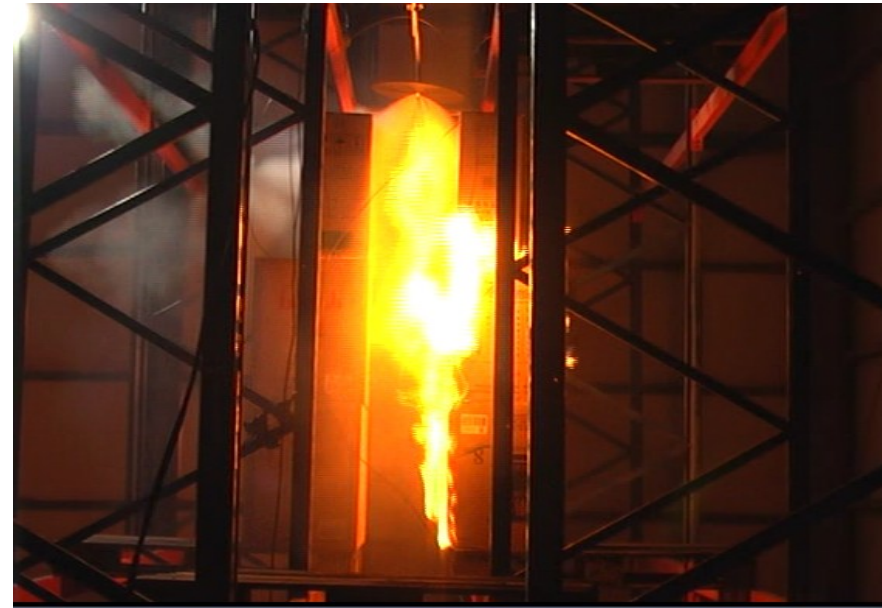


Fire Protection with High Pressure Water Mist in the Tobacco Warehouse



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Outline

- **Fire Risks in the Tobacco Warehouse**
- **Full Scale Fire Tests with High Pressure Water Mist in the Simulated Storage**
- **Site Fire Tests in the Tobacco Warehouse**
- **Summary**

Fire Risks in the Tobacco Warehouse

- Concentration of large combustible storage with very high fire load
- Large buildings to protect the unit relatively independent
- Complicated fire hazards
 - Spontaneous Combustion
 - Fumigation fire caused by improper operation
 - Electrical fire / illegal use of fires
 - Arson
- Coexistence of various forms of fires (surface fire, deep-seated fire, flaming fire, smoldering fire etc), easy to form three-dimensional fires, difficult for fire fighting
- Huge losses caused the improper fire fighting will be much greater than fire losses

Alcoholization Warehouse



Tobacco leaf box

High-rack Warehouse



Fire cases



**July 5, 2008, Arson fire in Hainan Hongta cigarette factory,
Fire loss: 0.23 billion**

Fire cases

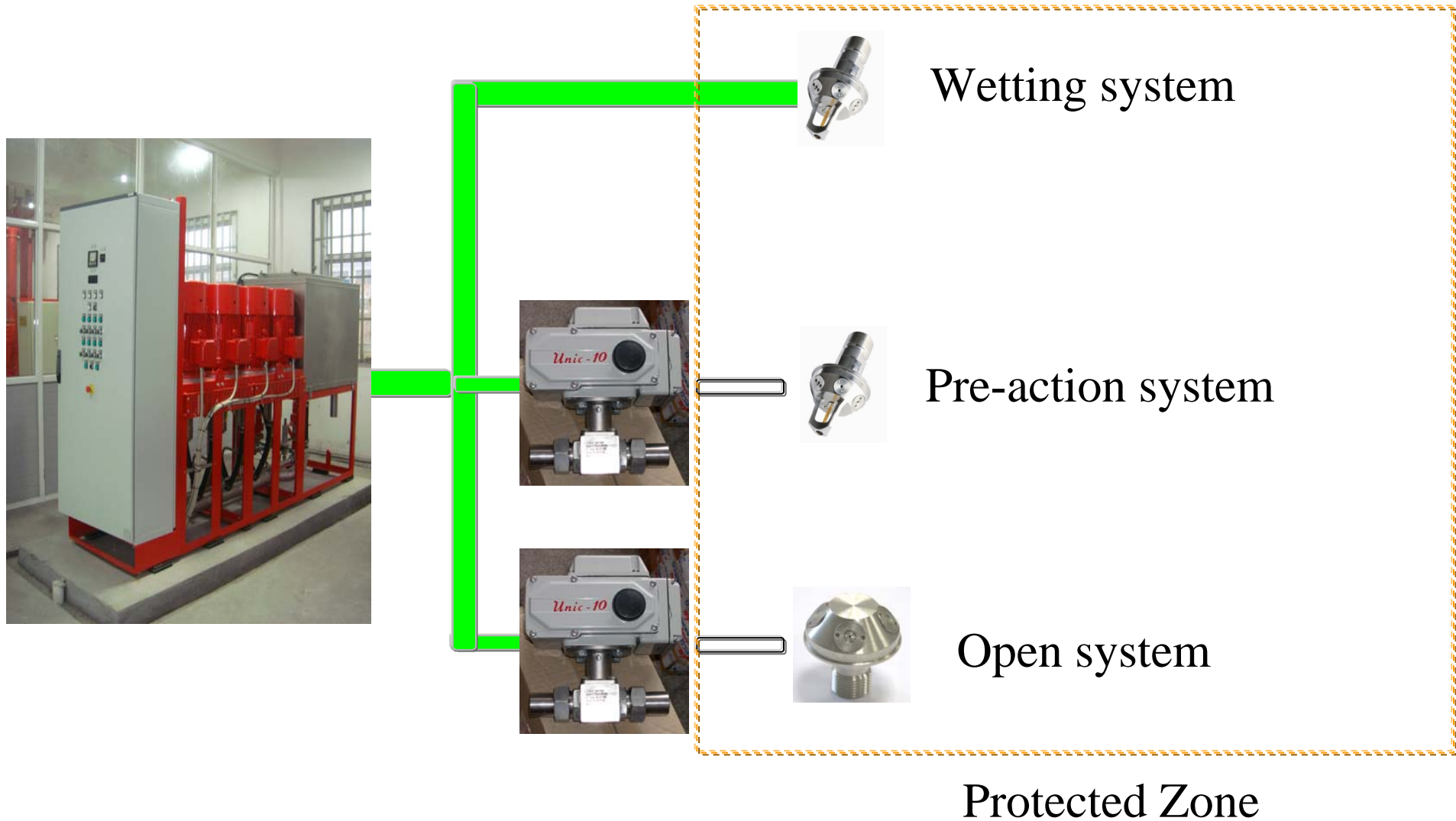


December 28, 2008, Spontaneous fire in Yongzhou tobacco warehouse, Fire loss: 0.12 billion

Requirements of fire extinguishing system in the tobacco warehouse

- Efficient and reliable for early fire extinguishing
- Continuous fire fighting ability for re-ignition
- Reduce the losses caused by fire fighting
- Safe and reliable to avoid losses caused by malfunction
- Low operating costs, convenience for repair and maintenance
- Adaption to the tobacco Production technology
- Environmentally friendly

Application of High Pressure Water Mist System in the Tobacco Warehouse



Simulated Fire tests(1)



12.0m × 12.0m × 5.6m (high) , single floor storage

Simulated Fire tests(2)



12.0m × 12.0m × 8.5m(high), high-rack storage

Combustibles

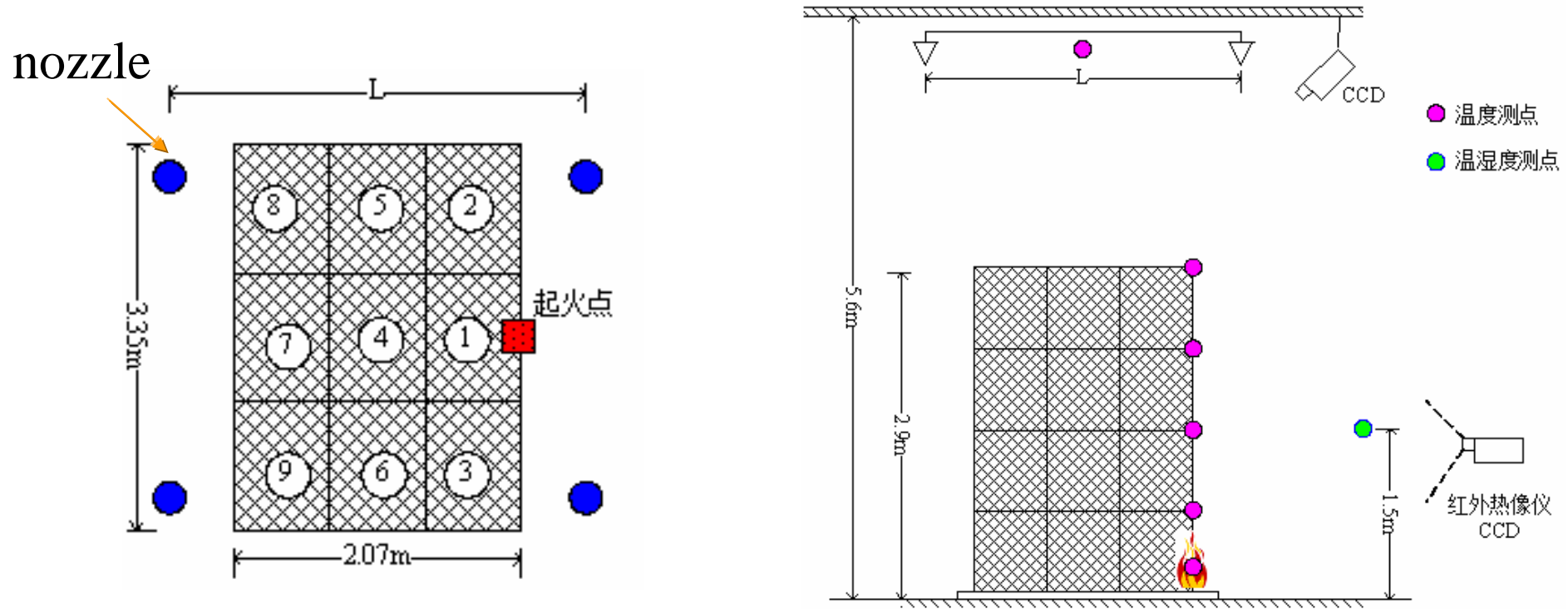


tobacco leaf



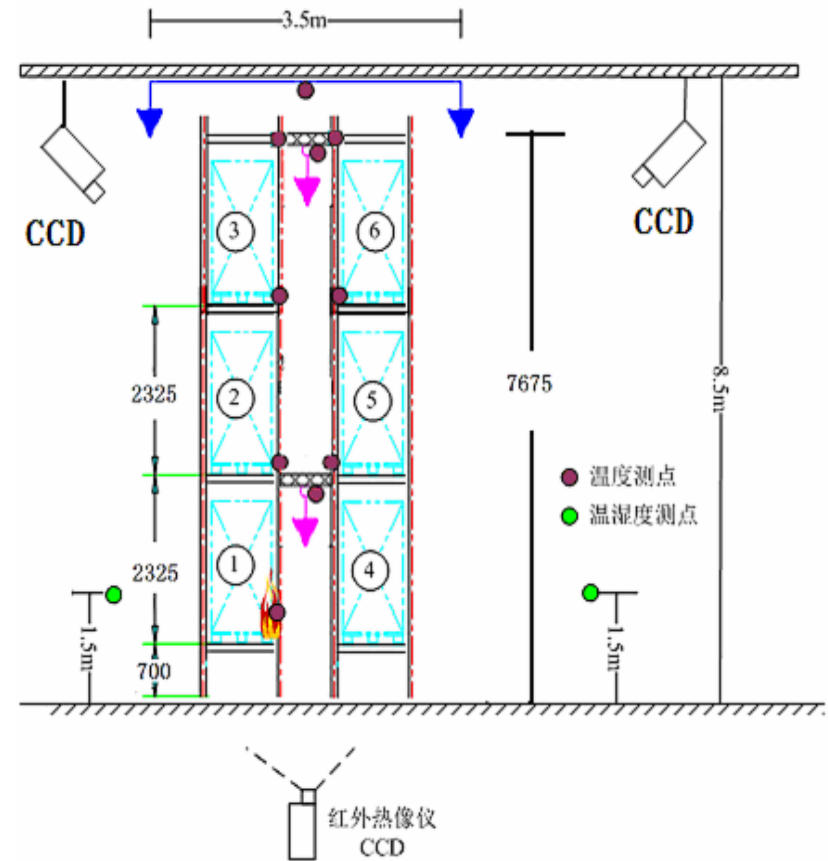
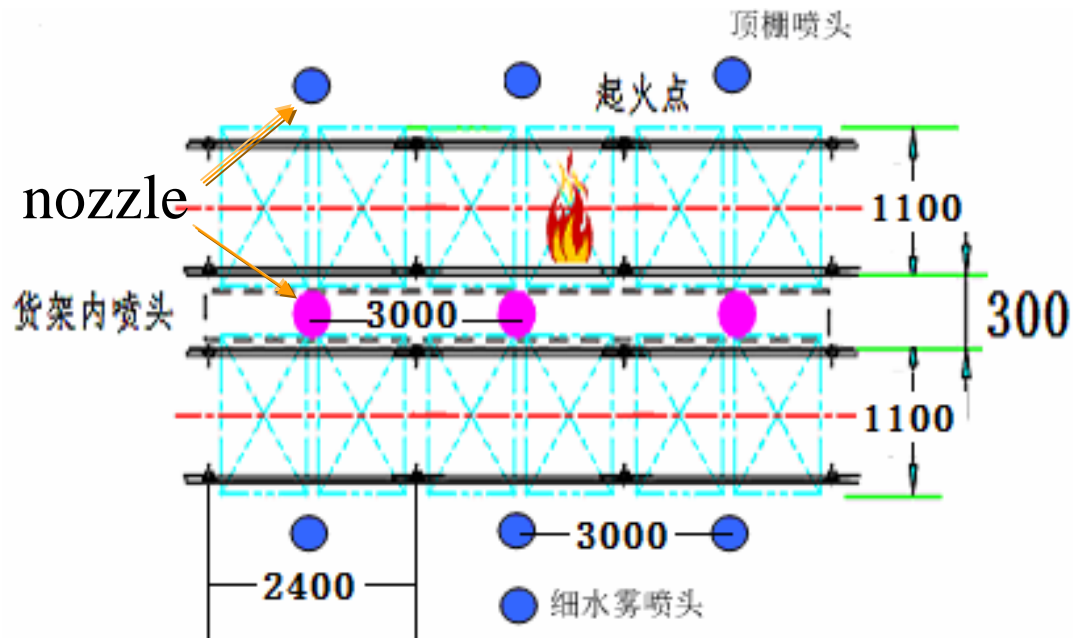
Cigarette

Design fire Scenario(1)



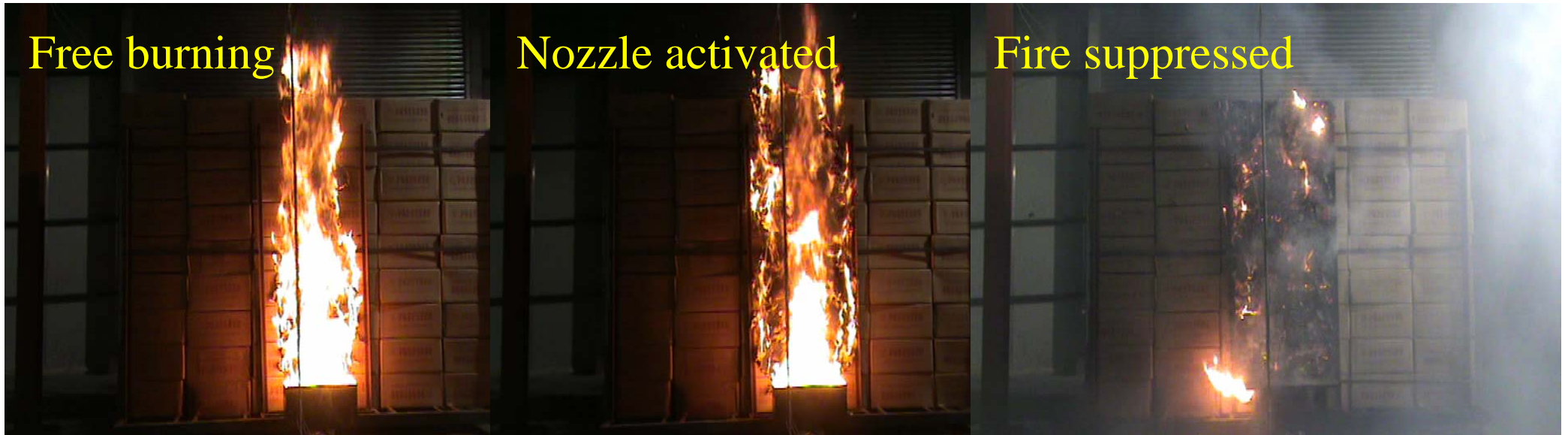
(a) tobacco crib test
Max Nozzle space: 3.5m

Design fire Scenario(2)

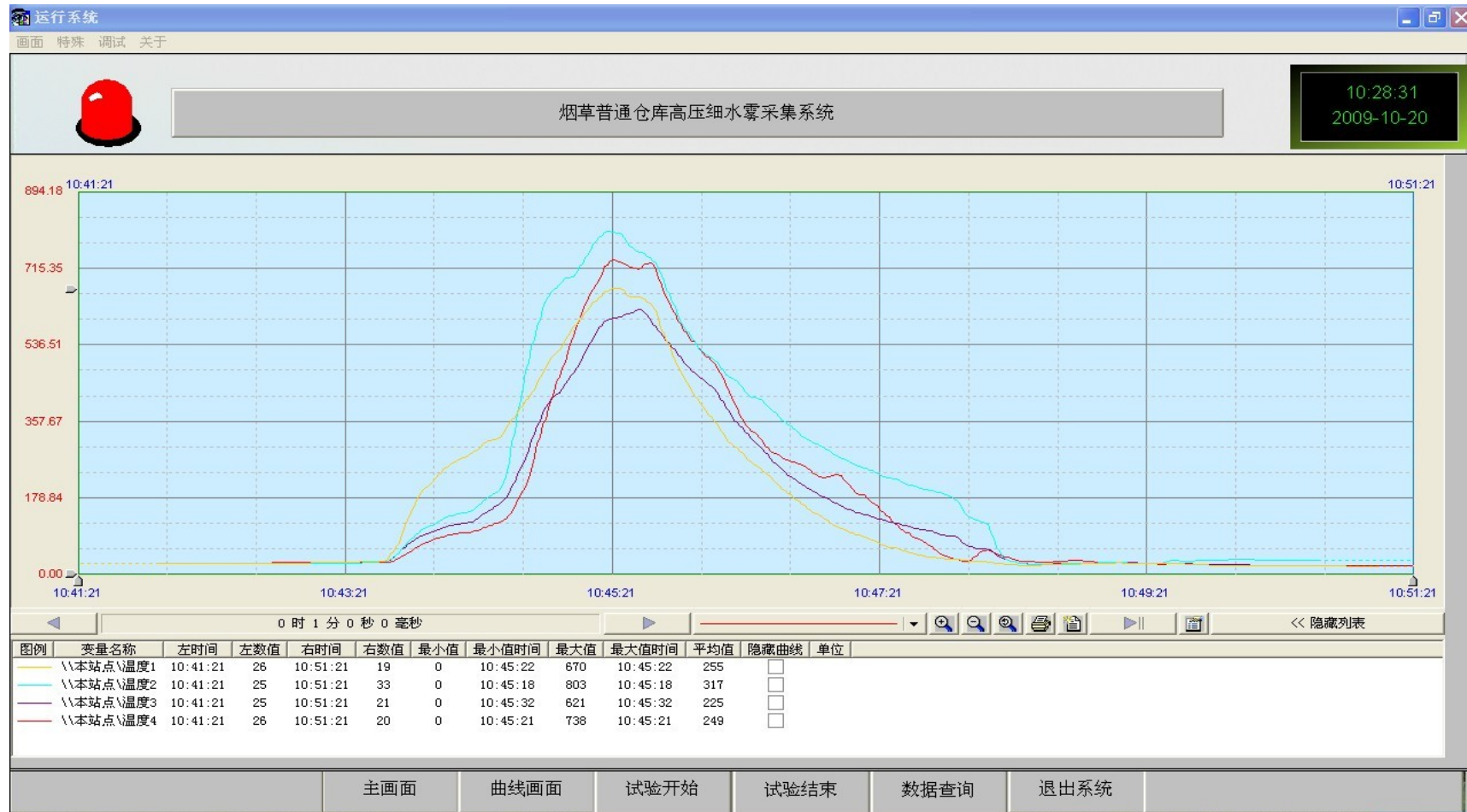


(b) High-rack storage test
Max Nozzle space: 3.0m

Tobacco crib test results



Tobacco crib test results

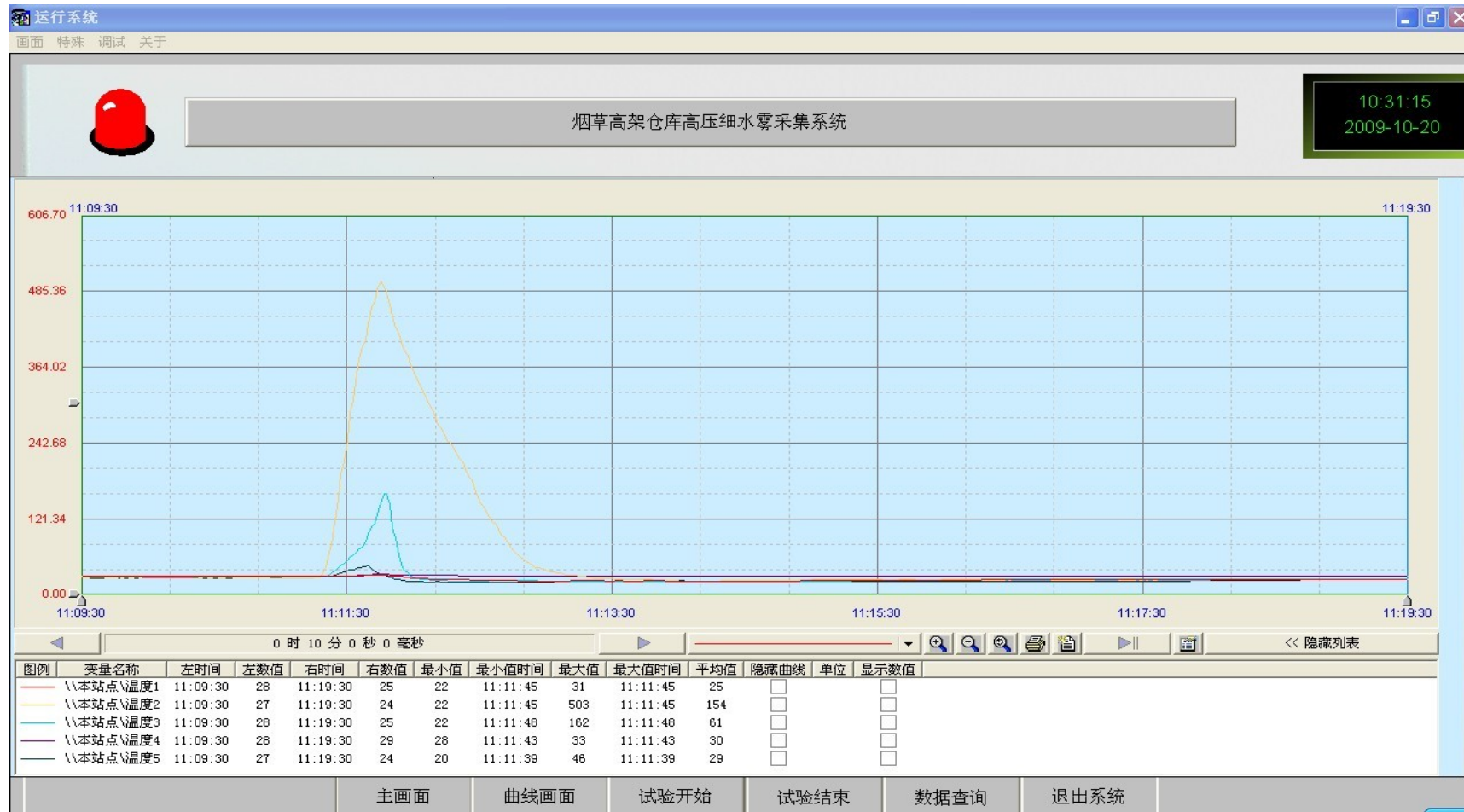


Temperature change during the test

High-rack storage test results(1)



High-rack storage test results(1)



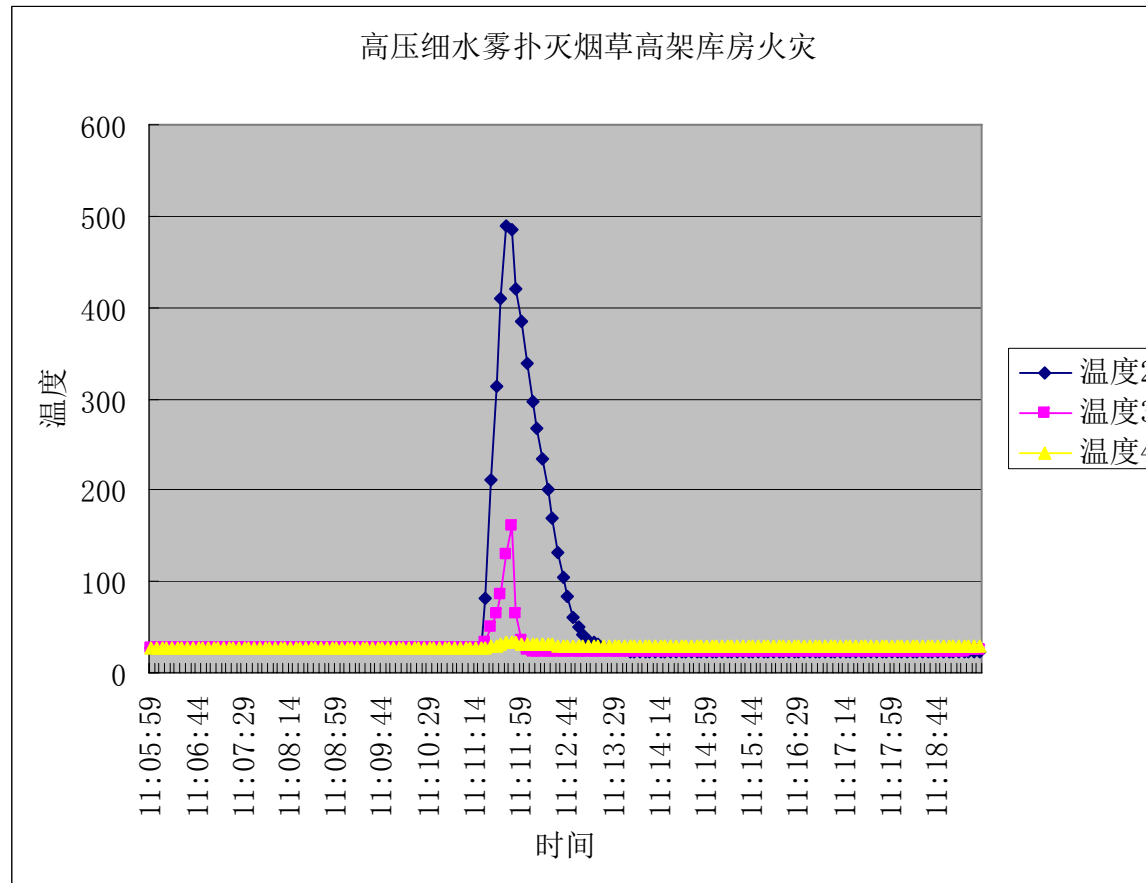
Temperature change during the test

High-rack storage test results(2)



Fires spreading from the under box

High-rack storage test results(2)



Temperature change during the test

Site fire tests in Yunnan Hongta tobacco warehouse



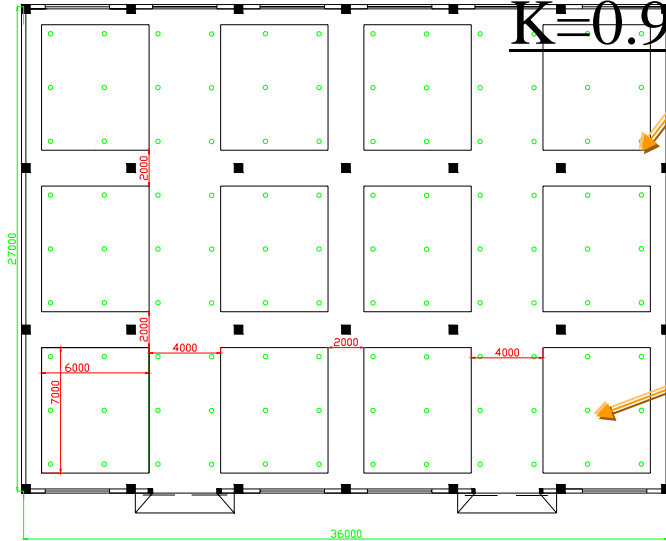
27.0m × 36.0m × 5.6m (high) , single floor storage
Totally 12 tobacco cribs, each crib is 7m long, 6m wide and 4m high.

Site fire tests setup

Open nozzle activated by air sample detection system

细水雾灭火系统安装示意图

$K=0.95$, $P=10\text{MPa}$, Max nozzle space 3.0m



Ignited crib



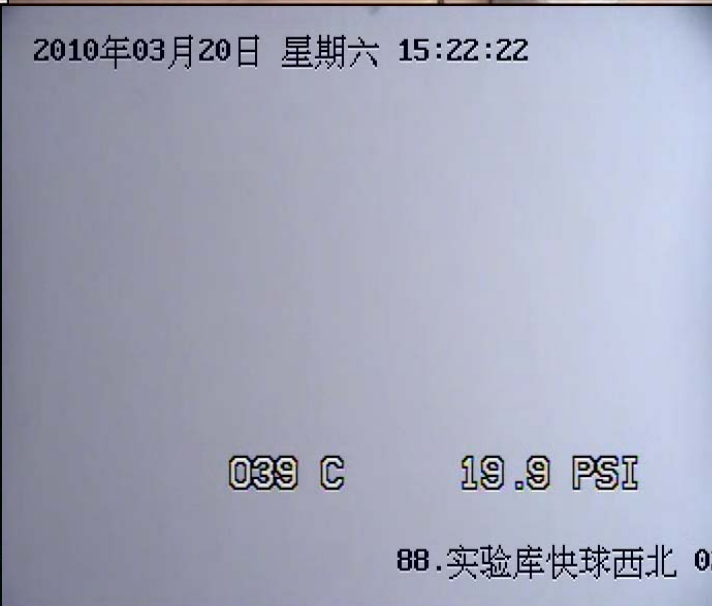
喷头安装位置说明：
根据12个防护区划分，喷头安装间距中心为5米，其余间距3米



Site fire test results – Surface fires



Site fire test results – deep-seated fires



Site fire tests in Guangdong Shima tobacco warehouse



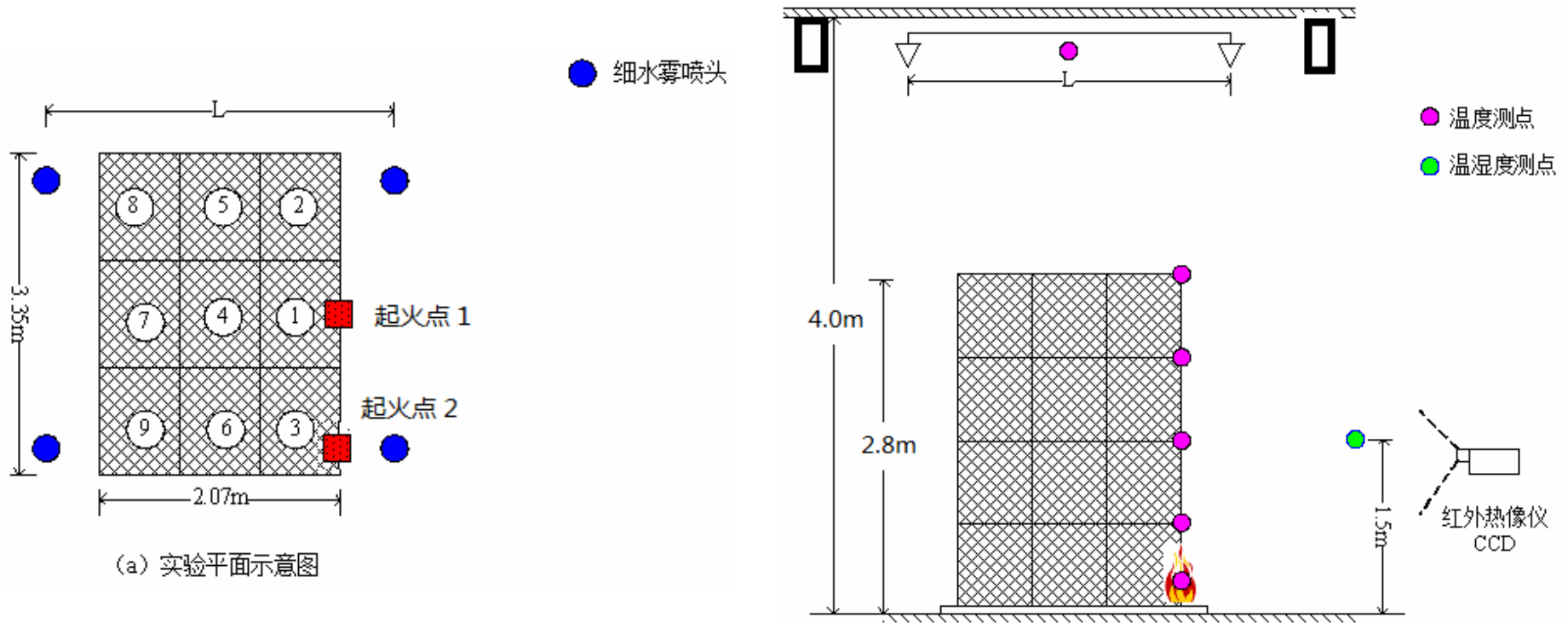
8.0m × 7.0m × 4.0m (高)

Combustibles



Cigarettes (200 boxes)

Design fire Scenario



Arson fires with gasoline

Site fire test results – Arson fires

Ignition



Nozzle activated



Fire suppressed



Flame fire extinguished



Site fire test results – Arson fires

Re-ignition



Nozzle activated



Fire suppressed with mist gun



Total fire extinguishment



Summary

- Fire protection is very important in the tobacco warehouse because of the high value. High pressure water mist system with less water and less water damage is regarded as priority option in the tobacco warehouse.
- Both simulated and site fire tests showed that high pressure water mist could extinguish surface fires of tobacco crib less than five minutes, while deep seat fires or smolder fires would only be controlled or suppressed. However, the decline of fire temperature was conducive to firefighters quickly approaching and fighting fire. High-pressure water mist gun was proved to a good manual fire fighting way in the tobacco warehouse.
- Further work was carried on evaluating the risk of water mist on fumigation. Because in the fumigation of tobacco leaf, aluminium phosphide was used as the pesticide. However there was risk of explosion due to the pesticide decomposition products reaction with water.



Thanks!

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