

British Standard 8458 - Residential and Domestic Water Mist Standard

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UK Water Mist Seminar 2016, IWMA

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- According to UK statistics[10], most fires in buildings attended by local authority fire and rescue services each year occur in dwellings.
- Most fire deaths and injuries occur as a result of people being overcome by smoke or toxic gases.
- Accidental fires that result in deaths in dwellings most frequently start in rooms defined as ‘the lounge, living room or dining room’ followed by rooms defined as ‘the bedroom or bed sitting room’.
- Most injuries are caused by accidental fires that start in the kitchen of a dwelling.

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Digest

Watermist systems for fire protection in domestic and residential buildings

An introduction

Corinne Williams

Watermist fire protection systems are being considered for and installed as fire protection measures in domestic and residential buildings in the UK. They are seen as a novel technology in the market but are sensitive to small design changes (see Section 1.1). Therefore, for successful implementation, watermist suppliers and approving bodies require an in-depth knowledge of the systems and its intended application. They are being offered as a ‘greener’ alternative to sprinkler systems because of their potential to reduce water consumption.

This Digest introduces the subject of watermist systems in domestic and residential building types to designers, specifiers, authorities having jurisdiction (building control practitioners, fire safety officers and insurers), and clients, developers, fire safety managers and non-specialists. It briefly covers:

- background
- reasons for choosing watermist systems
- current UK standards
- how watermist systems work
- issues to be considered including specification, design, installation and ongoing maintenance
- use of independent third-party approved suppliers and products

on board ships, and have been used to protect assets from fire (e.g. electronic equipment, machinery spaces and deep fat fryers). The systems are now being considered for and installed in a range of building applications, including domestic and residential buildings, as an alternative to automatic sprinkler systems.

Watermist systems are a new technology compared with sprinkler systems, which have their own design rules and a long history of performing successfully against real fires. It is generally accepted that such a design approach is not possible with watermist systems, which are typically bespoke and sensitive to small design changes and factors that impact on them.

1 Introduction

1.1 Historical context

A form of watermist was originally used in the 1930s, in industrial applications for the protection of assets from fire. However, it is only relatively recently that watermist systems came to prominence in the protection of spaces on board ships and for industrial and commercial applications. In the past two decades, a significant amount of research and development has been carried out on watermist technology. This has resulted in systems that have been optimised and proven for a range of applications. They have proved to be suitable and effective in fire protection of spaces

1.2 Reasons for choosing watermist systems for domestic and residential buildings

Watermist systems can be installed as part of the overall package of fire safety measures in a domestic or residential building for the purpose of life safety and/or property protection. Detailed advice on general fire safety in domestic and residential premises can be found in references [1]-[7].

IBS



UK domestic and residential studies

- 1989 Front Room Fire (VHS)
- 2000s UK experimental research
 - House fires and calorimetry fires
 - Compartment fires
 - Benchmark sprinkler fires
 - Care homes
 - Concealed/recessed

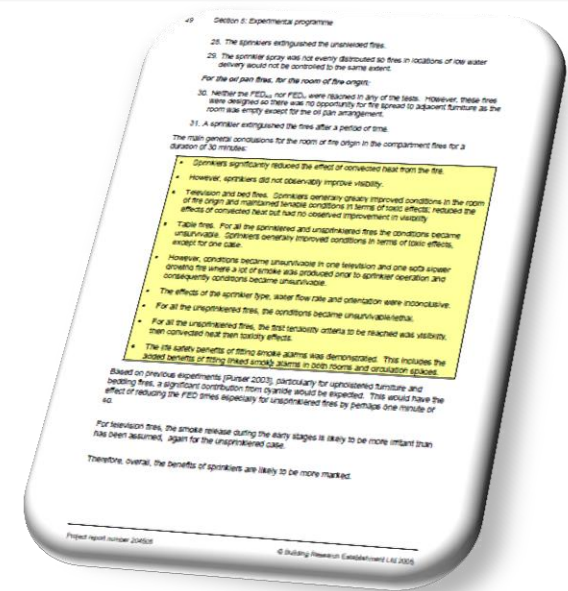
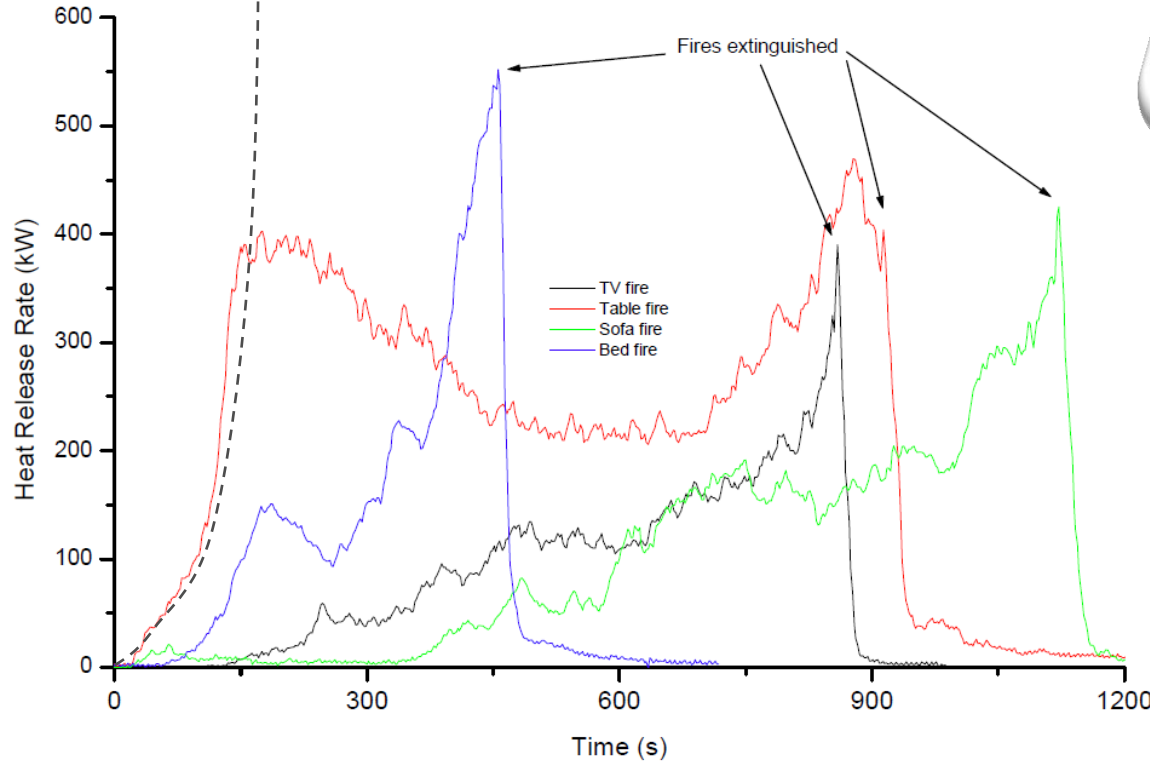
In addition

- 2007+ Watermist test
 - Prisons & office tests
 - DD8458 Domestic and residential tests



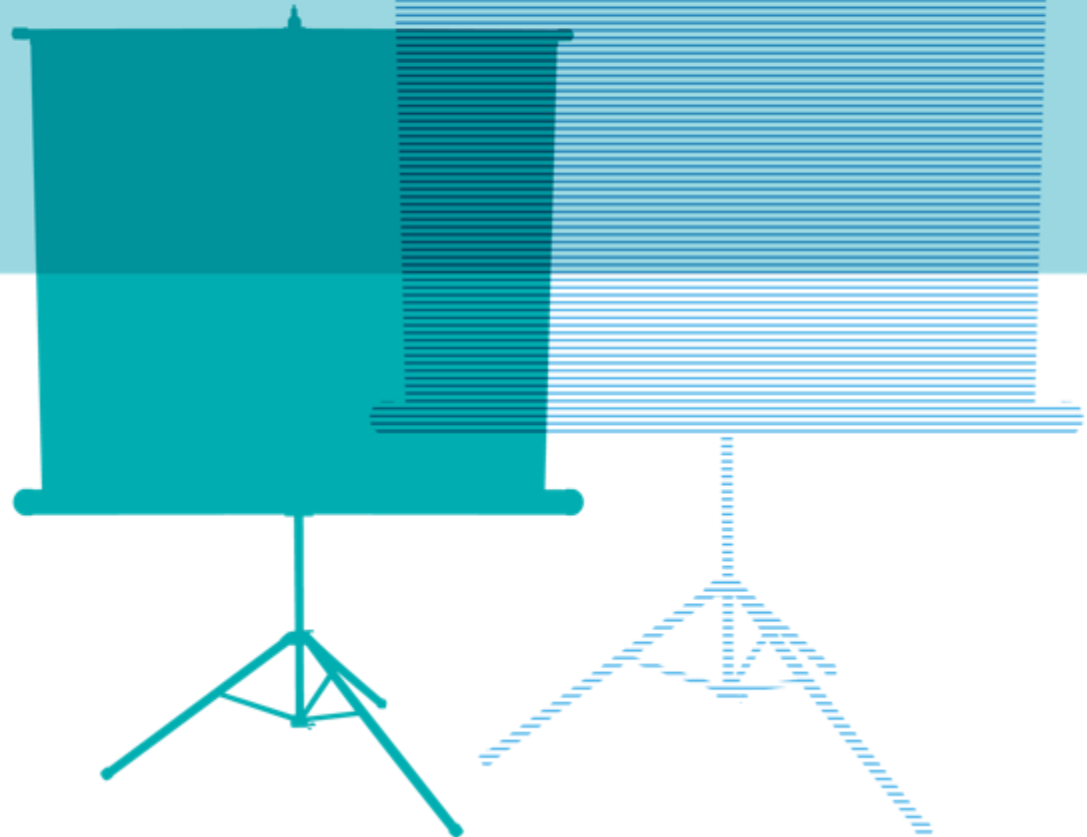
Fire hazard

Simulated furniture, stylized test protocol - estimate

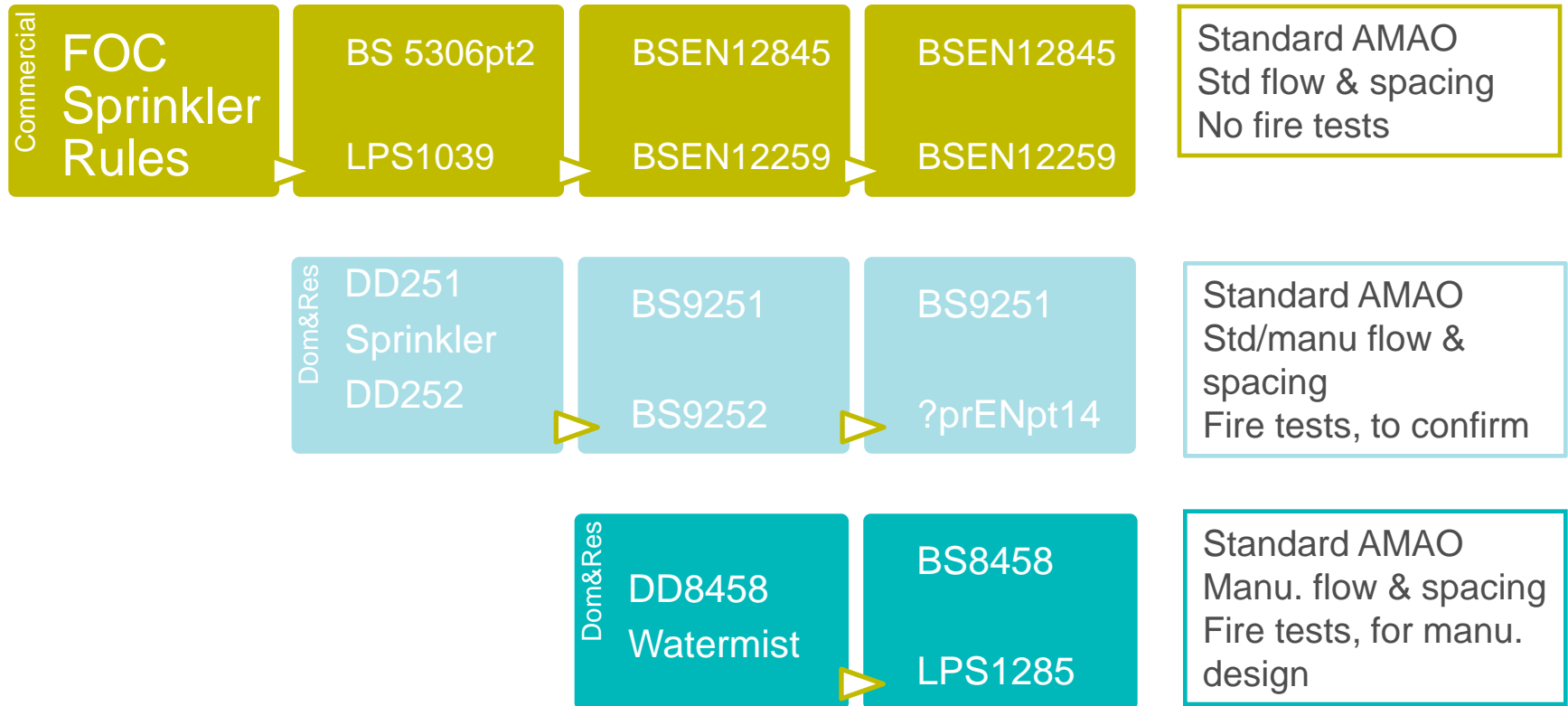


BS 8458:2015

Fixed fire protection systems – Residential and domestic watermist systems – Code of practice for design and installation



Standards



AMAO – assumed maximum area of operation
 Std - standard
 Manu – manufacturer's

BS 8458:2015 overview

- 1 Scope**
- 2 Normative references**
- 3 Terms and definitions**
- 4 Preliminary work and consultation**
- 5 System actuation**
- 6 Design**
- 7 Installation, commissioning and documentation**
- 8 Maintenance**

Application

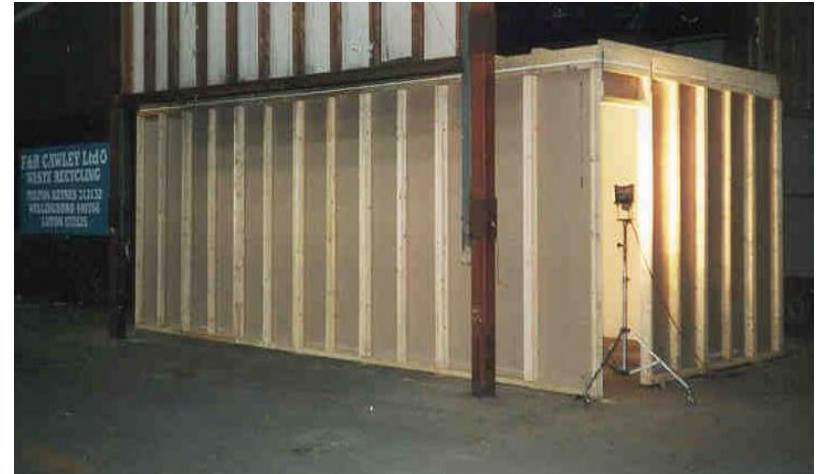
- Domestic occupancies include individual single family dwellings, houses of multiple occupancy (HMOs), bed and breakfast accommodation, boarding houses, blocks of flats 18m or less in height and with a maximum total floor area of 2400m².
- Residential occupancies for multiple occupation include blocks of flats greater than 18m in height, sheltered and extra care housing, residential care premises, residential rehabilitation accommodation, dormitories (e.g. attached to educational establishments) and hostels.
- **Building height limit, 45m**

Preliminary work and consultation

- 4.1 Initial considerations
- ..
- 4.5 Use of watermist systems as a compensatory feature
- 4.6 Special circumstances
- **Annex B** (informative) Watermist performance, reliability and resilience for systems installed in the homes of vulnerable people

Fire tests

- Clause 6.1 used to establish:
 - Operating pressure (i.e. nozzle flow)
 - Nozzle spacing
 - 2 to 4m, 4 to 5 m
 - Room size
 - 32, 50, 80 m²
 - Ceiling height
 - 3.5, 5.5 m
- Annex C (normative)
- Room fire tests for watermist systems with automatic nozzles

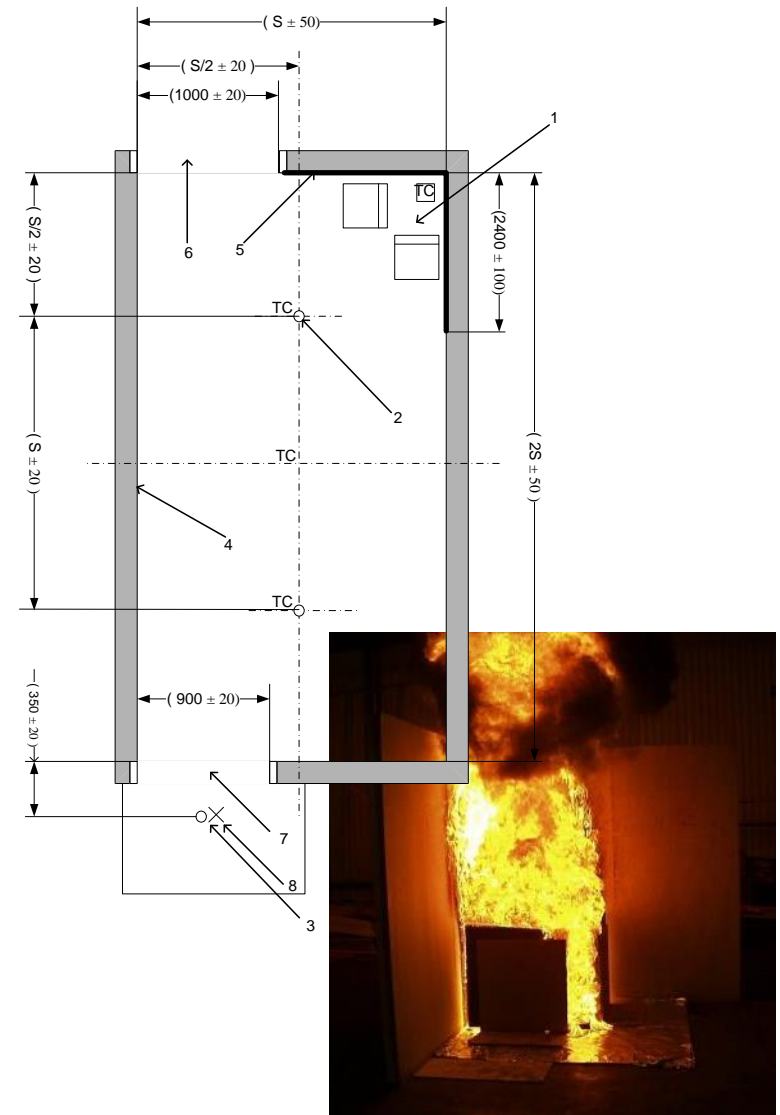


BS 8458 – test procedure

- a) Corner fuel package
- b) Between two nozzles
- c) Beneath one nozzle
- d) Ventilation – greatest challenge fuel
- e) Open room (option)
 - i. greatest challenge fuel
 - ii. next greatest challenge fuel
- f) Increased ceiling height (option)
 - a), b), c), d), e)

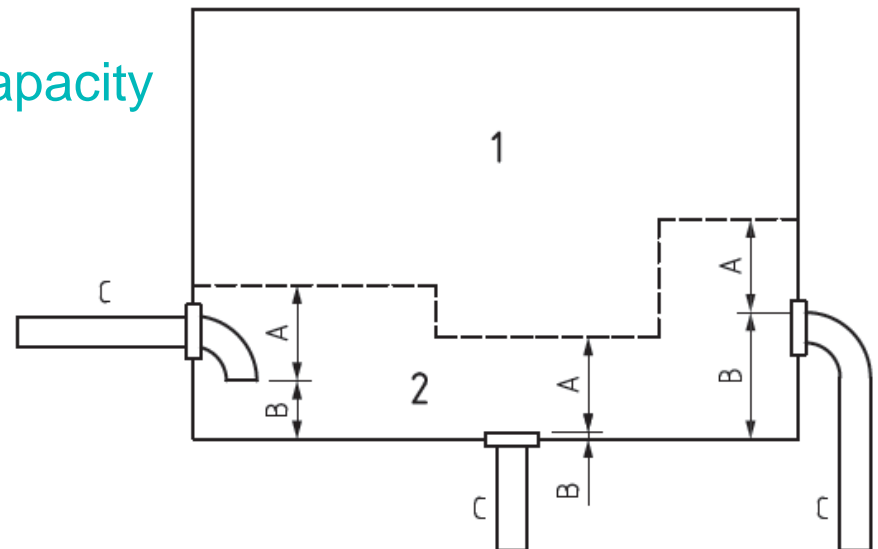
– Additional tests for minimum pressure, additives.....

– a),b),c),d) – unchanged from DD8458



Other design criteria

- Hydraulic calculations + Annex D (normative)
- Domestic occupancies
 - 10 minutes, test room/largest room (up to 64m² AMAO)
- Residential occupancies
 - 30 minutes, 64m² AMAO
- Stored water supply, effective capacity
- Water quality
- Strainers

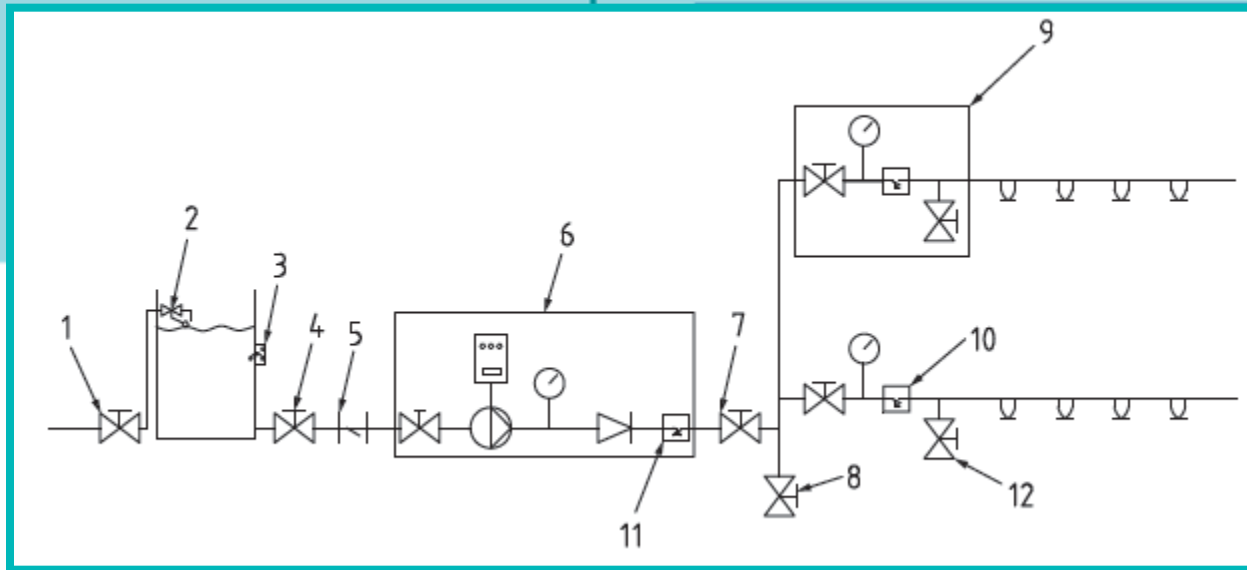


Installation, commissioning, maintenance

- Leak test, functional test, alarm test
- Compliance certificate
- Documentation
 - Log book
- System data label + Annex E
- Inspection of hazard
- Inspection of nozzles...
- Routine tests (pump)
- Log book

Watermist system data	
Installed at	123 Main Street, Town, County, Postcode
Installation date	month/year
Design specification	
Code of practice	BS 8458:2015
Category of system	Domestic/Residential
Hydraulic data	
Nozzles operating	2 No.
Flow/pressure demand	100 L/min @ 5 bar
Installing contractor	
Name	Contract Reference No.
Address	AB1234
Logo	
Third party certification body, if appropriate	Name
Certificate URN	CD5678

Components



Components

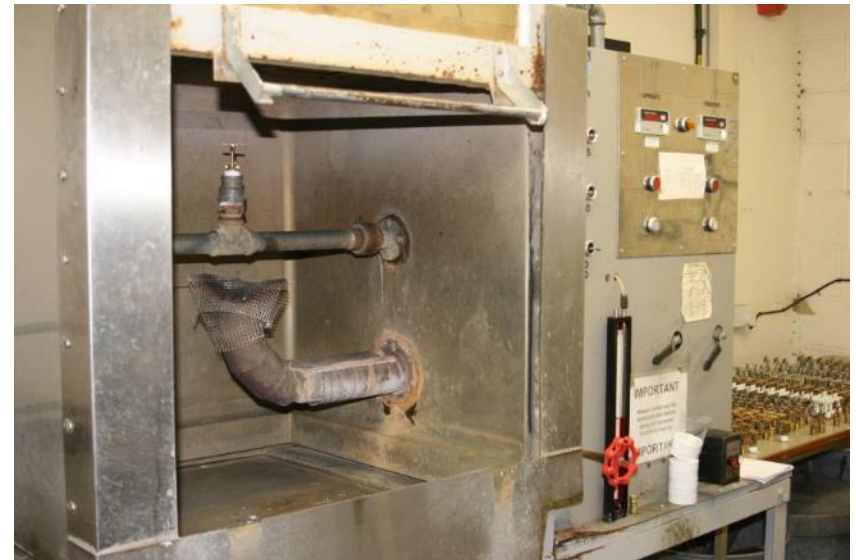
<p>Water nozzles Water control valves Water check valves Water pipe, fittings and couplings</p>	<p>Water pumps Water tank and valves Water flow, level Pressure switches Water manifold</p>	<p>Water strainers and filters Water pipe hangers Manual release Water additive</p>
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Tests

- Examination
- Marking
- Strength test
- Internal pressure test
- Leakage test
- Corrosion tests
- Function tests
- Operation tests
- Long term ageing tests
- Thermal shock test
- Nozzle clogging test
- Pump running test

Watermist component approval

- Nozzle challenge:
 - Wet valve held closed, under pressure, and expected to operate after 10+ years
 - Full flow required through small orifices
- Testing:
 - Aging (@ 121degC)
 - Corrosion (with exposed seals)
 - Leakage...
- Type audit testing (annual)
- Three yearly testing of samples taken from installation



Certification of manufacturer's product

- Assessment of performance requirements against standardised methodologies
- Assessment of quality control, ISO 9001
- On-going assessments of product, system and management through regular Factory Production Control (FPC) and product audits.



Specifier/AHJ/end user

- Compliance with BS 8458
- Understand risk to be protected, type of occupancy, any special circumstances
- Check water supply requirements and availability
- Inspect BS 8458 or DD 8458 fire performance reports
 - Check test house credentials
 - Check test report compliance to scope and standard
- Check watermist system details
 - NOTE: small differences in parameters (system or test) can make a big difference to the outcome
- Check component and system approvals, LPS 1285
- Check compliance certificate, documentation

Thank you

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Redbook listing for:

Watermist components, e.g. nozzle

Watermist systems – LPS 1285

Third party approvals - increase confidence in product and system performance

