



Watermist for High Rise Buildings

David Sherrington
Ultra Fog Ltd.

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Overview

- Installation of watermist systems within new high rise projects
- Retrofit installation of watermist systems within residential tower blocks
- Unique opportunity for watermist to play an important role as a means of escape





Building Regs 2010, Section 8: Compartmentation, para 8.14

“Blocks of flats with a floor more than 30m above the ground level should be fitted with a sprinkler system [...]”

Features & benefits of watermist

Consumption of 80-90% less water than conventional sprinkler systems	<ul style="list-style-type: none"> ★ Reduced demands on water supply ★ Smaller diameter pipework ★ Reduced water damage
Smaller droplets, larger surface area	<ul style="list-style-type: none"> ★ Rapid cooling ★ Reduces the transmission of radiant heat ★ Suspended in air for longer ★ Influenced by convection ★ Greater interaction with smoke particles
High pressure	<ul style="list-style-type: none"> ★ Full height protection, with consistent flow rates
Stainless steel pipework	<ul style="list-style-type: none"> ★ Intrinsically fire resistant
Origins within marine & offshore sectors	<ul style="list-style-type: none"> ★ Robust & reliable ★ “New” but proven technology

Retrofit sprinklers



The need?

Under current UK legislation, there is no requirement for retroactive installation of sprinklers, unless a building undergoes significant structural changes or change of use.

Existing buildings use compartmentation to prevent the spread of fire between dwellings.

Fire Service to manage the firefighting / search and rescue.

“Stay put” policy in place.



Compartmentation failure

Lakanal House, 2009.

Shepherd's Court, 2016.

Grenfell Tower, 2017 - *public inquiry ongoing.*





Outcome of Lakanal House Inquest

1

Failure of compartmentation via inadequate fire stopping, an open window, and cross connection of ventilation ducts.

3

6 fatalities - all advised via phone to stay put to await rescue. Extensive smoke logging of the communal areas prevented rescue.

2

Fire spread rapidly - both vertically and horizontally.

4

Coroner's Section 43 letter issued to the Council.

construction of high rise residential buildings and refurbishment work carried out to enable an assessor to consider whether compartmentation is sufficient or might have been breached.

Training of staff engaged in maintenance and refurbishment work on existing building

It is recommended that your authority consider the training needs of personnel who will be involved in procuring or supervising work to existing high rise residential buildings – whether maintenance, refurbishment or rebuilding of parts of buildings – to ensure that materials and products used in such work have appropriate fire protection qualities. Staff should, for example, be trained to understand the significance of the compartmentation principle and to appreciate when Building Control should be notified about work to be undertaken.

Access for emergency vehicles

It is recommended that your authority liaise with emergency services to consider access for emergency vehicles to high rise residential buildings, having particular regard to obstructions such as vehicle parking in locations which emergency services might need to use.

Retro fitting of sprinklers

Evidence adduced at the inquests indicated that retro fitting of sprinkler systems in high rise residential buildings might now be possible at lower cost than had previously been thought to be the case, and with modest disruption to residents.

It is recommended that your authority consider the question of retro fitting of sprinkler systems in high-rise residential buildings.

Response

Rule 43A of the Coroners Rules requires that you give a written response within 56 days beginning with the day on which the report is sent. If you are unable to respond within that time, you may apply to me for an extension. The response is to contain details of any action that has been taken or which it is proposed will be taken whether in response to this report or otherwise, or an explanation as to why no action has been taken.

As required by rule 43, I shall send a copy of this report to the Lord Chancellor.

At your request, I am copying this report to Ms Eleanor Kelly, Chief Executive.

Yours sincerely



Section 43 letter

Source:

<https://www.lambeth.gov.uk/elections-and-council/lakanal-house-coroner-inquest>

Sprinkler feasibility study commissioned in response to section 43 letter

Recommendations from the consultancy appointed by the Council:

Type of accommodation	Installation of sprinkler systems into existing high-rise buildings
Sheltered housing	Recommended
Temporary housing	Recommended
General needs housing	<u>Not</u> recommended. Instead, as a minimum, LD3 fire detection is strongly recommended.

Source: <http://moderngov.southwark.gov.uk/documents/s42927/Report%20Lakanal%20inquiry%20-%20Sprinkler%20Feasibility%20Study.pdf>

Justification?

Issues which were considered by the Council:

1

“Currently no legal requirement to install sprinklers in existing buildings [...]”

3

“Effect on amenity” - pipe routing, accidental painting of sprinkler heads, aesthetics, coring/boring, disturbing the existing fire stopping, asbestos, etc.¹

2

Council has “no right of access to leasehold properties” - retrofit within leasehold flats would require the owners’ consent and, normally, their funding.¹

4

Cost

1. <https://www.lambeth.gov.uk/sites/default/files/ec-london-borough-southwark-letter-response-to-rule-43-23May2013.pdf>

Costs benefit analysis

Shortfalls

The analysis was...

...based on the costings provided by one sprinkler company.
Realistic reflection of competitive tendering?

...based on conventional sprinkler systems and personal protection sprinklers. Watermist not considered.

...based on application of building regs (*for new buildings*) to existing buildings.





Building Regs 2010, Section 8: Compartmentation, para 8.14

“Sprinklers need only be provided within the individual flats. They are not required in the common areas such as stairs, corridors, or landings”



Indicative costs

Source: <http://moderngov.southwark.gov.uk/documents/s42930/Appendix%203%20Feasibility%20report%20indicative%20costings.pdf>

Costs calculated in 2013.
Excludes VAT, professional fees, inflation/deflation, and relocation costs.

Conventional Sprinkler Systems

£127M

Total cost for 103 high rise,
general needs housing blocks

Conventional Sprinkler Systems

£18.5k

Average cost per flat

LD2 Fire Detectors

£0.7k

Average cost per flat



Local Government Association - Fire safety in purpose built flats
[https://www.local.gov.uk/sites/default/files/documents/
fire-safety-purpose-built-04b.pdf](https://www.local.gov.uk/sites/default/files/documents/fire-safety-purpose-built-04b.pdf)

“It is unlikely that retrofitting sprinklers or water mist systems would be reasonably practicable for existing blocks. Nevertheless, this does not preclude their use where there is **clear justification** and **appropriate consideration of the practicalities** of their installation and subsequent maintenance.”

A horizontal bar with a dark blue segment on the left and a light blue segment on the right.

An alternative approach for retrofit installation within residential buildings

When installation of sprinklers within individual flats of a high rise block is not practicable, consider the use of watermist within the building's escape route(s).

Proposal

Watermist nozzles immediately outside the entrance of every flat.

Watermist dry riser within the communal stairwells and corridors.

Watermist pump unit at ground level.



General advantages



Cost

Considerably lower installation costs to install within escape routes, rather than individual flats.

Access rights

Installation within public areas would not affect private / leaseholders' flats.



Effects on amenity

Minimal change to the fabric of the building

Unique advantages of watermist



Less water

Considerably less water than sprinkler systems. Less demand on the building's water supplies. Less "drenching" of environment and occupants during evacuation.

Positive pressurisation within stairwells & corridors

Rapid evaporation and expansion of water to water vapour may produce a positive pressure within the communal spaces, potentially restricting the ingress of smoke.

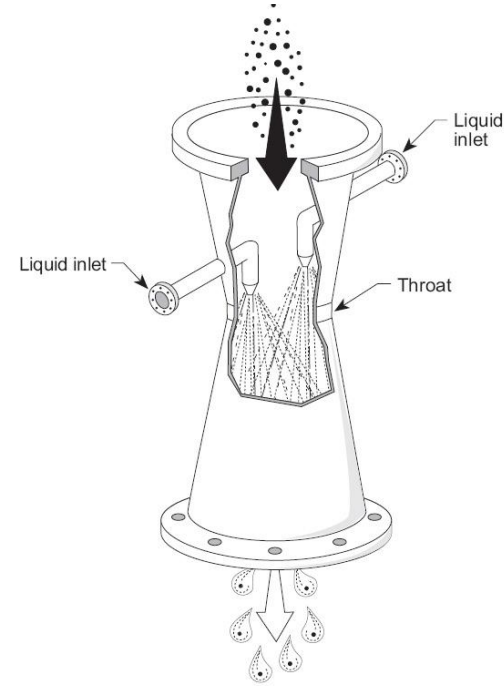


Rapid cooling and "scrubbing" of smoke

Watermist is commonly used to scrub smoke within industrial emission control systems.

Wet scrubbing

Wet scrubbers are effective air pollution control devices for removing particles and/or gases from industrial exhaust streams. A wet scrubber operates by introducing the dirty gas stream (*smoke*) with a scrubbing liquid – typically water.



Potential challenges



Slippery floors / stairs

Mitigated by watermist's lower flow rates.
Supporting measure could include non-slip floor coatings, drainage channels, handrails, etc.



Reduced visibility?

Consideration of installation of low level, emergency lighting to guide occupants and fire crews.

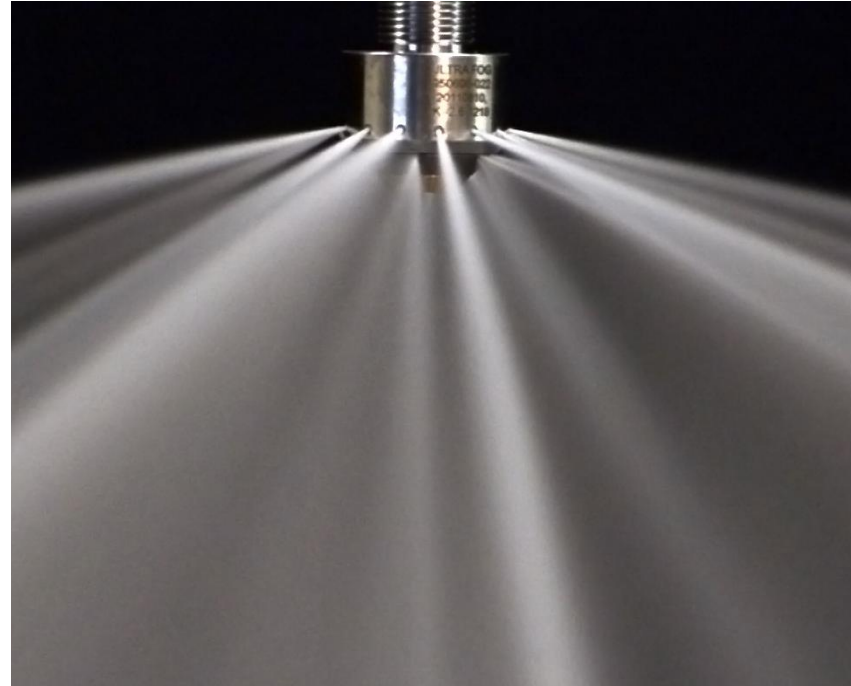


Flux density and continuity of flow

Cooling and scrubbing will be dependent upon the flux density ($L/min/m^3$). How much water would be required to maintain an escapable environment? ..and for how long?

Summary

- Watermist is a proven technology, which provides comprehensive protection, while consuming considerably less water than conventional sprinkler systems.
- Recent events demonstrate that compartmentation cannot always be relied upon, and there remains a reluctance to the retrofitting of sprinkler systems due to their perceived expense, and the complexities of installation within individual dwellings.
- The unique characteristics of watermist present an opportunity to protect lives at significantly lower cost, by primarily focusing on the protection of escape routes within high rise residential buildings.





Thank you.

david.sherrington@ultrafog.com

www.ultrafog.com

Ultra Fog Ltd. Cambridge, UK

