

## AUTOMIST HYDRA PRE-ENGINEERED WATER MIST SYSTEM

### MANUFACTURER'S DECLARATION OF CONFORMITY (MDOC) TO BS 8458: 2015

For manufacturer supplied components and fire testing results

## Introduction

BS 8458 takes the form of a 'Code of Practice'. As per BS-0:2021 9.4.1, it '*contains recommendations and guidance, where the recommendations relevant to a given user have to be met in order to support a claim of compliance.*' It is why its clauses carry the term *should* instead of *shall*. It also states that '*users may also justify substitution of any of the recommendations in a code of practice with practices of equivalent or better outcome*'.

BS 8458:2015 does include Automist Hydra in its scope which states: '*This British Standard gives recommendations for the design, installation, water supplies, commissioning, maintenance and testing of watermist systems with automatic nozzles installed in residential and domestic occupancies up to a maximum ceiling height of 5.5 m. It primarily covers water mist systems used for life safety, but might also provide property protection.*' The only water mist system excluded by the scope is those for commercial and industrial use. Automist Hydra is an **electronically controlled automatic nozzle**, part of the broader category of automatic nozzles, as opposed to open nozzles. For example, the latest publication of NFPA 750 water mist systems includes electronically controlled nozzles as an automatic nozzle.

Automist Hydra is also a pre-engineered system, in which a significant number of design criteria which would be left to the installer, are instead pre-engineered by Plumis. This includes hydraulic calculation and the AMAO. The installer will nevertheless have to declare that their installation is compliant to BS 8458 if they have followed the Automist Hydra DIOM and have not deviated from it, without themselves justifying substitutions for equivalent or better outcomes.

The existing framework in the standards therefore allows Plumis to make a valid declaration of product conformity to the standard BS 8458 by justifying substitutions and providing evidence for equivalent or better outcomes, as follows.

## Automist Hydra System Declaration of Conformity to BS 8458:2015

Components of the system:

Watermist spray head assembly - SH11  
Watermist positive displacement pump assembly - AP08  
Watermist system controller - CT01

We hereby declare that the Automist Hydra water mist system, composed of the components detailed above, conforms to the appropriate recommendations given in BS 8458: 2015, *Fixed fire protection systems – Residential and domestic watermist systems – Code of practice for design and installation* when installed in accordance to the Automist Hydra DIOM 3.0 onwards. The substitutions to the recommendations in the standard are listed below and the better or equivalent outcome justified, with evidence.

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William Makant - Managing Director

Clause	Recommendation	Justification for substitution
5	<i>System actuation should be automatic by glass bulb or fusible link, initiated by heat.</i>	System is actuated automatically by a “double-knock” smoke detector and verified through an infra-red temperature sensor, not by a glass bulb or fusible link. <b>The substitution results in a faster activation and avoids the water supply being overrun by excessive nozzles activating.</b> It is proven for a number of scenarios, the measured activation times of a concealed sprinkler head are 2.0 to 13.7 times greater than those using an electronic nozzle system. A combination of an effective <a href="#">Response Time Index (RTI) of 20 m½s½</a> and an <a href="#">effective conduction factor (C factor) of 0.25 m½s⁻½</a> has been shown to reasonably predict activation times for an electronic nozzle system when simulated in a B-RISK zone model.
6.3 b)	<i>System design: The water mist system should be a wet pipe system (i.e. one that is permanently charged with water).</i>	Automist Hydra uses a dry-pipe unpressurised system on standby. <b>The substitution avoids Escape of Water claims from tampering, legionella, corrosion and clogging.</b> A wet pipe recommendation is logical for a mechanical automatic nozzle which takes longer to activate than an electronic nozzle. The time to fill the maximum piping length of Automist Hydra at 60m is 20 seconds and is used <a href="#">successfully on every fire test in Clause 6.1.</a>
6.3 c)	<i>Thermally activated nozzles should have quick-response thermal elements in accordance with BS EN 12259-1</i>	Automist Hydra uses a combination of detection (to EN-54 or to BS EN 14604:2005) and infra-red temperature sensing to initiate discharge of a single nozzle. <b>The substitution results in a faster activation (as detailed in Clause 5 above) and avoids the water supply being overrun by additional mechanical automatic nozzles involuntarily activating.</b>
6.5	<i>System piping should be</i>	Automist Hydra is a pre-engineered system with a maximum total

	<p><i>hydraulically designed to deliver the required water flow and pressures as determined by the fire tests in Annex C.</i></p>	<p>pipe/hose length of 60m i.e. the hydraulic calculations have been done by the manufacturer and are included in the DIOM. <b>The substitution results in less work by the designer (and less chance of human error) in ensuring the water supply will be sufficient for the installed system because the manufacturer has done that already as part of its pre-engineered design, as documented on the DIOM.</b></p>
6.6	<p><i>the system should be capable of providing pressures and flow rates to permit all the water mist nozzles in the fire test room or largest compartment, whichever is the greater, up to a maximum area of operation (AMAO) of 64 m<sup>2</sup>, to operate simultaneously</i></p>	<p>Automist Hydra is electronically controlled, and it is programmed so that only one nozzle always operates. <b>This substitution results in assurance that the water supply only needs to be dimensioned for a single nozzle flow as there is no chance for other nozzles to involuntary discharge, increasing the demand for flow</b>, which is expected to happen with a mechanical automatic nozzle, hence the existence of the clause. <b>The substitution also gives assurance that no stored water is required</b> for the installation as the system is pre-engineered to draw only 6lpm.</p>
6.10.2.2	<p><i>Where nozzles are fitted within a sloping ceiling, nozzle positions should be determined by the pitch of the ceiling.</i></p>	<p>Automist Hydra has proprietary nozzle locations and coverage at approximately 1.3m height FFL and not on the ceiling, which is detailed in its DIOM. <b>This substitution results in fire suppression performance compliant with Clause 6.1 while using less water than ceiling mounted systems</b>, by discharging mist at the base of the fire without loss through the hot smoke layer adjacent to the ceiling. A better wording for clause 6.10.1 would be the one found in EN 14972-1 (note the term 'shall' as a mandatory requirement): '<i>For each application the manufacturer shall prepare a detailed manual to provide a specification of the system information.</i></p> <p><i>10) nozzle orientation, installation and positioning parameters;</i>  <i>11) requirements concerning obstructions (e.g. min. distance to beams, spray obstructions);</i>  <i>12) type of fire detection system (if used in the fire test);'</i></p>
6.11.1	<p><i>Components should be in accordance with BRE publication LPS 1283 [N1], FM 5560, or other appropriate standard that can be shown to give equivalent performance (e.g. a listed component in the LPCB Red Book Live [15]).</i></p>	<p>Automist Hydra has been third party tested on all applicable clauses of BS 8663-1 (available in a separate document), following the same process <b>as its product approval process being carried out in the US. This substitution provides the best publicly available evidence of performance given the lack of a component approval process in the UK which is willing to test Automist Hydra.</b></p>
6.11.6.2	<p><i>All pumps should be designed to include an automatic test cycle where the pump is churned over at least monthly.</i></p>	<p>The Automist Hydra positive displacement pump is monitored but not churned monthly. <b>This substitution is due to 1. The dry pipe nature of the system and 2. Pump seizure is a failure mode of centrifugal (low pressure) pumps, not high-pressure positive displacement.</b> A better solution still is the full system discharge carried out as part of the commissioning and annual service procedures as it tests the correct operation of the whole system, not possible with traditional mechanical systems.</p>

## Supporting documents:

Type	Link	For official use - Notes
Manufacturer's spray head data sheet	<a href="#">SH11</a>	
Manufacturer's pump data sheet	<a href="#">AP08</a>	
Manufacturer's controller data sheet	<a href="#">CT01</a>	
Manufacturer's spray head drawings	<a href="#">SH11</a>	
Manufacturer's pump drawings	<a href="#">AP08</a>	
Manufacturer's controller drawings	<a href="#">CT01</a>	
Manufacturer's system design manual and installation manual	<a href="#">DIOM 3.1</a>	
Manufacturer's fire performance test report	<a href="#">Warringtonfire fire test report</a>	

## MDOC Table 1 – Declaration of system details and design parameters

	System specification and limits	Data	For official use Notes
Flow	Supply type (pump or cylinder)	Positive displacement pump	
	Minimum operating pressure (bar) and flowrate(l/min)	80 bar and 5.6 lpm	
	Maximum operating pressure (bar) and flowrate (l/min)	110 bar and 6 lpm	
	Standby pressure, minimum (bar)	0 bar (dry, open pipe)	
	Standby pressure, maximum (bar)	0 bar (dry, open pipe)	
	Maximum nozzle spacing (m)	Custom to Hydra: 6 m radius, chamfered laterally at 4m as	

Dimensioning of water supply	per DIOM	
	Minimum nozzle spacing (m)	0 m
	Maximum depth below ceiling (mm)  Note: Nozzle depth > 300 mm is outside the intended scope of BS 8458: 2015	Depth from FFL of 1100mm to 1450mm
	Maximum room area (m <sup>2</sup> )  Note: either fire test room area or 80 m <sup>2</sup>	80 m <sup>2</sup> as per fire test but unlimited for this targeted system
	Maximum ceiling height (m), for standard rooms	3.5 m as per fire test
	Maximum ceiling height (m), for taller spaces	Only as part of fire engineered solution
	Minimum design area (m <sup>2</sup> )	46m <sup>2</sup> which is the maximum area of 1 nozzle
	Minimum number of nozzles	1 nozzle, always, as it is electronically controlled
	Minimum design duration (min)	30 minutes
	Wet system only (dry and pre-action not allowed)	Dry system which performs to the fire performance requirements despite the 20 seconds delay to fill pipes. "Not Allowed" is a misleading statement when performance can nevertheless be met.
	Flat ceilings and limited slopes	Not limited as nozzles are not in the ceiling. Placement of detectors following BS 5839 should be followed
	Obstructions	As per details on DIOM and avoided by using "Preferred Positions"
	Other	

## MDOC Table 2 – Declaration of conformance to BS 8458: 2015 fire test protocol for the system in MDOC Table 1

Information required	Details to be completed by manufacturer	For official use
BS 8458 fire test report (report number, number of pages, date, issue number)	<a href="#">Report 514130, 08/03/2022, Issue 1, 33 pages</a>	
Name and address of test laboratory	Warringtonfire, Holmesfield Road, Warrington, UK	
Nozzle arrangement: designation (model, material, unique identifier), type, orientation, k-factor, temperature rating, spacing, operating pressure	SH11 nozzles, AP08 pump and CT01 controller arranged as per <a href="#">this document</a>	
Details of any additives used in the test programme	None	
Details of the water supply method used in the test programme (pump/cylinder specification as well as pressure/flow and duration)	Mains inlet water at 3 bar, supplying 6 lpm	
Fire test series arrangements completed (see Table 1 in guide) from the following: <ul style="list-style-type: none"><li>● Baseline series (4 tests), give room area and ceiling height</li><li>● Series for larger rooms (2 tests plus baseline 4 tests), give room area and ceiling height</li><li>● Series for taller rooms (4 tests plus baseline 4 tests), give room area and ceiling height</li><li>● Series for taller and larger room (6 tests plus baseline 4 tests), give room area and ceiling height</li></ul>	Room area for all tests: 32m <sup>2</sup> (8m x 4m)	
Any other supporting data	<a href="#">BSI Verification Certificate</a>	
Questions	Answer (yes/no)  If no, detail non-compliances and provide supporting data	
Is the test report by an independent third-party, UKAS accredited test laboratory or equivalent?	It is a laboratory that complies with BS EN ISO/IEC 17025:2017, as required by BS 8458:2015	

Is the nozzle in MDOC Table 1 identical to that used for <u>all</u> fire tests?	Yes	
Is the nozzle arrangement (e.g. spacing, pressure, flow, height, depth) in MDOC Table 1 identical to that used for <u>all</u> fire tests?	Yes	
Is the maximum room area of 32 m <sup>2</sup> or 50 m <sup>2</sup> in MDOC Table 1 confirmed by successful completion of all tests (baseline series) and against all clauses (as given in BS 8458 clause 6.1)?  Note: If no, the nozzle model cannot be applied to room areas greater than the fire test room area (i.e. 32 m <sup>2</sup> or 50 m <sup>2</sup> as tested).	Yes, open room tests successfully completed, allowing for maximum room area of 80m <sup>2</sup> as per BS 8458	
Is the maximum ceiling height of 3.5 m in MDOC Table 1 confirmed by successful completion of all tests (baseline series) and against all clauses (as given in BS 8458 clause 6.1)?  Note: If no, the nozzle model cannot be applied to room heights from zero to 3.5 m or above.	Yes	
Is the larger room area (maximum area of 80 m <sup>2</sup> for maximum ceiling heights of 3.5 m) in MDOC Table 1 confirmed by successful completion of the all tests (series for larger rooms) and against all clauses (as given in BS 8458 clause 6.1)?  Note: If no, the nozzle model cannot be applied to room areas of 80 m <sup>2</sup> .	Yes	
Is the taller room (maximum ceiling height of 5.5 m and standard test room area) in MDOC Table 1 confirmed by successful completion of the all tests (series for taller rooms) and against all clauses (as given in BS 8458 clause 6.1)?  Note: If no, the nozzle model cannot be applied to room heights from 3.5 m to 5.5 m for maximum room areas = area of fire test room.	No	
Is the taller and larger room (maximum ceiling height of 5.5 m and maximum area of 80 m <sup>2</sup> ) in MDOC Table 1 confirmed by successful completion of all tests (series for taller and larger rooms) and against all clauses (as given in BS 8458 clause 6.1)?  Note: If no, the nozzle model cannot be applied to room heights from 3.5 m to 5.5 m and room areas of 80 m <sup>2</sup> .	No	
Does the water mist system and test report show full compliance with all clauses BS 8458 (e.g. clause 6.1 and Annex C)?	Yes	

## Glossary of terms

**AMAO (Assumed Maximum Area of Operation):** maximum area over which it is assumed, for the design purposes, that automatic water mist nozzles will operate in a fire. Note: The total area of operation can consist of more than one section (as per BS EN 14972-1:2020).

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**Automatic water mist nozzles:** Nozzles that operate independently of other nozzles by means of a detection/activation device built into the nozzle (as per NFPA 750 2023).

**DIOM (Design, installation, operation and maintenance manual):** document describing the design process and giving details on the installation, operation and maintenance of the water mist system. Note: It is issued by the water mist manufacturer for specific application, based on the results of successful fire tests. The contents of the DIOM manual will form part of the assessment of the overall system compliance (as per BS EN 14972-1:2020).

**Electronically operated automatic water mist nozzles:** nozzles that are normally closed and operated by electrical energy that is initiated and supplied by fire detection and control equipment (as per NFPA 750 2023).

**Engineered water mist system:** Those systems that need individual calculation and design to determine the flow rates, nozzle pressures, pipe size, area, or volume protected by each nozzle, discharge density of water mist, the number and types of nozzles, and the nozzle placement in a specific system (as per NFPA 750 2023).

**Hydraulic calculation:** The pipe work of each water mist system shall be hydraulically calculated to demonstrate the capability of the water supply to meet the water mist system discharge characteristics. Pre-engineered systems shall be in accordance with the DIOM manual (as per BS EN 14972-1:2020 Clause 4.12).

**Pre-engineered water mist system:** Those systems that have predetermined pipe and tube sizes, maximum and minimum pipe lengths, number of fittings and numbers and types of nozzles, nozzle pressures, atomizing media, and water storage quantities and that do not require additional hydraulic calculations (as per NFPA 750 2023).