RISCAuthority

FPA Fire Protection Association Project Consultancy

Watermist protection of commercial risks:

Demonstrating competent design

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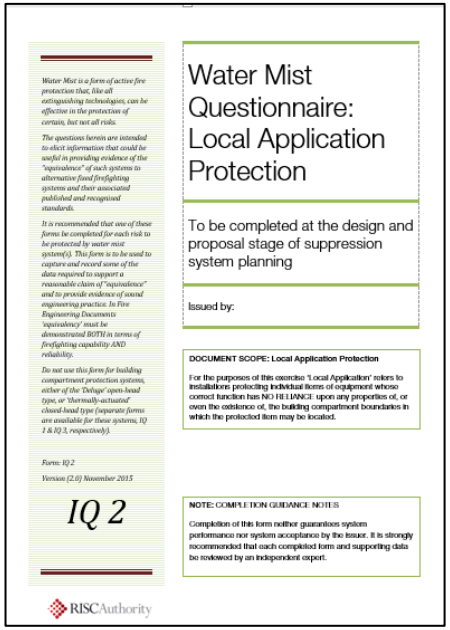
FPA, RISCAuthority & Watermist

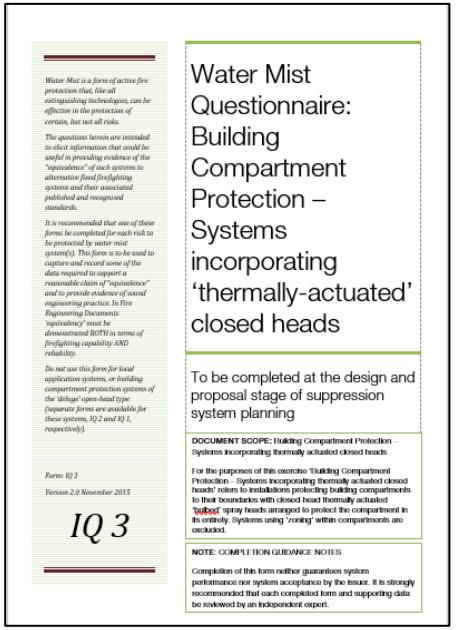
- Authors of UK Defence Standards for watermist protection of warships
- Development and proving of watermist protection for Astute and Successor submarines

- Technical advisors to UK insurance industry through RISCAuthority
- Litigation SME advisers to legal profession for system failures
- Technical advisors to UK Ministry of Defence through NAIA
- Business & Property (Resilience focus)

Reference Documentation (www.RISCAuthority.co.uk)

Objective: to demonstrate that Watermist is the correct technology choice and that it has been integrated with the environment it operates within to optimise / assure performance.





1. IQ1 - Water Mist Questionnaire - 'Deluge' open-head systems
2. IQ2 - Water Mist Questionnaire - Local Application Protection
3. IQ3 - Water Mist Questionnaire - Systems incorporating 'thermally-actuated' closed heads

What has prompted this work?

We see a great number of cases where watermist is used but:

1. the protection capability is misunderstood by the owner
2. it is not the best choice of media for the application
3. it is the correct choice but it is very poorly implemented
4. there is concern over the use of ‘closed heads’ in large arrays and ‘equivalency’ specification with sprinkler systems

Significant financial loses have occurred in the commercial sector where watermist suppression systems have underperformed and reputation of watermist is being damaged

1. Protection Objective Clarity

Confusion of performance terminology:

- Extinguishing system – extinguishes and secures the fire against refresh 100% - no other actions necessary

- Suppression system – holds the fire in a constrained state until other factors are deployed to actually put the fire out (i.e. manual 1st aid fire-fighting or F&RS in association with alarm raising)

However ……

Definitions

- Wikipedia

"*Automatic fire suppression systems control and extinguish fires without human intervention. Examples of automatic systems include fire sprinkler system, gaseous fire suppression, and condensed aerosol fire suppression.*"

- Manufacturer's / Supplier's website

"Fire Suppression Systems & Automatic Fire Suppression Systems control and extinguish fires in buildings without human intervention. Automatic Fire Suppression Systems fall into two categories engineered and pre-engineered systems. Fire Suppression Systems can use a variety of extinguishing agents depending on the assets it is designed to protect."

Question: What is the average man in the street supposed to think?

Definitions

Confusion of Terminology between 'Extinguishing system' and 'Suppression system' means -

- The average end-user may have safety systems in place that assume one level of performance (extinguishment), which ultimately turn out to be useless in mitigating loss because the system can only 'suppress'.
- Legal investigations ongoing currently where this has been the case for watermist and other technologies (incl. gas / aerosol)
- For an 'expert solutions provider' to provide a 'suppression system' in a safety framework where other actions are required to meet the safety ambition, but not provide them or note their need, could be legally challengeable

Design Objectives

It is vitally important to understand the Design Objectives for the system as this can remove much of the complexity of the design:

- Guaranteed Extinguishment of fire
- Suppression of fire until other actions can be implemented
- Prevention of flashover
- Security of escape routes for a defined period of time
- To meet Building Regulations (Passive make-up)
- Business & Property / Process protection (£)
- Etc.

2. Choice of media

Watermist is best where:

LOCAL APPLICATION

- Momentum of the mist is maintained
- Mist densities are high

COMPARTMENT PROTECTION

- The compartment is sealed
- The fire is LARGE in comparison to the volume of the enclosure
- Fuels have high heat output (Class B liquid fuels)
- Fuels burn on the surface
- Ceiling heights are low

BOTH

- *Suppression* rather than *guaranteed extinguishment* is the objective

2. Choice of media

Yet we still see it specified in applications with multiple characteristics of:

- big volumes with high ceiling heights
- often well ventilated
- Class A, deep-seated & smouldering fuels
- complex geometries
- with a necessity to extinguish

and, as 'expert system providers' failure of poorly selected systems will be, and is, challenged in the courts following loss

3. Correct technology poor implementation

The most prevalent source of problems observed for all active fire protection systems, examples:

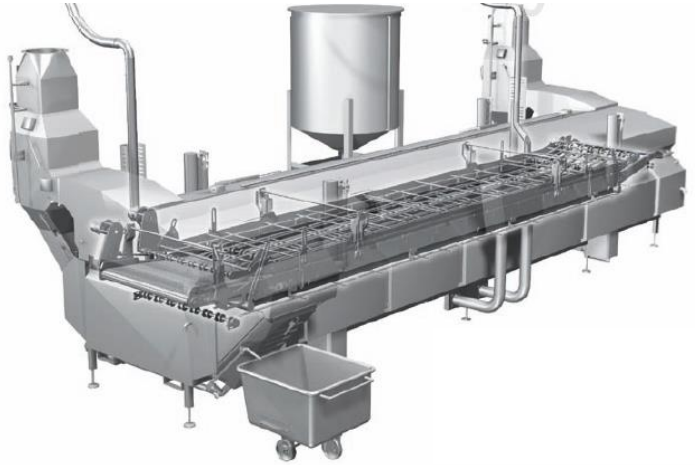
- Design intention is not properly understood (i.e. property protection vs. LS)
- Risk never properly investigated and/or understood
- System design never validated against appropriate risk (marine)
- System design does not consider all ‘modes’ of operation of the equipment it is protecting
- Very short water supply durations in comparison with shut down & control of ignition sources *

3. Correct technology poor implementation

- Activation of system not interlocked with:
  - Power
  - Fuel
  - Ignition sources
  - Ventilation
  - Conveyancing equipment (conveyor belts)
- Inappropriate detection in the context of suppression system's / risk's needs*
- Insufficient guidance, training, and manuals
- Poor ergonomics
- Inappropriate referencing of sprinkler equivalency *
- No overall ownership
- Fraud and mis-selling (poorly regulated market)

Real Case Study

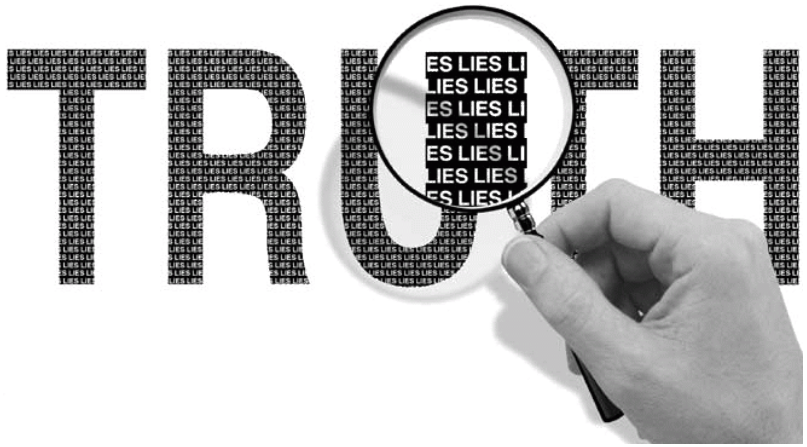
Proposal made for a system to protect a deep fat fryer.



Design documentation presented:

- Nozzle numbers and positions
- Rudimentary detection system description
- Discharge time (water capacity) 10 minutes
- Large bundle of Approvals Documentation
- Letter stating imminent Approvals with well recognised organisations

Real Case Study



Insurer analysis made using IQ2

The reality:

- NO interlocking of gas supplies, ventilation or conveyancing with WM operation
- NO approvals relevant to deep fat fryers (paperwork was for a marine compartment system using different nozzles and sundry other QA stuff)
- NO test data or evidence of operation on deep-fat fryers
- The supposedly ‘proven’ 10 minute discharge time is the minimum allowed IF the system had gone through FM/UL testing (which it had not)*
- Contact made with one of the ‘imminent approvals bodies’ – they had never heard of the company
- Some key areas of the machine were unprotected
- System design only considered ‘normal operation’. No capability to protect during high risk times of maintenance or malfunction.

Real Case Study

But it's not all bad news:

Going through the questionnaire with the installer resulted in enough of the issues being addressed in a revised design for it to be considered acceptable to the insurer

Future challenge is the ensure these Questionnaires are a 'starting point' for installers to work with – we are currently working closely with FIA to make IQ2 an 'industry document'.

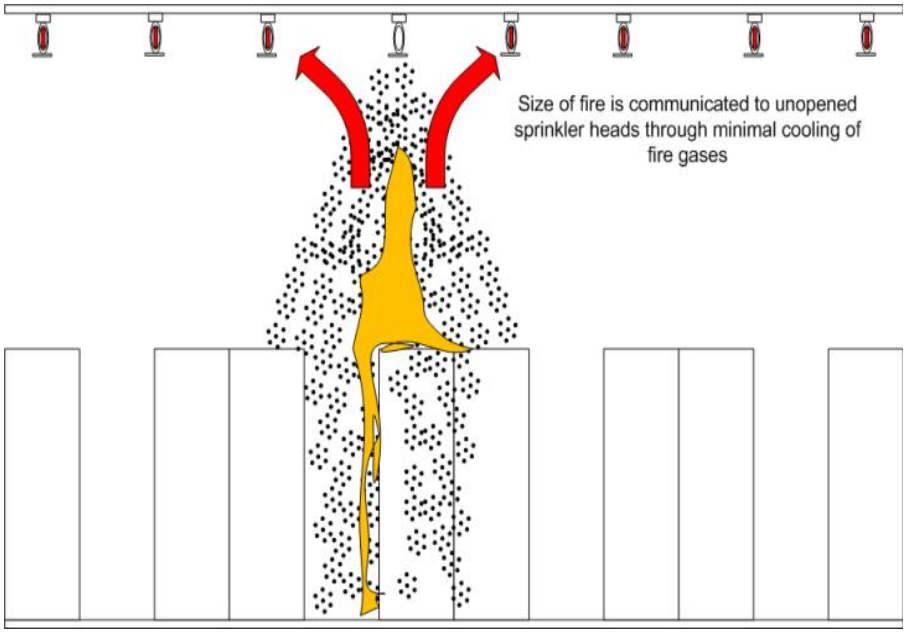
4. Large array ‘Closed-Head’ Systems

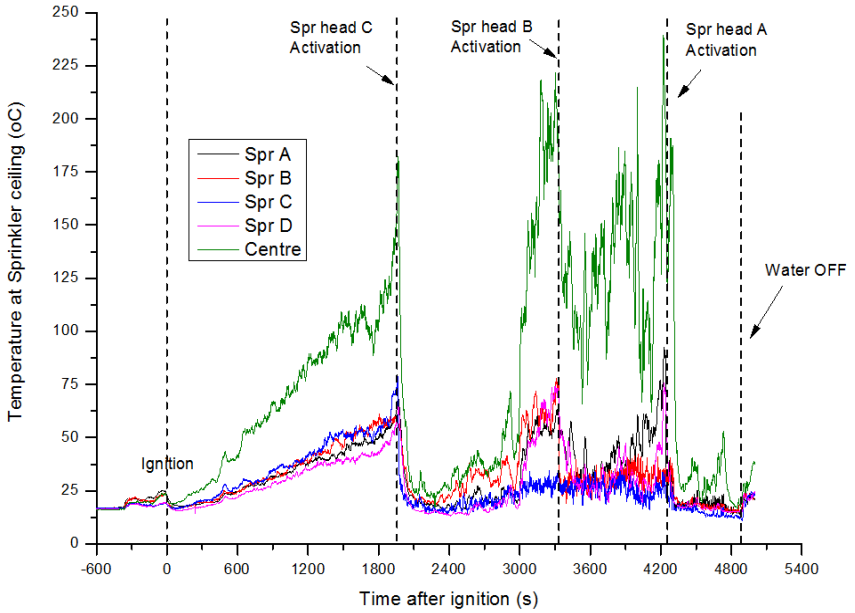
- To all intents and purposes (on-shore property protection) these systems do not currently exist
- BS 8489 will be an enabler for their introduction to the UK
- FPA / RISCAuthority / ABI have the following grave concerns:
  - Fundamental operational technical shortcomings in the use of ‘bulbed’ watermist heads
  - An almost certain belief of ‘equivalency’ with sprinkler systems – when they are actually performing very different roles

‘Closed-Head’ Systems

- ‘Closed-head’ or ‘bulbed’ systems demand good communication with the fire so the next head to open knows when it is needed
- In sprinkler systems this is achieved through:
  - Ensuring droplets do not cool the gas layer (large droplets)
  - Ensuring spray cannot impinge directly upon adjacent heads
  - Limiting ceiling heights
  - Controlling ceiling clearance above stock

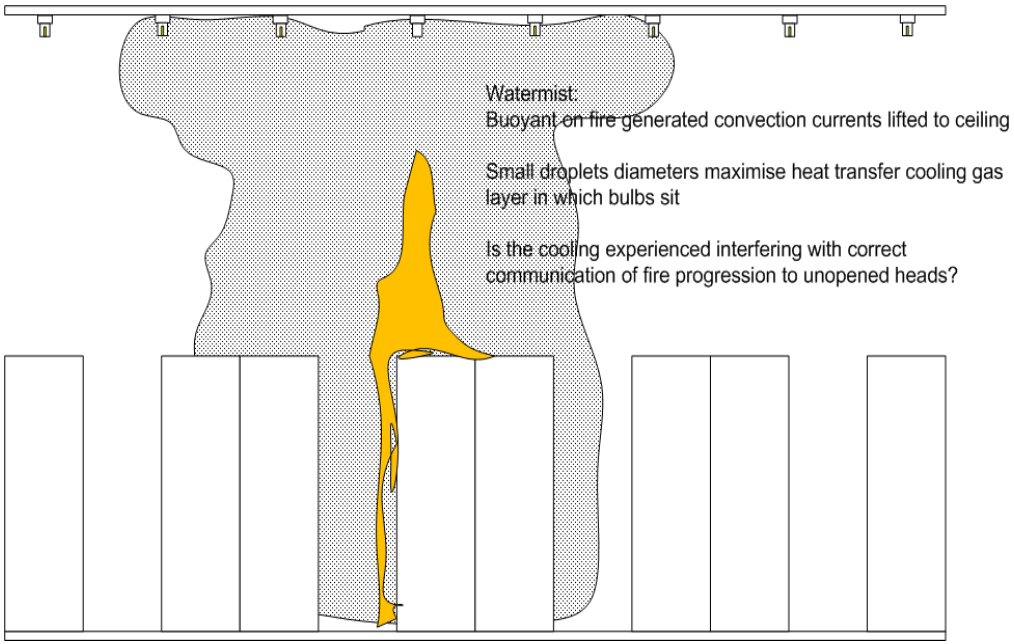
Full-Scale Sprinkler System Activation Data

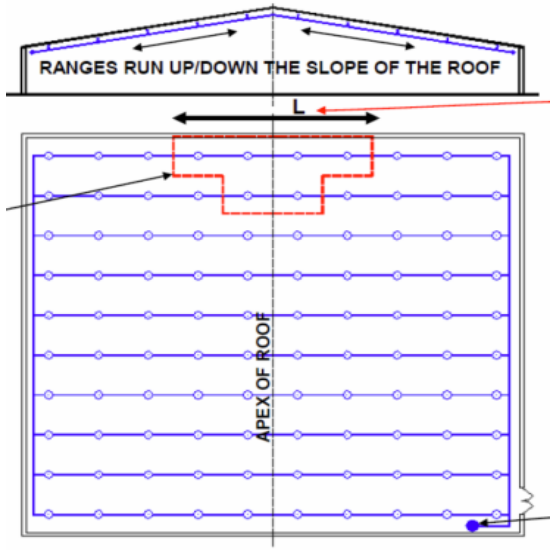




‘Closed-Head’ Watermist Systems

- Watermist droplets
  - Cool in the gas phase immediately upon leaving the nozzle
  - Are buoyant on a fire plume and may hug the ceiling
  - Limit temperature almost universally to near-steam temperatures





Equivalency

Where EQUIVALENCY is request between competing water-based suppression systems (as is the case for building codes), the following must be considered in full:

PERFORMANCE – ability to tackle all fire challenges against the design objective

RELIABILITY - the ability of the system to deliver water when required
- the ability of the system to NOT deliver water when NOT required

EXTENT OF PROTECTION – (Voids and all)

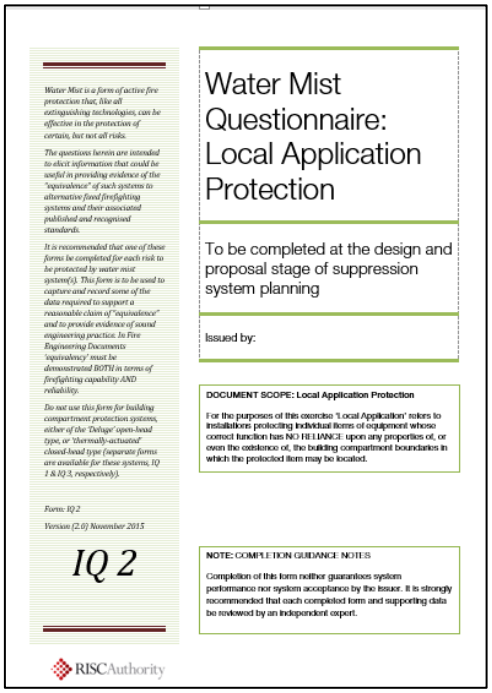
There is little by way of codes or standards to dictate that watermist systems will have many of the features that we know make Sprinkler Systems effective for the long term protection of property and business:

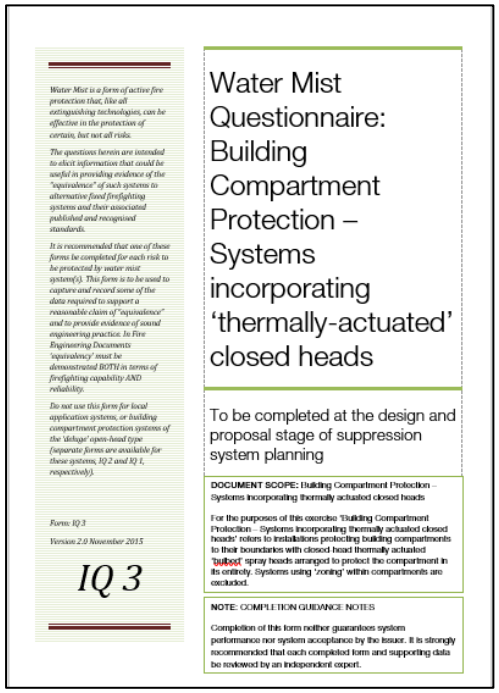
It will need to be specified separately – and this is addressed in the IQ series!

Why do we need questionnaires for watermist?

- Repeated calls from insurers for guidance, especially when proposed in place of sprinkler systems
- A need for RISCAuthority to promote new technologies to where they can provide most benefit for business and property protection - in the right places watermist can be the BEST option.
- To allow the designer /s pecifier to demonstrate to the purchasers/insurer that a full and appropriate job has been/will be done in the design and implementation of the system

Reference Documentation (www.RISCAuthority.co.uk)





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Water mist questionnaires

- Questionnaires ONLY ask details of the steps that MUST be taken in the provision of an effective water mist response
- Difficultly to complete may indicate that all the bases have not been covered and should serve as a warning
- The intention is to develop further questionnaires for gaseous extinguishing systems

Thank you

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