



# Ultra Fog Presentation | IWMA Paris October 16 2013



High pressure  
water fog sprinkler  
systems for fighting fires

[www.ultrafog.com](http://www.ultrafog.com)



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## Topics for this presentation

- Protection of high voltage transformers
- Protection of gas turbines and machinery spaces
- How to test an automatic sprinkler nozzle



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● Protection of high voltage transformers

How the use of water mist droplets can utilise a very good fire fighting performance on high voltage transformers.



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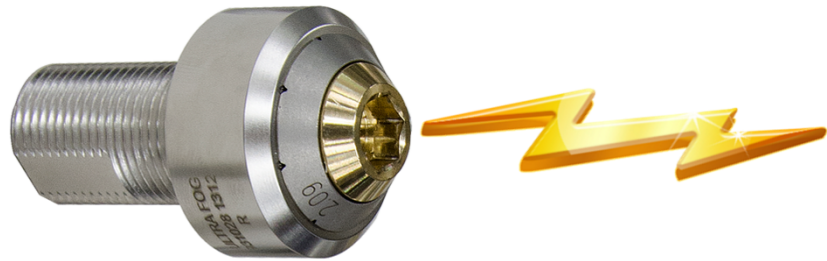
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## ● Protection of high voltage transformers

Water Mist: Droplet size below 1000 microns [NFPA 750]

HP water mist droplet size typically 15 – 200 microns

Provides very low conductivity



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## ● Protection of high voltage transformers

NFPA 750 gives guide lines for clearance.

Nominal System Voltage (kV)	Maximum System Voltage (kV)	Design BIL† (kV)	Minimum Clearance*	
			mm	in.
To 13.8	14.5	110	178	7
23	24.3	150	254	10
34.5	36.5	200	330	13
46	48.5	250	432	17
69	72.5	350	635	25
115	121	550	1067	42
138	145	650	1270	50
161	169	750	1473	58
230	242	900	1930	76
345	362	1050	2134	84
		1050	2134	84
		1300	2642	104
500	550	1500	3150	124
		1800	3658	144
765	800	2050	4242	167

\* For voltages up to 161 kV, the clearances are taken from NFPA 70, *National Electrical Code*. For voltages 230 kV and above, the clearances are taken from Table 124 of ANSI C2, *National Electrical Safety Code*.

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● Protection of high voltage transformers

**Full scale fire testing**

Semi closed Transformer

Transformer size: 10MW

Dimension: 4,4m3 (14,7M2)

Fire heat release: 10MW

Nozzles no: 8pcs, k-factor 0.8

Result:

Extinguishing: 45sec

Water used: 48L



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## ● Protection of high voltage transformers

### Full scale fire testing

Open space Transformer

Transformer size: 30MW

Dimension: 26,1m3 (31,2m2)

Fire heat release: 40MW

Nozzles no: 16pcs, k-factor 1.76

Result:

Extinguishing: 65sec

Water used: 207L



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● Protection of high voltage transformers

With use of the low conductivity and the high cooling effect from water mist, the system can be used to cool down transformer in operation.



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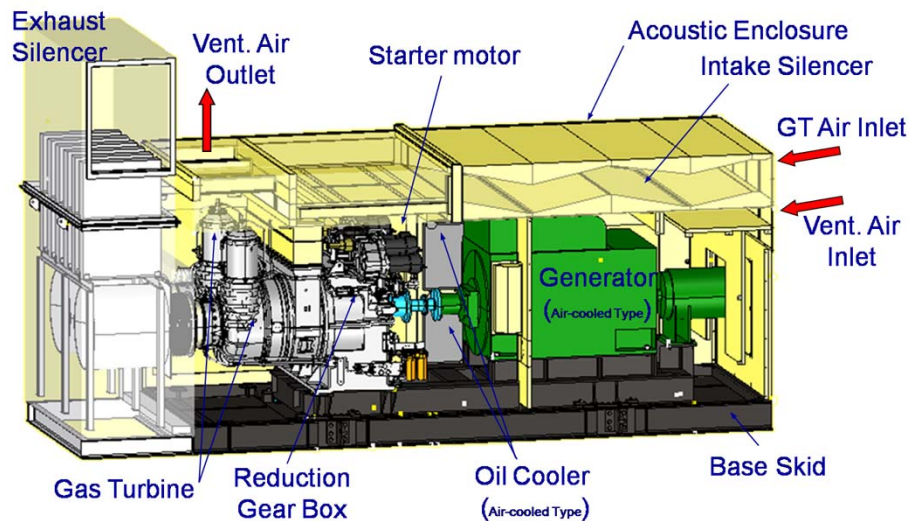
## Protection of gas turbines and machinery spaces

Application standard: FM 5560 - 2012

Machinery enclosures and Combustion Turbines enclosures

Annex C+D: Volumes up to 260m<sup>3</sup>

Annex E+F: Volumes up to 1200m<sup>3</sup>



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## Protection of gas turbines and machinery spaces

Application standard: FM 5560 – 2012

Fire test scenario: Appendix C & D (<math>260\text{m}^3</math>)

Spray fires: diesel & heptan fuel, 1 and 2MW, shielded & unshielded

Pool fires: diesel & heptan fires,  $1\text{m}^2$

Spray Cooling: Cooling test from  $300^\circ\text{C}$  heated  $2\text{m}^2$ , 5cm thick steel plate to verify even and controlled cooling.



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## ● Protection of gas turbines and machinery spaces

Application standard: FM 5560 – 2012

Fire test scenario: Appendix E & F (<1200m<sup>3</sup>)

Spray fires: diesel fuel, 1 to 6MW, shielded & unshielded

Flowing fire: heptan fuel, 28MW

Pool fires: diesel & heptan fires, 1m<sup>2</sup>, 1 to 7,5MW

Spray Cooling: Cooling test from 300°C heated 2m<sup>2</sup>, 5cm thick steel plate to verify even and controlled cooling.



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## ● Protection of gas turbines and machinery spaces

Fire test video, spray & pool fire test, 260m<sup>3</sup>



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## ● How to test an automatic sprinkler nozzle



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## How to test an automatic sprinkler nozzle

### Why?

#### Commissioning Service Verifying



Commissioning: Drain pipe work from air to create more a robust system and for faster activation.

Service: To check function and water quality

Verifying: Check flow and k-factor



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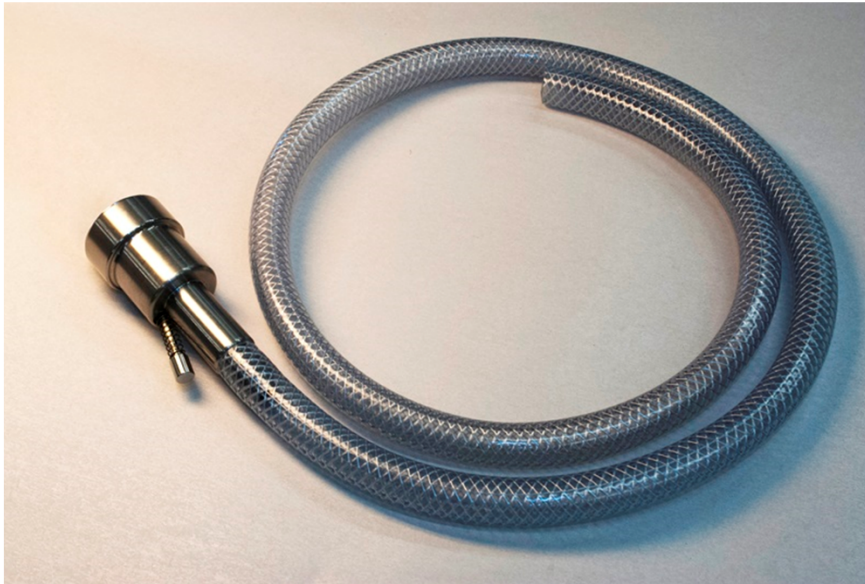
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## How to test an automatic sprinkler nozzle

Ultra Fog Test tool



Tool comes with a hose to collect water  
to a bucket/bottle for measuring of flow  
and k-factor

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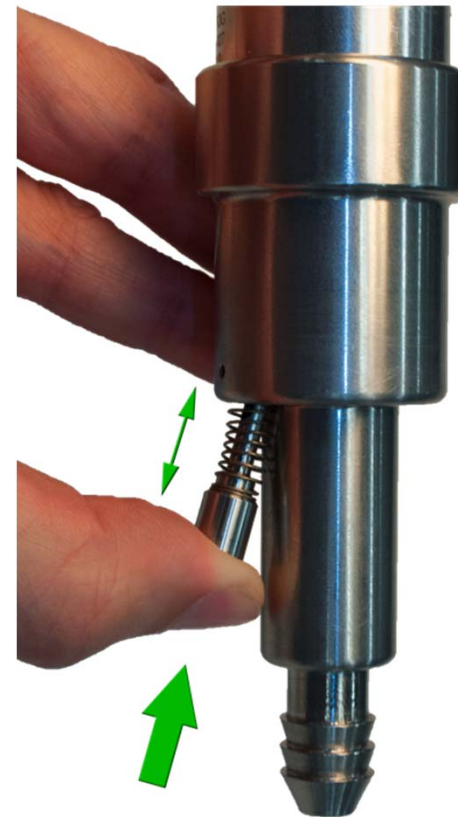


## How to test an automatic sprinkler nozzle

Connect Ultra Fog test  
tool to sprinkler head.

Then push rod to open the  
sprinkler head.

After finished test, release  
rod and remove test tool.



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● Thank you for your attention



**IWMA**  
International Water Mist Association



  
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