine water mist mode
Max efficiency
0 to 1.500 l/min



High flow mode
water mist
0 to 3.500 l/min

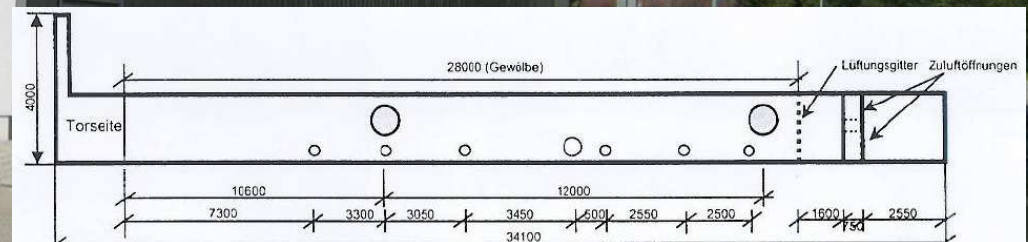


High flow mode
max throw distance
0 to 3.500 l/min



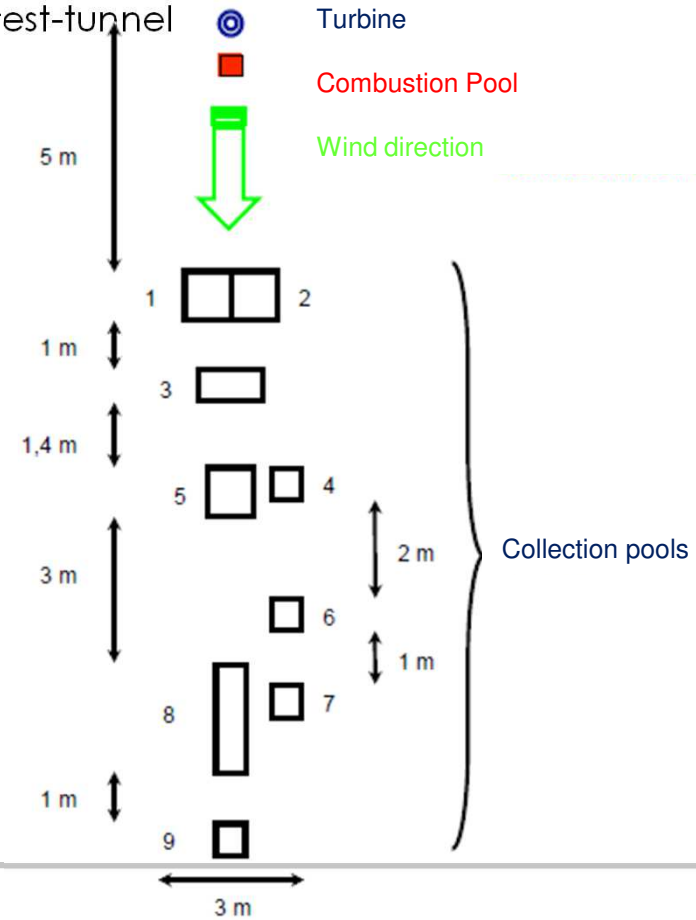
WHAT IS THE EFFICIENCY OF TAF?

Tests of mitigation efficiency in IdF Tunnel



Testing in IdF Magdeburg

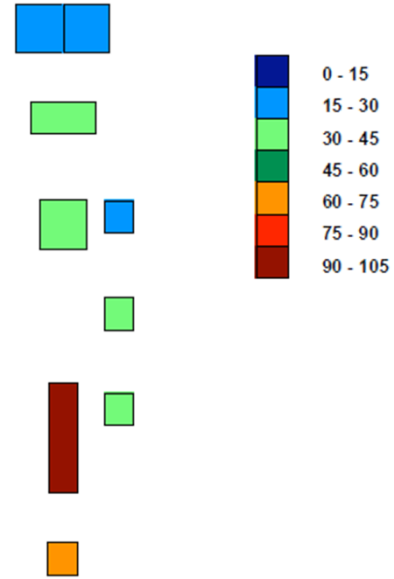
Abatement of Trichlorosilane vapour in the test-tunnel



Testing in IdF Magdeburg

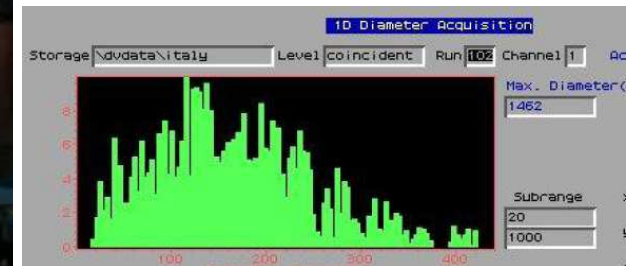
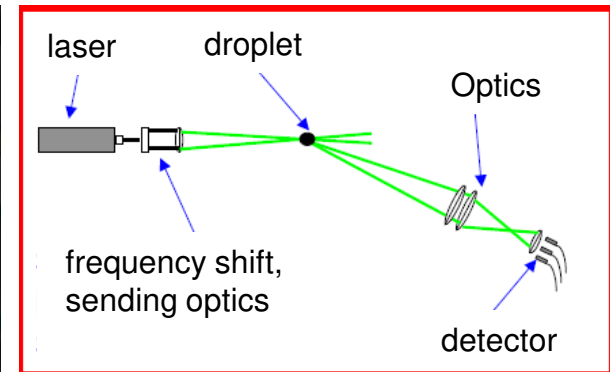
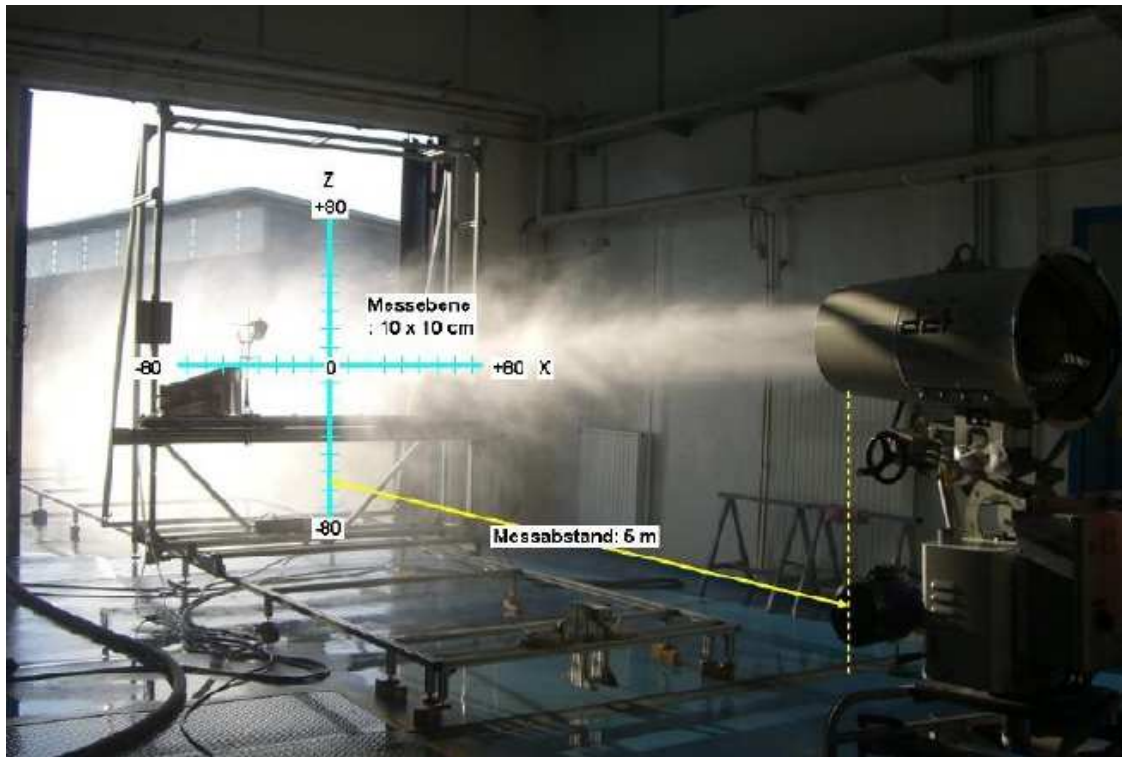


○
↓
Analysis of chloride concentration



Measurements in IdF Magdeburg

Droplet size measured with
 Phase Doppler Particle Analyzer



Areas of Aerosols

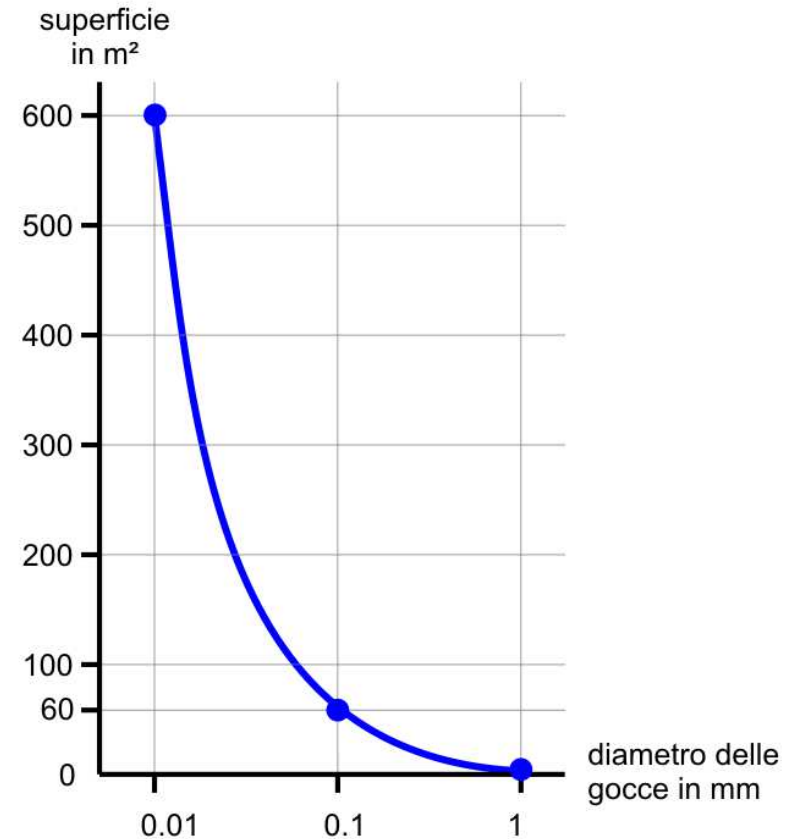
Total area inversely proportional
To the diameter of droplets

For example:

1 l water sprayed in droplets of:

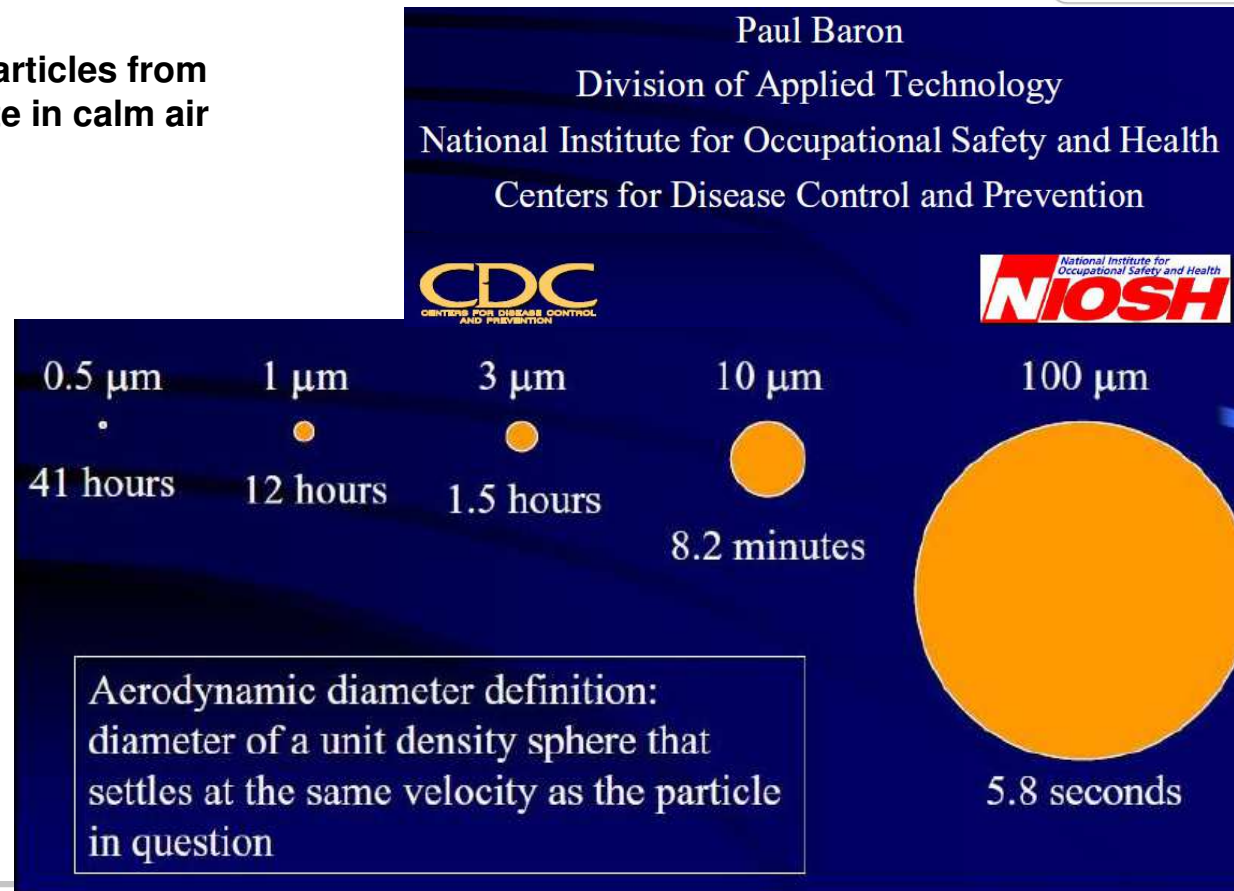
- 1 mm diameter → 6m²
- 100 μm diameter → 60m²
- 10 μm diameter → 600m²

$$A_{H_2O} \sim \frac{1}{d}$$

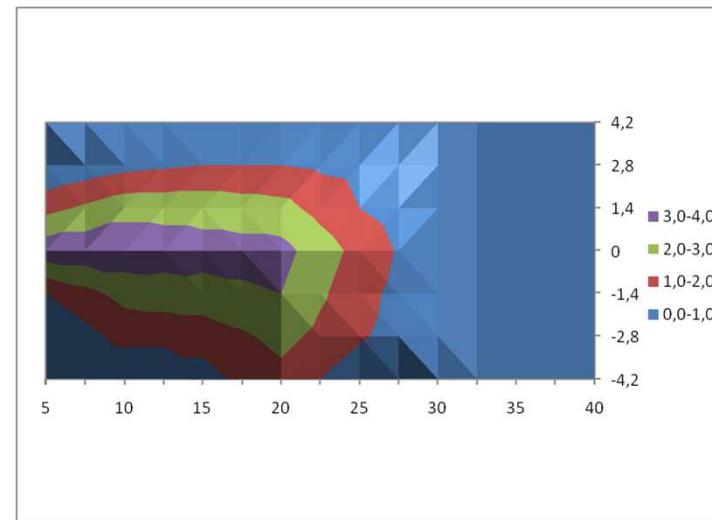
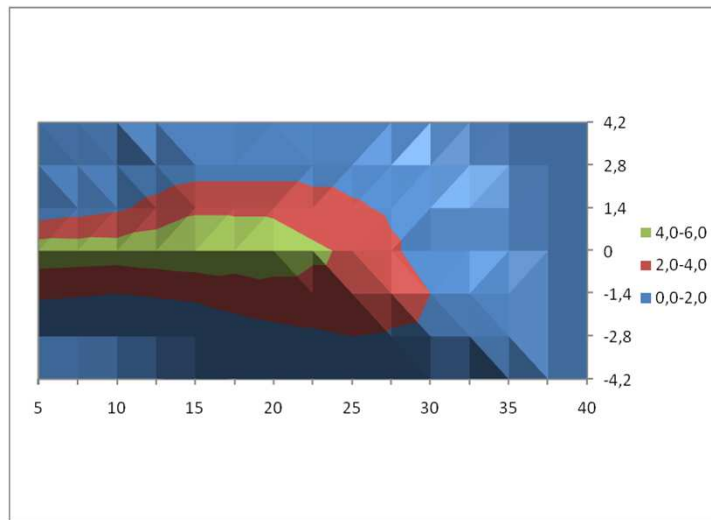


Sedimentation time

of solid particles from
1.5m quote in calm air







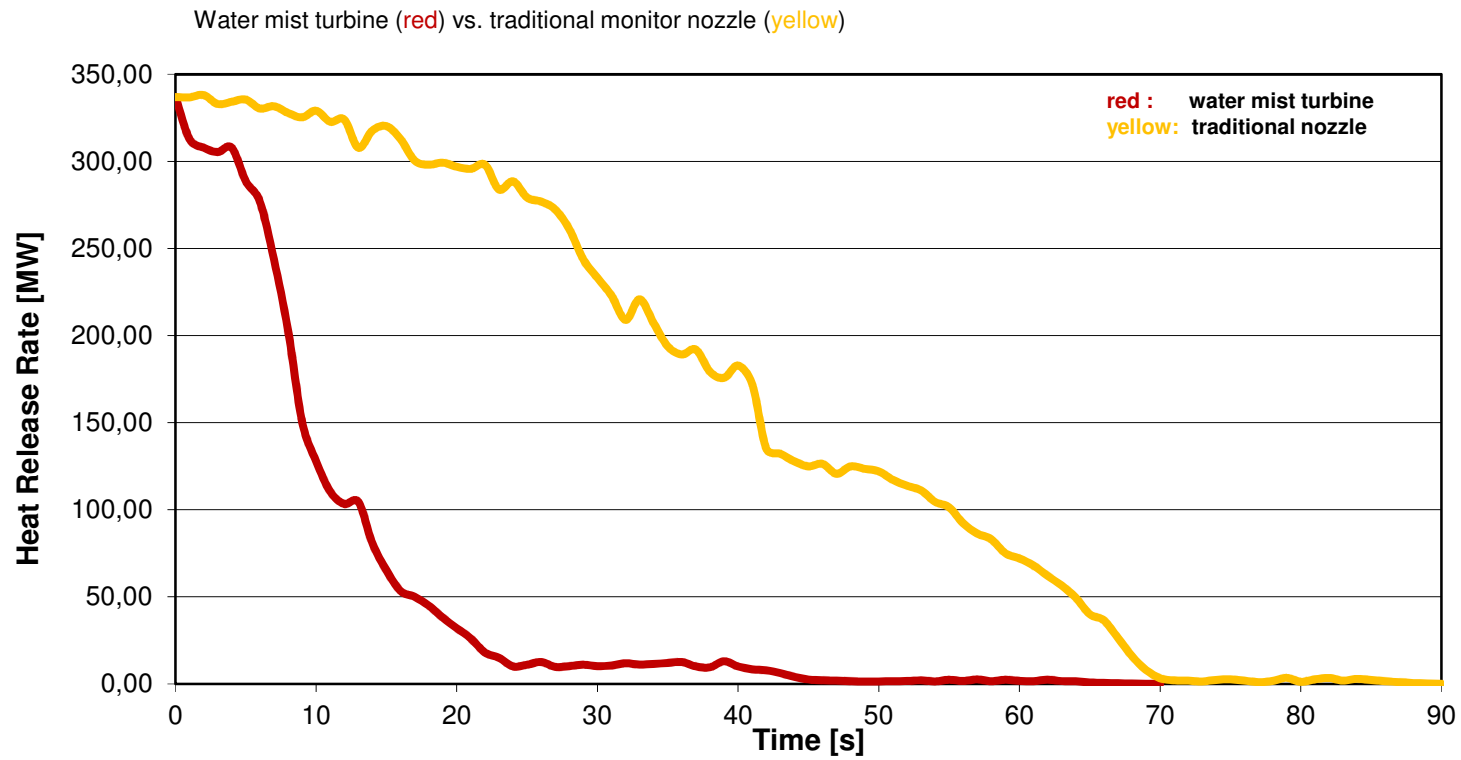
Testing efficiency in
training ground of FER refinery - Hungary



Test: 160m² surface - 2400l fuel – 350MW HHR – 1% AFFF foam



Test result: HHR vs. time



Efficiency of Turbine



- Rate of abatement of Trichlorosilane with Water-mist Turbine > 90%
- Identification of Concentration gas vs. Concentration water-mist
- No significant differences observed from -5°C to +30°C
- Flames control time < 1/2 compared to traditional nozzles

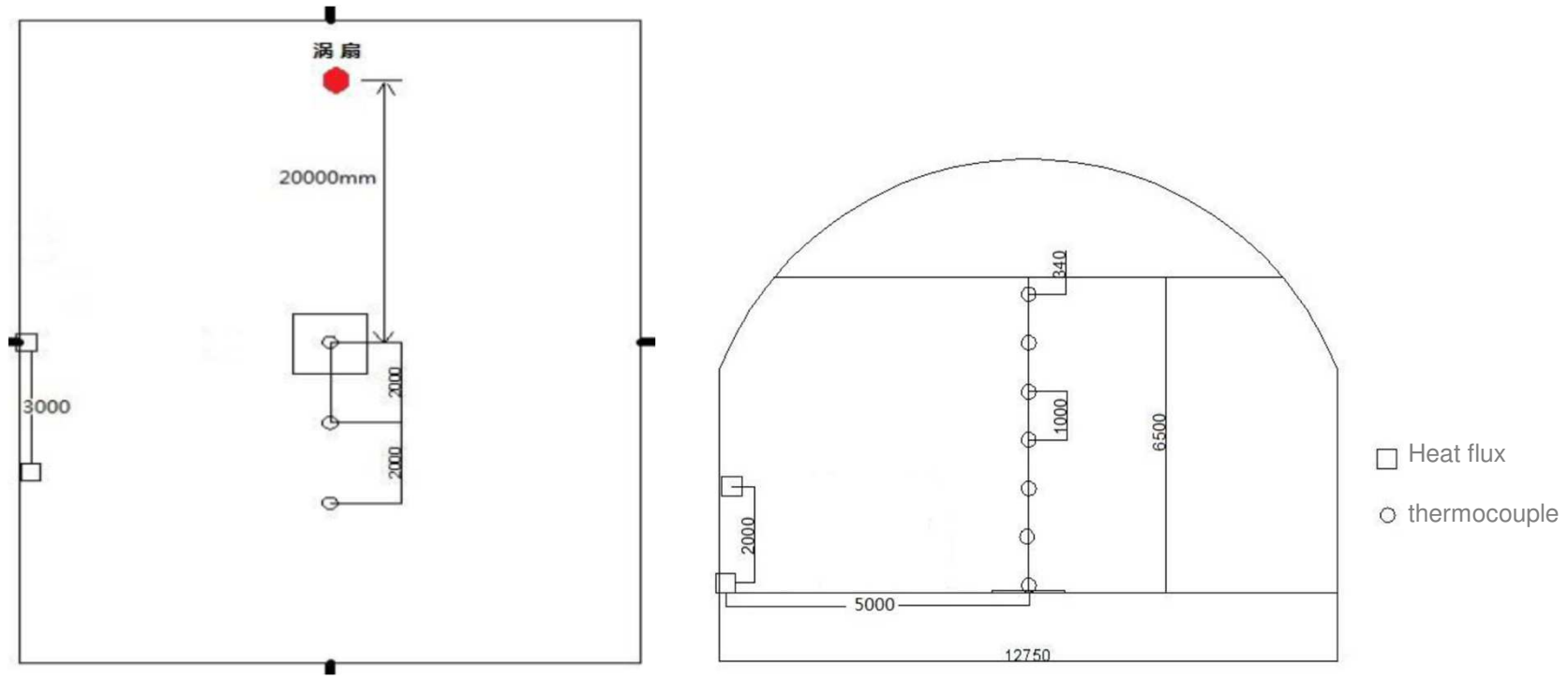


TESTS FOR HANGAR

Test configuration



Test configuration



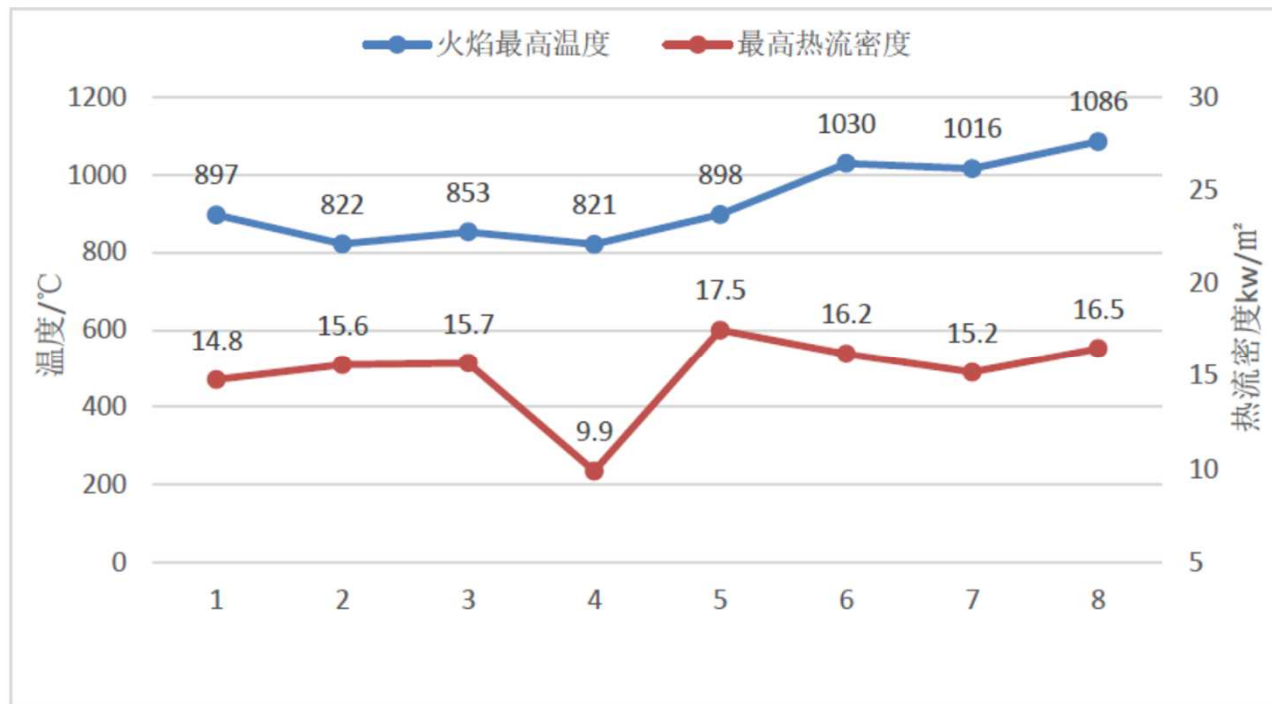
Versuchsreihen



Test #	Pan size (m ²)	Fuel (l)	Water mist flow (l/min)	Extinguishment fluid	Preburnig (s)
1	1	10	700	water	40
2	3	30	700	water	40
3	3	30	700	3% foam	40
4	3	30	700	3% foam	40
5	6	78	700	3% foam	40
6	9	60	700	3% foam	40
7	12	96	700	3% foam	40
8	15	96	700	3% foam	40

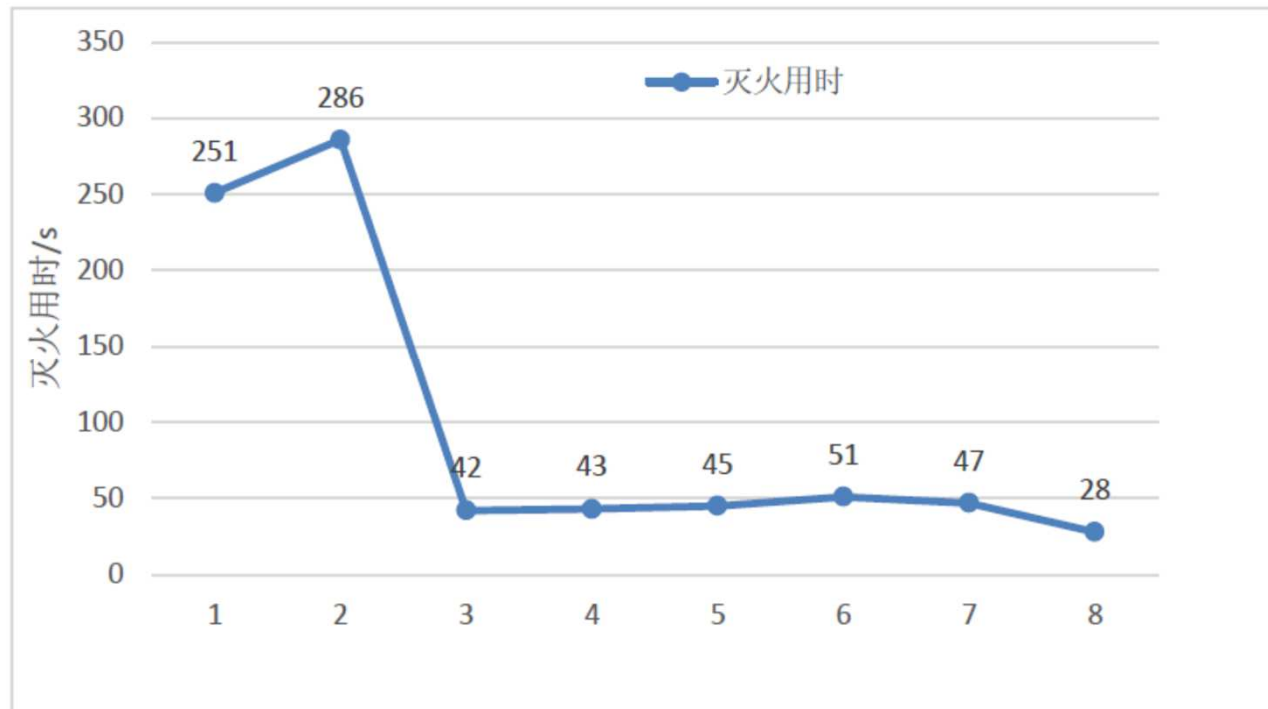
Max T and Max radiation

during pre-burning



Extinction time

for 8 test runs



TESTS FOR DISTRICT HEATING PLANTS

District heating plants





District heating plants

Test in with Thermo-oil

COOLING



District heating plant

Test in with Thermo-oil

FIRE EXTINCTION





TESTS FOR ANCIENT TOWNS

The problem



The concept



Video 4

Video 10

www.emicontrols.com

