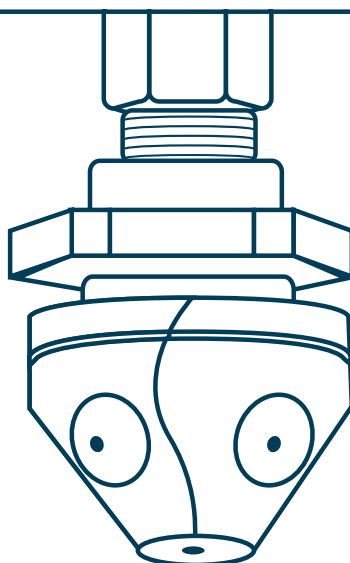


**Guidance
Note**



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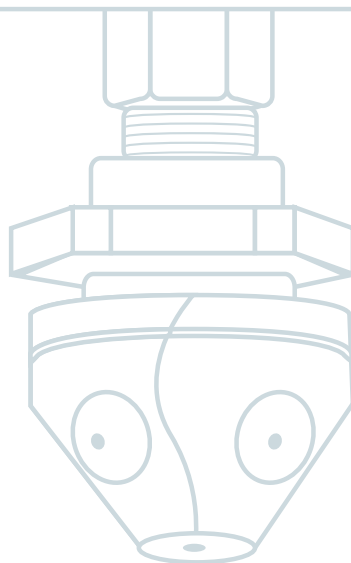
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**FIA Guidance on the protection of high rise buildings
using Water Mist**

FIA Guidance Document – FIA Guidance on the protection of high rise buildings using Water Mist.

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1. INTRODUCTION

This document is intended to assist anyone who:

- Is selecting and / or specifies fixed firefighting systems.
- Is designing, specifying and installing water mist systems in a high rise building, whether the buildings are new or existing.
- Has a regulatory or approval function in respect of a high-rise building.
- Owns or operates a high-rise building.

Water mist can be a very attractive form of fixed firefighting system for use in high rise buildings. For example, the smaller pipe diameters and potentially smaller water supplies can offer significant architectural and practical installation advantages.

As high-rise buildings tend to be higher risk buildings, great care should be taken in designing and specifying safety systems which should provide a high level of reliable and effective service for the long life of buildings.

Particular attention is drawn to the need to:

- Ensure stakeholder* consultation and acceptance of the proposed system. Particularly in regard to the risks, benefits and the specification and design challenges posed by water mist systems, which should be discussed openly with them.
- Use a competent person to derive a suitable system specification.
- Preferably, use third-party certified and approved system designs and/or failing that, manufacturer approved system designers.
- Preferably, use third-party certified and approved system installers and/or failing that, manufacturer approved system installers.
- Ensure fire test evidence selected is suitable for all of the fire hazards within the building.
- Use tested and certified critical system components.
- Be aware of the need for spares in the long-term for a system and seek assurance that they will be available for the lifetime of the system.
- Consider the use of additional independent checking services at specification, design, installation and commissioning stages (particularly where third-party certified and approved system designers and designs are not used).
- Take due-diligence steps (e.g. checks on financial standing and provision of similar works).
- Understand that water mist systems or system components may be closed protocol (i.e. lacking interoperability). In such cases, this may mean that future supply of parts, maintenance, modifications or extensions are likely to be tied to only one or a limited number of suppliers.

* *Project stakeholders typically include: any relevant authority having jurisdiction (AHJs) or others who might have a direct interest in the installation, including: water undertaker or licensed water supplier fire authority, licensing authority, building control body, conservation regulators, insurer(s) of the building and its contents, water mist system designer; and the client, and their representatives, e.g. consultant(s), architect, fire engineer, surveyor, building owner, building management, and/or the responsible person for the building*

There is no single agreed definition of what constitutes a high rise building in the UK. This document creates functional definitions tied to current guidance in the “Scope” section of this document.

It is assumed that all high rise buildings will have a Fire Risk Assessment and Fire Strategy to support the safe design and operation of the building. These documents should include details of how proposed water mist systems are utilised as part of the strategy.

2. SCOPE

This document makes additional recommendations for automatic water mist systems for:

- Residential buildings in which the highest story is 18m or more above the ground.
- Non-residential buildings in which the highest story is 30m or more above the ground.

This document does not cover maintenance of water mist systems. However, the criticality of maintenance must be acknowledged, and suitability addressed.

This document considers a residential building to be “high-rise” if it has a storey height of 18m or more because 18m is currently generally recognised (e.g. proposed Fire Safety Act) as the height at which the risk profile of a residential building warrants enhanced protection measures, including enhancements to suppression system design e.g. see clause 4.1 of this document.

It is recommended that non-residential buildings with a storey height of 30m or more are to be enhanced as per clause 4.2 of this document.

Building height is to be measured from ground level (fire and rescue service access level) to the upper floor surface of top floor. Normally unoccupied plant rooms at roof level can be excluded from this measurement.

NOTE 1: *in the other devolved administrative regions of the UK (Scotland, Wales and Northern Ireland), similarly, the authorities should be engaged in meaningful and detailed consultation.*

NOTE 2: *BS EN 14972-1 is now published. BS EN 14972-17 and other residential fire test protocol parts of the series are not yet published. As noted in the National Foreword to BS EN 14972-1, there are currently safety concerns about the standard BS EN 14972-1 so its use is not recommended at this time. This FIA guidance document may be updated when the concerns are considered resolved.*

3. BASIS OF PROTECTION – RESIDENTIAL BUILDINGS

It is recommended that all parts of the building should be fitted with a fixed firefighting system. The need to document and justify (e.g. by way of a comprehensive Fire Risk Assessment and Fire Strategy) any decision to the contrary.

Where within the scope of BS 8458, the water mist protection of residential occupancies should comply in full with BS 8458:2015. Where residential occupancies (or part thereof)

are not within the scope of BS 8458 (e.g. large compartments, high ceilings, other unusual features) and for non-residential building parts (e.g. garages, car parks, bin stores, plant rooms, electrical rooms, tenant storage areas, offices, laundries, communal amenity areas, retail areas, foyer/reception areas, atria, cafes, commercial kitchens, etc); an alternative suitable form of fixed firefighting system shall be used.

For example:

- A water mist system complying fully with BS 8489-1 and supported by applicable fire test data to reflect the difference or higher challenge of the fire hazard, or if in excess of this,
- Other suitable form of fixed firefighting system.

Table 1 describes the basis for minimum design and duration of water supply for residential water mist systems greater than 18m building height covered by BS 8458:2015 and BS 8489-1:2016. The water mist system shall be capable of providing the minimum discharge water flow and water pressure as specified by the manufacturer’s Design, Installation, Operation and Maintenance DIOM manual.

Table 1: Minimum design and duration of water supply

Category of system	Minimum design area	Number of design nozzles	Minimum duration of water supply	Fire test protocol
Residential buildings greater than 18 m in height up to maximum 45m height	64m ²	The number of design nozzles shall be designated as the number of nozzles having the greatest hydraulic demand in the 64m ² design area	30 minutes (FIA recommend this be increased to 60 minutes for buildings >18m in height; see section 4.1 of this document)	BS 8458:2015
Residential buildings greater than 45m height	72m ²	The number of design nozzles shall be designated as the number of nozzles having the greatest hydraulic demand in the 72m ² design area, with a minimum of 4	60 minutes	BS 8489-7:2016

In residential buildings with a story of greater than 18m in height, there are circumstances where enhanced performance, reliability and resilience arrangements should be provided. Section 4.1 of this document describes recommendations that should be applied for these circumstances. The system design and resilience features should be agreed with the stakeholders*.

4. BASIS OF PROTECTION – NON-RESIDENTIAL BUILDINGS

It is recommended that all parts of the building should be fitted with a fixed firefighting system. The need to document and justify (e.g. by way of a comprehensive Fire Risk Assessment and Fire Strategy) any decision to the contrary will be required.

Where within the scope of BS 8489-1, the water mist protection to the building should comply in full with BS 8489-1. Where building parts are not within the scope of BS 8489 series (e.g. higher than “low hazard” fire loading; high ceilings, garages, car parks, bin stores, retail and storage areas, atria, commercial kitchens, etc); an alternative suitable form of fixed firefighting system shall be used. For example:

- A water mist system complying fully with BS 8489-1 and supported by suitable, applicable additional fire test data specific to the hazard, to reflect the difference or higher challenge of the fire hazard.
- Other suitable form of fixed firefighting system.

In non-residential buildings with a story of greater than 30m in height there could be circumstances where enhanced performance, reliability and resilience arrangements should be provided. Section 4.2 of this document describes recommendations that should be applied for these circumstances. The system design and resilience features should be agreed with the AHJ(s).

5. SYSTEM ENHANCEMENTS (ALL HIGH RISE BUILDING TYPES)

Approved Document B (AD-B) Annex E specifies the following: *“Any sprinkler system installed to satisfy the requirements of Part B of the Building Regulations should be provided with additional measures to improve system reliability and availability and is therefore to be regarded as a life safety system”*.

Both BS 8458 and BS8489-1 includes a range of potential system enhancements to satisfy these additional measures, which are described in clause 4.6 (BS8458) and in clause 6.2.2 (BS8489-1).

Where using water mist systems in a high rise buildings, at least the enhancements of clauses 5.1 and 5.2 of this document are recommended.

5.1. Enhancements to BS 8458 residential protection

Residential high rise water mist systems shall be enhanced as follows. The aim of these enhancements is to ensure that any single points of failure are eliminated, and system performance is enhanced to suit higher-consequence scenarios:

- Extended duration of water supply (≥ 60 minutes for buildings ≥ 18 m in height).
- Duplicate, redundant pump sets. The pumps should be configured to work independently of each other.
- Duplicate power supplies, with automatic changeover functionality i.e. both supplies capable of feeding both pump sets. Sources of further guidance include: BS 8519:2020, LPC Rules TB210 F.10, BS 9251 figure 9.

- Duplicate water tanks (can be a single 50/50 split capacity tank, which allows drain down of one side without affecting the other or the system).
- Incorporate electrical monitoring of all fire and fault conditions (to a suitable permanently staffed location).
- Increased design discharge density and/or design assumed maximum area of operation (AMAO) and/or reduced nozzle spacings.

NOTE (to last bullet point): *Water mist system standards do not provide prescriptive and quantified methodologies to determine to what degree and how systems should be enhanced in this regard. However, additional safety margin should be added to the design; these parameters should be precisely specified and agreed in the Fire Strategy and in co-operation and co-ordination with the derivation of the water mist system specification.*

5.2. Enhancements to BS 8489-1 protection

Buildings protected with water mist to BS 8489 shall be enhanced as follows. The aim of these enhancements is to ensure that any single points of failure are eliminated, and system performance is enhanced to suit higher-consequence scenarios:

- Extended duration of water supply; consult with local fire and rescue service and building control authority.
- Incorporate sub-division into zones (see BS 8489-1:2016 clause B.1.1).
- Be of “Wet pipe” design type (see BS 8489-1:2016 clause B.1.2). Pre-action (see BS 8489-1:2016 clause B.2.1) and deluge might be used in limited areas.
- Incorporate “quick response” nozzles (see BS 8489-1:2016 clause B.1.3).
- Incorporate duplicate control valves (see BS 8489-1:2016 clause B.2).
- Incorporate electrical monitoring of all fire and fault conditions (see BS 8489-1:2016 clause B.3); to a suitable permanently staffed location.
- Incorporate enhanced water supply requirements (see BS 8489-1:2016 clause B.5).
- Duplicate, redundant pump sets. The pumps should be configured to work independently of each other. Sources of further guidance include: BS 8519:2020, LPC Rules TB210 F.10, BS 9251 figure 9.
- Duplicate power supplies, with automatic changeover functionality i.e. both supplies capable of feeding both pump sets.

It may also be appropriate to include the following:

- Increased design discharge density and/or design assumed maximum area of operation (AMAO) (e.g. for buildings $\geq 30\text{m}$ in height, or those with a higher than average perceived risk profile).

NOTE (to last bullet point): *Water mist system standards do not provide prescriptive and quantified methodologies to determine to what degree and how systems should be enhanced in this regard. However, additional safety margin should be added to the design; these parameters should be precisely specified and agreed in the Fire Strategy and in co-operation and co-ordination with the derivation of the water mist system specification.*

6. CRITICAL SYSTEM COMPONENTS

In addition to the system design, installation, maintenance and fire testing requirements of standards such as BS 8458 and BS 8489 series, conformity and quality assessment of critical system components is critical to system whole-life performance and reliability.

All critical system components shall be detailed in the water mist manufacturer's DIOM manual.

All critical water mist system components should be third-party approved, for fire protection service, to applicable component standards.

All system nozzles should be third party approved and certified to: BS 8663-1 or equivalent (for example: LPCB technical approval for Water Mist nozzles, FM 5560 clause 4.2 or UL 2167).

Ideally, all of the following other critical components should be certified (for example by LPCB, FM or UL) for fire protection service in water mist systems:

- Pumps and pump sets
- Zone, control and deluge valves
- Non-return and check valves
- Pipes, fittings and pressure bearing components
- Pipework supports
- Pressure and flow sensing devices
- Pressure gauges
- Level switches
- Tanks
- Strainers
- Pressure relief devices

NOTE *At the time of writing, FM 5560 appears to be the only standard covering the majority of these components.*

7. REFERENCE DOCUMENTS

Approved Document B1:2019 + 2020 amendments – The Building Regulations 2010
– Fire safety – Approved Document B – Volume 1: Dwellings

Approved Document B2:2019 + 2020 amendments – The Building Regulations 2010
– Fire safety – Approved Document B – Volume 2: Buildings other than Dwellings

BS 8458:2015 Fixed fire protection systems – Residential and domestic watermist systems
– Code of practice for design and installation

BS 8489-1:2016 Fixed fire protection systems – Industrial and commercial water mist systems
Part 1: Code of practice for design and installation

BS EN 14972-1:2020) Fixed firefighting systems — Water mist systems – Part 1: Design,
installation, inspection and maintenance

BS 8663-1 Fixed fire protection systems – Components for water mist systems Part 1:
Specification and test methods for water mist nozzles

FM 5560:2021 Examination Standard for Water Mist Systems. FM Global

UL 2167:2021 – UL Standard for Safety Water Mist Nozzles for Fire Protection Service

DISCLAIMER

The information set out in this document is believed to be correct in the light of information currently available but it is not guaranteed and neither the Fire Industry Association nor its officers can accept any responsibility in respect of the contents or any events arising from use of the information contained within this document.



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