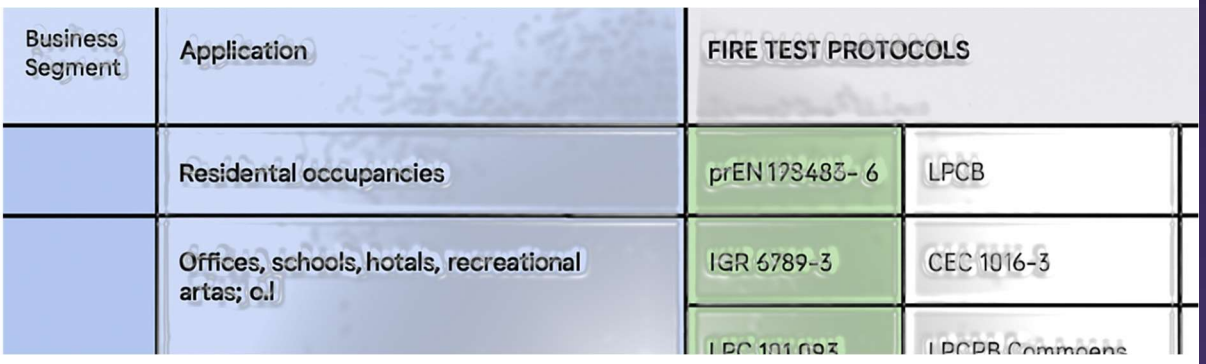
WATER MIST MATRIX – IWMA Guide



Business Segment	Application	FIRE TEST PROTOCOLS	
	Residental occupancies	prEN 179483- 6	LPCB
	Offices, schools, hotals, recreational artas; o.l	IGR 6789-3	CEC 1016-3
		LPC 101 083	LPCPB Commoens

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1 Introduction

Water mist technology is now a mature fire suppression solution, having entered its third decade of use in both marine and land-based applications. Initially developed over 30 years ago as a replacement for Halon systems on board ships, water mist rapidly achieved near-total adoption in the marine fire protection market for passenger ships, protecting hazards from machinery spaces to accommodation and public areas.

By the early 2000s, multiple land-based applications were developed, supported by fire test protocols from internationally recognised organisations such as FM Approvals, UL, VdS, LPCB, and others. While the technology has reached almost universal acceptance in marine applications, its adoption in land-based markets has been more limited.

A key barrier identified by the IWMA is that fire engineers often face challenges in selecting the most appropriate water mist system for a given application and verifying that the design parameters are correct.

To address this, IWMA developed several key reference documents:

- Project Water Mist – An Alternate Solution to Sprinkler Protection in Building Fire Protection (2014), a comprehensive reference of available fire test protocols and their applicable occupancies.
- The Water Mist Matrix, a practical tool designed to guide fire engineers in system selection and to support Authorities Having Jurisdiction (AHJs) in review and approval processes.
- The Water Mist Guide (2025), An introductory guide to water mist fundamentals and design principles.

The Matrix is maintained and updated regularly by the IWMA Scientific Council, with input from members, ensuring it reflects the current state-of-the-art in water mist fire protection.

2 The Matrix documents available on IWMA

The first document, referred to as “the Project”, is available on the IWMA website. It provides a complete list of all known fire test protocols at the time of publication, along with the occupancies to which they apply and the organisations that developed them.

While highly valuable, the Project requires significant knowledge of water mist technology to apply effectively. To make the information more practical, the IWMA Scientific Council, with input from members, developed the Water Mist Matrix — a working tool structured to suit the design and review activities of fire engineers. It is updated regularly to reflect the latest industry developments.

The Matrix is available for both marine and land-based applications. For the land-based version, see: https://iwma.net/the-matrix/land-based-applications

3 The Matrix

3.1 Land based Matrix

The land-based Matrix presents applications, test protocols, and type-approval information in a clear tabular format.

MATRIX Table - Residential and Commercial Application				
		General Design & Installation		
		EN 14972-1:2020	Fixed Firefighting Systems - Water Mist Systems Design and Installation	
		VdS 3188:2020	Water mist Sprinkler Systems and Water Mist Ext. Systems (HPS) Planning and Installation	
		NFPA 750:2023	Standard on Water Mist Fire Protection Systems	
		FM Data Sheet 4-2:2022	Water Mist Systems	
Business Segment	**Application**	**Fire Test Protocols**	**Type Approvals**	**Fire Hazard description (from final draft of Annex-1 to EN 14972-1)**
Residential	Residential occupancies	**prEN 14972-17** - Test protocol for residential occupancies for automatic nozzle systems		Systems tested according to EN 14972-17 are limited to the maximum ceiling height tested, up to 5,5 m. WM systems tested according to EN 14972-17 are applicable to residential buildings up to 45 m in height. More details are given in EN 14972-1 Annex 1
		BS 8458:2015 - Fixed fire protection systems – Residential and domestic watermist systems – Code of practice for design and installation	LPCB	
		UL 2167:2021 - Water Mist Nozzles for Fire Protection Service, Ch. 4.4: Residential area fire tests	UL	
Commercial buildings	Offices, schools, hotels, recreational areas, etc (EUR OH1, FM HC-1, NFPA LH)	**EN 14972-3**:2021 - Test protocol for office, school class rooms and hotel for automatic nozzle systems		WM systems tested according to EN 14972-3 are applicable to office areas and hotel areas, as detailed in Annex 1 to EN 14972-1 with no area limitation for open plan offices, counter areas, restaurant and kitchen (excluding deep fat friers), etc.. as well as technical areas related to office bldgs and to Hotel rooms and related hazards. With 50 m^2 limitation to store rooms, libraries, archives and comparable risks. More details are given in EN 14972-1 Annex 1
		prEN 14972-4 - Test protocol for non-storage occupancies for automatic nozzle systems	LPCB	WM systems tested according to EN 14972-4 are applicable to apartents, offices, meeting rooms, hotel rooms, concealed spaces, unused attics, museums, reaturants, kitchens, istitutions, schools, gymnasium, libraries with some limitations, and comparable risks. More details are given in EN 14972-1 Annex 1
		prEN 14972-7 - Test protocol for commercial low hazard occupancies for automatic nozzle systems	LPCB	WM systems tested according to EN 14972-7 are applicable to residential buildings which do not fall under the scope of EN 14972-17 and to offices, hospitals, museums, schools and unused attics in low hazard premises containing very low combustible content. A Category restriction table, showing the allowed combustible loading and more details, are given in EN 14972-1 Annex 1
		VdS 3883-1en:2020 - Fire Test Protocol for Water Mist Systems, Part 1: Protection of office spaces and accommodation areas	VdS	
		BS 8489-7:2016 - Fixed fire protection systems – Industrial and commercial watermist systems Part 7: fire performance tests and requirements for water mist systems for the protection of low hazard occupancies	LPCB	
		FM 5560:2021 - Approval Standard for Water Mist Systems, Appendix G: Fire Test protocol for water mist systems for the protection of non-storage occupancies (HC-1) - Formerly Light Hazard Occ.	FM Approvals	Systems tested according to FM 5560 appendix G are suitable for the protection of the occupancies classified as Light Hazard as per NFPA 13 or HC I according to FM standards. Details and limitations about the use of these systems are given in the specific FM Data Sheets
		UL 2167:2021 - Water Mist Nozzles for Fire Protection Service Ch. 43 - Shipboard public spaces fire test and CH 45 - Light Hazard areas: Light Hazard area fire tests	UL	
	Sidewall sprinklers	FM 5560:2021 - Approval Standard for Water Mist Systems, Appendix G: Fire Test protocol for water mist systems for the protection of non-storage occupancies (HC-1) - Formerly Light Hazard Occ.	FM Approvals	
		VdS 3883-2en:2020 - Protection of Office Spaces and Accommodation Areas with Water Mist Sidewall sprinklers	VdS	
	False floors and false ceilings	**prEN 14972-6** - Test protocol for false floors and false ceilings for automatic nozzle systems		WM systems tested according to EN 14972-6 are applicable to concealed spaces between 0,3 and 0,8 m in height. They include both raised floors and false ceilings with the main limitation that no fire load shall be located above the nozzles. More details about limitations are given in EN 14972-1 Annex 1
		VdS 3883-2en:2020 - Fire Test Protocol for Water Mist Systems, Part 2: Protection of False Ceilings and False Floors of OH Group 1	VdS	
	Atrium	**EN 14972-10**:2020 - Test protocol for atrium protection with sidewall nozzles for open nozzle systems		WM systems tested according to EN 14972-5 are deluge systems released by automatic fire detection and are applicable to spaces with low or medium fire load, such as hotel lobbies, reception and recreation areas where the fire load and the obstrucyitions do not extend over 1,5 m in height More details are given in EN 14972-1 Annex 1

	Car garages / Parking garages (NFPA OH2, FM HC-2/HC-3)	**EN 14972-5** - Test protocol for car garages for automatic nozzle systems		WM systems tested according to EN 14972-5 are applicable to parking garages which are enclosed on all sides. It does not applies to automatic garages or stackble garages. More details are given in EN 14972-1 Annex 1
		VdS 3883-4en:2020 - Fire Test Protocol for Water Mist Systems, Part 4: Protection of car garages	VdS	
		UL 2167:2021 - Water Mist Nozzles for Fire Protection Service Ch. 46: Ordinary Hazard Group 1 fire tests	UL	
	Sales, storage & shopping areas (NFPA OH2)	**prEN 14972-2** (no published document available yet) - Test protocol for shopping areas for automatic nozzle systems		WM systems tested according to EN 14972-5 are applicable to sales areas, storage areas adjacent to sales areas, archives, libraries, technical areas and similar fire risks. Several details and limitations are established for the systems under this hazard classification; they are given in detail in EN 14972-1 Annex 1
		VdS 3883-5en:2020 - Fire Test Protocol for Water Mist Systems, Part 5: Protection of selected sales and storage areas and mechanical floors	VdS	
		UL 2167:2021 - Water Mist Nozzles for Fire Protection Service Ch. 47: Ordinary Hazard Group 2 fire tests	UL	
	FM - Non storage Occupancies, Hazard Category 2 (HC-2)	FM 5560:2021 - Approval Standard for Water Mist Systems, Appendix P: Fire Test protocol for water mist systems for the protection of non-storage occupancies, Hazard Category 2 (HC-2)	FM Approvals	
	FM - Non storage Occupancies, Hazard Category 3 (HC-3)	FM 5560:2021 - Approval Standard for Water Mist Systems, Appendix P: Fire Test protocol for water mist systems for the protection of non-storage occupancies, Hazard Category 3 (HC-3)	FM Approvals	
	Data halls	FM 5560:2023 - Approval Standard for Water Mist Systems, Appendix M: fire tests for the protection of electronic data processing equipment rooms/halls - above raised floor	FM Approvals	Systems tested according to FM 5560 appendix M are suitable for the protection of the Data Processing Equipment in the space above raised floors. Details and limitations about the use of these systems are given in the specific FM Data Sheets
		FM 5560:2023 - Approval Standard for Water Mist Systems, Appendix N: fire tests for protection of electronic data processing equipment room/halls - below raised floors	FM Approvals	Systems tested according to FM 5560 appendix N are suitable for the protection of the Data Processing Equipment in the space below raised floors. Details and limitations about the use of these systems are given in the specific FM Data Sheets
	Mechanical escalators	VdS-Rolltreppen/escalator_en_V1 (draft) 20.08.09 - Test Setup and Requirements - Protection of mechanical escalator	VdS	
	Commercial deep fat cooking friers	**FprEN14972-12** - Test protocol for commercial deep fat cooking fryers for open nozzle systems		WM systems tested according to EN 14972-12 are deluge systems with open nozzles and are applicable to the protection of deep fat friers. More details and limitations are given in EN 14972-1 Annex 1
Note	1) if standards for an application do not exist yet, IWMA recommends full-scale fire tests to be conducted to prove system performances.			

3.2 Reading instructions

The **first column** identifies the business segment — Residential and Commercial.

The **second column** lists the *Applications* and is critical for correct interpretation. Selecting the application that best matches the actual hazard requires professional judgement. Linking the actual application to a test protocol implies that the application can be protected by a water mist system. However, real-world applications do not always match test protocol descriptions exactly. For example, “car garages/parking garages” and “industrial oil cookers” are clear, whereas “residential occupancies” or “data halls” may require additional interpretation.

The **third and fourth columns** list the applicable fire test protocol(s), updated regularly. In many cases, more than one protocol is available. Choosing the most suitable one again requires understanding the relationship between the formal test protocol and the actual hazard. The **last column** identifies whether passing the test protocol leads to a formal type approval, and by which organisation. Approval Bodies (FM Approvals, UL, VdS) typically grant type approval, while Standardisation Bodies (CEN, BSI) generally do not — with the exception of BS 8458 residential protocols approved by LPCB.

The **last column** recently added and to be considered “a draft version” gives some indications to the users to verify whether the mentioned protocol is applicable to the case under consideration. It is directly

derived from the Annex 1 to EN 14972-1 where also other indication for the correct application of the standard are given.

Approval Body protocols usually specify exactly which applications the approval covers. For example, FM 5560 lists 16 detailed applications with limitations and extensions. Standardisation Body protocols also include application descriptions, but these are embedded in the text and less accessible.

4 Comments and future work

4.1 Comments

Determining the correlation between a fire test protocol and an actual application can be straightforward for Approval Body protocols but is more challenging for Standardisation Body protocols.

The Matrix confirms whether test protocols exist for a given application and whether they can lead to type approval. It does not, however, identify which manufacturers have approved systems for those protocols. This remains the responsibility of the fire engineer.

4.2 Future work

The maintenance of the MATRIX, to be always updated, is of utmost importance for the tool and for the Association, in order to provide a concrete help to the fire engineers involved in the design, installation, or verification of a water mist system in land-based applications. IWMA aims to review and update the Matrix on a regular basis, with a minimum frequency of once per year, ensuring that it reflects the latest test protocols, approvals, and application knowledge.

The addition of a column to the current ones with a detailed description of the application to which the protocol is applicable, or the implementation of a “second page” in the summary with each line of the protocols completed with the description of the applicable scenarios given in the protocol itself, could be of help in finding the correct protocol to use for a given application.

Finally, the availability of water mist systems on the market cannot be included in the MATRIX itself but can be determined by consulting the appropriate sources of information. Considering that the number of organisations issuing protocols is small, it is relatively straightforward to check with each one of them which manufacturers have been tested per each protocol. To assist fire engineers in this search, a list of approval guides providing details of approved manufacturers is given in the bibliography.

It is more difficult to identify manufacturers that have successfully tested systems according to fire test protocols issued by one of the Standardization Bodies, as in these cases there is no central entity listing the performed tests. The only reliable source of information will be the manufacturers themselves, who should be asked to provide all relevant information and, where possible, the test report. This documentation is essential to confirm that their systems have successfully passed the necessary fire test protocols, because water mist is a specific application solution which must be proven for each individual application and/or occupancy.

5 Bibliography

General Bibliography

- SFPE Handbook of Fire Protection Engineering – Chapter 46 – Water Mist Fire Suppression Systems.

Specific Bibliography

- FM Approvals – https://www.approvalguide.com/search?searchParams=groupid=ODU=
- UL – https://www.ul.com/services/water-mist-system-equipment-component-testing
- VdS – https://vds.de/en/certification/companies-and-specialist-professionals/fire-protection/installercompany-for-fire-extinguishing-systems
- CEN – CEN/TC191/WG10 – Water Mist Fire Fighting Systems – EN 14972 series
- BSI – https://www.bsigroup.com/en-GB/searchresults/?q=Water%20Mist%20Systems&Page=1&tab=Standards
- LPCB – https://www.redbooklive.com/pdfdocs/redbook-vol1part3.pdf?rn=47100
- FM Class Number 5560 – Examination Standard for Water Mist Systems – January 2021 edition