

Delivering High Quality Water Mist Solutions

16th IWMC in Vienna (Austria)

21st/22nd September 2016



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Background to this presentation.

- The science/technology is proven.
 - Compliance to the standards relating to the design & installation of a water mist system.
 - “So called” experts in water mist ~ Disassociate from the “un-professional”.
 - “Water Mist is the future”
-
- ✓ **Water Mist, is not a new/risky technology/prototypes or scientific models.**
 - ✓ **Water Mist, is a full scale, established solution that is produced globally.**
 - ✓ **Water Mist, is a high quality proven solution.**

Content.

- ❖ As well as compliance with international standards;
 - ❖ Plus good working practices and manufacturing techniques delivering Quality Water Mist Solutions.
- ❖ By sharing examples of the “solutions”, we demonstrate evidence of the high quality of the product throughout the entire manufacturing process.

- Product Design and Development.
- Product Manufacturing and Testing.
- System Installation and Testing.
- System Maintenance.

To give an insight into the Quality of Water Mist systems.



Defined Quality

- NFPA 750
- FM5560
- CEN/TS 14972
- BS8458-1 & BS8498
- INSTA 900
- IMO

200-4 WATER MIST/FOG FIRE EXTINGUISHING SYSTEMS		CONTENTS	
Chapter 1 Administration 750-5			
1.1	Scope	750-5	5
1.2	Purpose	750-5	5
1.3	Application	750-5	5
1.4	References	750-5	5
1.5	Equivalency	750-5	5
1.6	Units	750-5	5
Chapter 2 Referenced Publications 750-6			
2.1	General	750-6	6
2.2	NFPA Publications	750-6	6
2.3	Other Publications	750-6	6
2.4	References for Executive Summary	750-6	6
Chapter 3 Definitions 750-8			
3.1	General	750-8	8
3.2	NFPA Official Definitions	750-8	8
3.3	General Definitions	750-8	8
Chapter 4 General 750-9			
4.1	General	750-9	9
4.2	Safety	750-9	9
Chapter 5 Classification of Occupancies 750-10			
5.1	Classification of Occupancies for Water Mist Systems	750-10	10
5.2	Classification of Specific Applications for Water Mist Systems	750-10	10
Chapter 6 Acceptance 750-11			
6.1	General	750-11	11
6.2	General	750-11	11
6.3	Piping	750-11	11
6.4	Drilling	750-11	11
6.5	Drainage	750-11	11
6.6	Nozzles	750-11	11
6.7	Water Mist Filters	750-11	11
6.8	Simulators and Filters	750-11	11
6.9	Pump Systems	750-11	11
6.10	Detector, Activation, Alarm, and Control	750-11	11
6.11	Control	750-11	11
Chapter 7 Acceptance 750-12			
7.1	General	750-12	12
7.2	Nozzles	750-12	12
7.3	Nozzles	750-12	12
7.4	Nozzles	750-12	12
7.5	Nozzles	750-12	12
7.6	Nozzles	750-12	12
Chapter 8 Installation Requirements 750-17			
8.1	General	750-17	17
8.2	General	750-17	17
8.3	General	750-17	17
8.4	General	750-17	17
8.5	General	750-17	17
8.6	General	750-17	17
8.7	General	750-17	17
8.8	General	750-17	17
8.9	General	750-17	17
8.10	General	750-17	17
8.11	General	750-17	17
8.12	General	750-17	17
8.13	General	750-17	17
8.14	General	750-17	17
8.15	General	750-17	17
8.16	General	750-17	17
8.17	General	750-17	17
8.18	General	750-17	17
8.19	General	750-17	17
8.20	General	750-17	17
8.21	General	750-17	17
8.22	General	750-17	17
8.23	General	750-17	17
8.24	General	750-17	17
8.25	General	750-17	17
8.26	General	750-17	17
8.27	General	750-17	17
8.28	General	750-17	17
8.29	General	750-17	17
8.30	General	750-17	17
8.31	General	750-17	17
8.32	General	750-17	17
8.33	General	750-17	17
8.34	General	750-17	17
8.35	General	750-17	17
8.36	General	750-17	17
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8.39	General	750-17	17
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8.48	General	750-17	17
8.49	General	750-17	17
8.50	General	750-17	17
8.51	General	750-17	17
8.52	General	750-17	17
8.53	General	750-17	17
8.54	General	750-17	17
8.55	General	750-17	17
8.56	General	750-17	17
8.57	General	750-17	17
8.58	General	750-17	17
8.59	General	750-17	17
8.60	General	750-17	17
8.61	General	750-17	17
8.62	General	750-17	17
8.63	General	750-17	17
8.64	General	750-17	17
8.65	General	750-17	17
8.66	General	750-17	17
8.67	General	750-17	17
8.68	General	750-17	17
8.69	General	750-17	17
8.70	General	750-17	17
8.71	General	750-17	17
8.72	General	750-17	17
8.73	General	750-17	17
8.74	General	750-17	17
8.75	General	750-17	17
8.76	General	750-17	17
8.77	General	750-17	17
8.78	General	750-17	17
8.79	General	750-17	17
8.80	General	750-17	17
8.81	General	750-17	17
8.82	General	750-17	17
8.83	General	750-17	17
8.84	General	750-17	17
8.85	General	750-17	17
8.86	General	750-17	17
8.87	General	750-17	17
8.88	General	750-17	17
8.89	General	750-17	17
8.90	General	750-17	17
8.91	General	750-17	17
8.92	General	750-17	17
8.93	General	750-17	17
8.94	General	750-17	17
8.95	General	750-17	17
8.96	General	750-17	17
8.97	General	750-17	17
8.98	General	750-17	17
8.99	General	750-17	17
8.100	General	750-17	17

SYSTEM COMPONENTS

SYSTEM REQUIREMENTS

INSTALLATION REQUIREMENTS

INSPECTION & MAINTENANCE

TEST PROTOCOLS



1.0 INTRODUCTION	4.2.1 Assem	4.5.1 Clapper - P	4.20.5 Air-Oven	4.33 PIPE HANGERS	B.4 FIRE TES	APPENDIX F: OTHER OCCUPANCIES WHICH FM GLOBAL HAS AN INTEREST IN PROTECTING WITH WATER MIST SYSTEMS	289
1.1 PURPOSE	4.2.2 Sireng	4.5.2 Additional P	4.20.6 Additional	4.34 HYDRAULIC C	B.4.1 Unshle		289
1.2 SCOPE	4.2.3 Leaks			4.34.1 Calculatio	B.4.2 Shleld		289
1.3 BASIS OF	4.2.4 Hydr	4.6 CONNECTION BL	4.21 PNEUMATIC AC				290
1.4 BASIS OF	4.2.5 30-Day	4.6.1 Performance	4.21.1 Pressure Re				292
1.5 BASIS OF	4.2.6 Water	4.7 CONTROL PANEL	4.21.2 Pressure Re				292
1.6 EFFICIT	4.2.7	4.8 CYLINDER BUR					293
1.7 SYSTEM	4.2.8 Air Bl	4.8.1 Pressure O					293
1.8 APPLCA	4.2.9 Hang	4.8.2 Pressure R					293
1.9 DEFINIT	4.2.10 Streng	4.9 CYLINDER, GAS					294
1.10 REFERE	4.2.11 Vacu	4.9.1 Construct					294
2. GENERAL	4.2.12 High	4.9.2 One Year I					295
2.1 PRODUCT	4.2.13 Thern	4.9.3 Extreme Le					296
2.2 APPROV	4.2.14 Disch	4.9.4 Extreme H					296
2.3 REQUIRE	4.2.15 Mdel	4.9.5 Hydrostatic	4.22.7 Hydrostatic	5. OPERATIONS R	Figure	APPENDIX F: FIGURES T-1 THROUGH T-6	294
3. GENERAL	4.2.16 Corro	4.9.6 Permanent V	4.22.8 Vibration	5.1 DEMONSTRATE	Figure	Figure T-1. Hang-Up of Operating Parts	294
3.1 REVIEW	4.2.17 Corro	4.9.7 Additional P	4.22.9 Wear		Figure	Figure T-2. Test Apparatus for Measuring Nominal K-Factors < 8.0 gal/min/psi (115.4 L/min/bar)	296
3.2 PHYSICA	4.2.18 Corro	4.10 CYLINDER					297
3.3 COMPON	4.2.19 Corro	4.10.1 Perform					297
3.4 MARKIN	4.2.20 Vibra	4.11 DETECTION					298
3.5 MANUFA	4.2.21 Rough	4.12 DRAIN/FILL					299
3.6 CALIBRA	4.2.22 High	4.13 FITTINGS &					300
3.7 TEST FA	4.2.23 Freed	4.13.1 Joining					
3.8 TOLERAN	4.2.24 Mini	4.13.2 Additional	4.25.4 Durability	5.5 MANUFACTUR	C-4.1 Unshle		
4. PERFORM	4.2.25 Proce	4.14 FLOW SWITCHES	4.23.5 Additional	5.5.1 Test Requi	C-4.2 Shleld		
4.1 GENERAL	4.2.26 Condi	4.14.1 Actuation P	4.24 PRESSURE SWIT	5.5.2 Test Requi			
4.1.1 Exar	4.2.27 Sensi	4.15					
4.1.2 Vab	4.2.28 Sensi	4.15.4 Verification	4.27.1 Equipment	APPENDIX A: FIRE E	C-4.11 Additi		
4.1.3 Hyd	4.2.29 Sensi	4.15.5 Additional F	4.27.2 Dielectric S	ENCLOSURES V	Figure		
4.1.4 Ope	4.2.30	4.16	4.27.3 Additional	A.1 TEST ENCL	Figure		
4.1.5 Dur	4.2.31	4.17	4.27.4 Additional				
4.1.6 Extr	4.2.32	4.17.1 Dielectric St	4.29.3 Endurance	A.4.5 Unshleld	D.4 FIRE TES		
4.1.7 Salt	4.2.33	4.17.3 Additional P	4.29.4 Flange and	A.4.6 Shlelded E	D.4.1 Unshle		
4.1.8 Vbr	4.2.34	4.18 MANUAL PELL. S	4.29.5 Hydrostatic	A.4.7 Shlelded E	D.4.2 Shleld		
4.1.9 Vab	4.2.35	4.18.1 Manual Rele	4.29.6				
4.1.10 Frie	4.2.36	4.19 MOUNTING CYL					
4.1.11 Scal	4.2.37	4.19.1 High Pressu	4.30 W				
4.1.12 Pipe	4.2.38	4.20 PNEUMATIC ACT	4.30.1				
4.2 WATER	4.2.39	4.20.1 Quick Burst	4.30.2				
4.5 CHECKAN	4.2.40	4.20.2 Threaded Co	4.31 W				
	4.2.41	4.20.3 Water Imme	4.31.1				
	4.2.42	4.32 REACTION VAL	4.32.1 Performan	B.1 TEST ENCL	Figure		
		4.32.1 Performan		B.2 COMBUSTIO	Figure		
				B.3 INSTUMEN	Figure		

SYSTEM COMPONENTS

SYSTEM REQUIREMENTS

INSTALLATION REQUIREMENTS

INSPECTION & MAINTENANCE

TEST PROTOCOLS

Product Design and Verification.



Product Design and Verification.

System Performance Testing:

- Fire Tests: Approved and witnessed.
- Comparisons to other standards/approvals.
- Meaningful fire tests.



Component Performance Testing:

- Sealing / Leakage.
- Durability / cycling.
- Extreme Temperature.
- Corrosion / vibration.





Design for competitive edge.

Innovation:

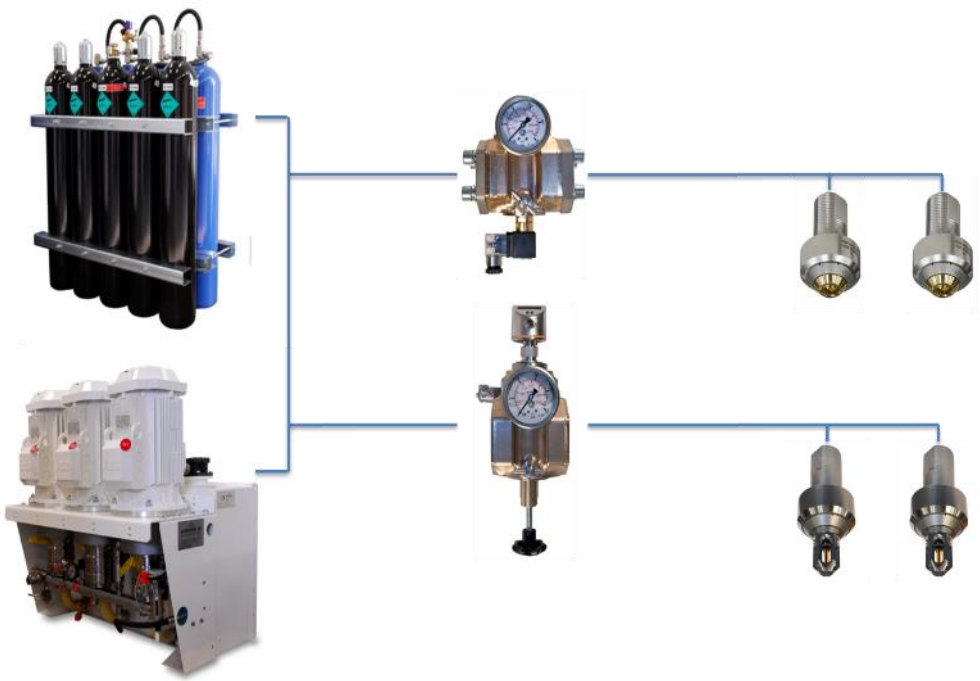
- Performance.
- Maintainability.
- Modular design.
- Engineered Solutions.
- Customer Feedback.



Product Manufacture & Testing.

Product Manufacture and Testing.

Simplified System:





The Ultrafog Sprinkler Nozzle



- A. Stainless steel 304/ or greater
- B. Aluminium bronze
- C. Stainless steel, 316/316L

- Stainless steel components have been treated to increase corrosion resistance.

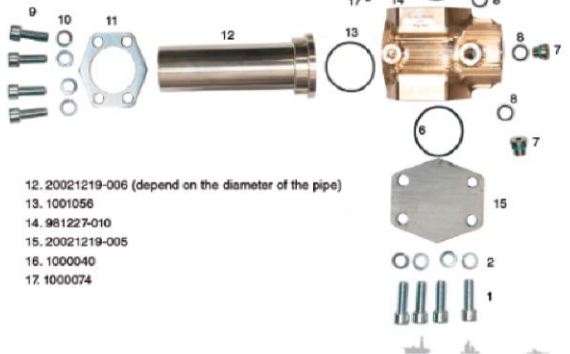
High pressure water mist extinguisher system for fighting fires | Reliable and efficient | Environmentally friendly and safe

ULTRA FOG®
FIRE EXTINGUISHING SYSTEM

SECTION VALVE ELECTRIC (Big) 20020626-301

(External components)

1. 1000528
2. 1000538
3. 20021219-004
4. 20021219-009 (depend on the diameter of the pipe)
5. 970218-006
6. 1001057
7. 1000112
8. 1000007
9. 1000529
10. 1000500
11. 20021219-002



12. 20021219-006 (depend on the diameter of the pipe)
13. 1001056
14. 981227-010
15. 20021219-005
16. 1000040
17. 1000074

High pressure water mist extinguisher system for fighting fires | Reliable and efficient | Environmentally friendly and safe

ULTRA FOG®
FIRE EXTINGUISHING SYSTEM

SECTION VALVE ELECTRIC (Big) 20020626-301

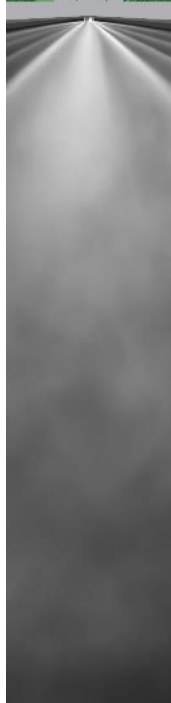
(Internal components)

1. 1000112
2. 1000007
3. 20020626-011
4. 20020626-002
5. 1000068
6. 1001059
7. 1001061
8. 20140217-002
9. 20140217-001
10. 20020626-014
11. 20020626-003
12. 1001060
13. 1001063
14. 1000024
15. 981227-007
16. 1000078
17. 981227-027
18. 1000054
19. 981227-008
20. 1000056
21. 1000055

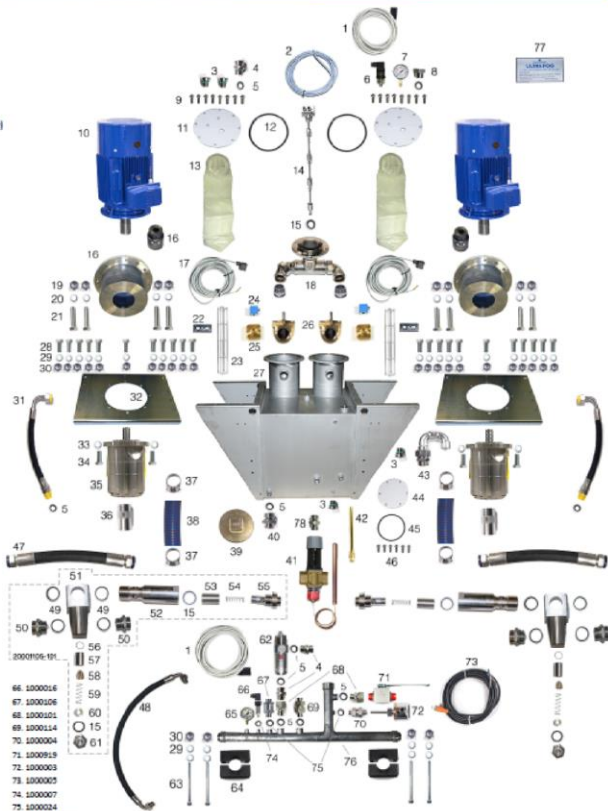


ULTRA FOG®
FIRE EXTINGUISHING SYSTEM

Fire Protection
Land



1. 1000002
2. 1001010
3. 1000112
4. 1000907
5. 1000008
6. 1000015
7. 1000018
8. 1000110
9. 1000110
10. 1003129 (or 1003109)
11. 20001107-023
12. 1000172
13. 1001036
14. 20001128-001
15. 1000009
16. 1000057
17. 1000140
18. 20001218-001
19. 1000533
20. 1000537
21. 1000256
22. 1000303
23. 1001002
24. 1000089
25. 1000088
26. 1000021
27. 20001107-001
28. 1000503
29. 1000502
30. 1000508
31. 20001219-001
32. 20001211-002
33. 1000554
34. 1000513
35. 1000053 *
36. 1000108
37. 1000037
38. 1000035
39. 1000109
40. 1000804
41. 1000033
42. 1000034
43. 20030410-001
44. 20001107-022
45. 1000071
46. 1000539
47. 20001219-003
48. 20001219-009
49. 1000050
50. 1000118 **
51. 20001104-001
52. 20001104-002
53. 20001104-004
54. 1000081
55. 20001104-003
56. 1000061
57. 20012122-002
58. 20012122-001
59. 1001053
60. 20012122-003
61. 1000117
62. 1000021
63. 1003485
64. 1000509
65. 1000102
66. 1000017



* It can be different

** If the Main Pump Unit do not have extensions one of these is 1001139

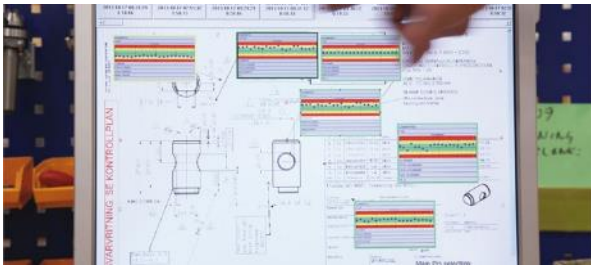


The Component Manufacture





The Component Inspection





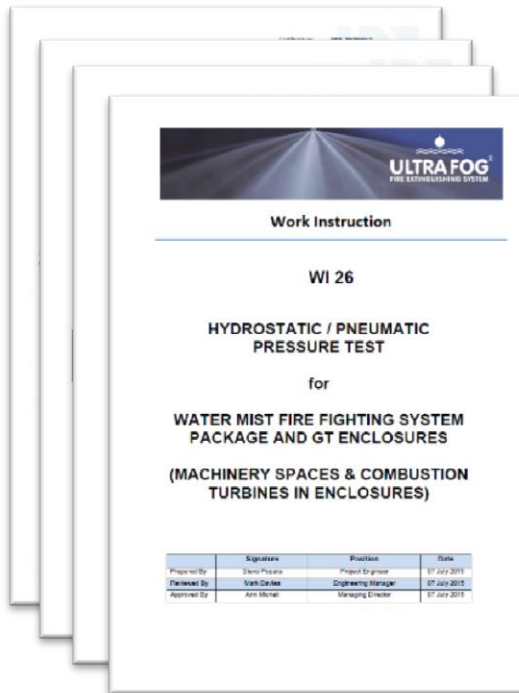
The System Manufacture





The Component/System Manufacture

- External Control: Approved and witnessed.
- Internal Control: Testing & Traceability
 - Pump performance + cylinder test.
 - Leakage, Hydrostatic
 - Material Certs – EN10204
 - System operation



	Signature	Position	Date
Prepared By:	Sham Prasad	Project Engineer	07 Jun 2015
Reviewed By:	Sanku Chatter	Engineering Manager	07 Jun 2015
Approved By:	Amr Mohan	Managing Director	07 Jun 2015

System Installation & Testing.



System installation and Testing.

Engineering Document: Maintenance Manual: Systems supplied by electric pump. Land applications.

0110 000 REV.AA

ULTRA FOG SOLUTIONS FOR PROTECTION OF:

Protection of Non-Storage Occupancies, Hazard Category 1 (HC-1)
 CENT 5 14972/23 Annex A2 Hazard Group 1
 Accommodation, public space and access areas - BRU MSC/115.235/34

0110 000 REV.AA (Data Model) 0110 APPROVED (Drawing No. 0110000 0111)
 0110 000 REV.AA (Data Model) - CENT 5 APPROVED (Drawing No. 0110100 0110)

Technology	0110	0111	0112	0113
Max height (m)	30 - 15m	30 - 15m	30m	30m
MSDR	MSD-3000R-D-F	MSD-3000R-D-G	MSD-3000R-D	MSD-3000R-D-G

FDA USES

- Ceiling and/or wall-mounted systems available.
- Ultra fog certified design with high performance for cooling effect and low consumption of water.
- 30m of discharge length available. See technical data for further details.
- See also Technical Specifications.

Model	Control Pressure (bar)	Max. Discharge (l/min)	Max. Discharge (m³/h)	Max. Discharge (m)	Max. Discharge (m)	Max. Discharge (m)
0110	1.0	150	9	30m	30m	30m
0111	1.0	150	9	30m	30m	30m
0112	1.0	150	9	30m	30m	30m
0113	1.0	150	9	30m	30m	30m

0110 000 REV.AA

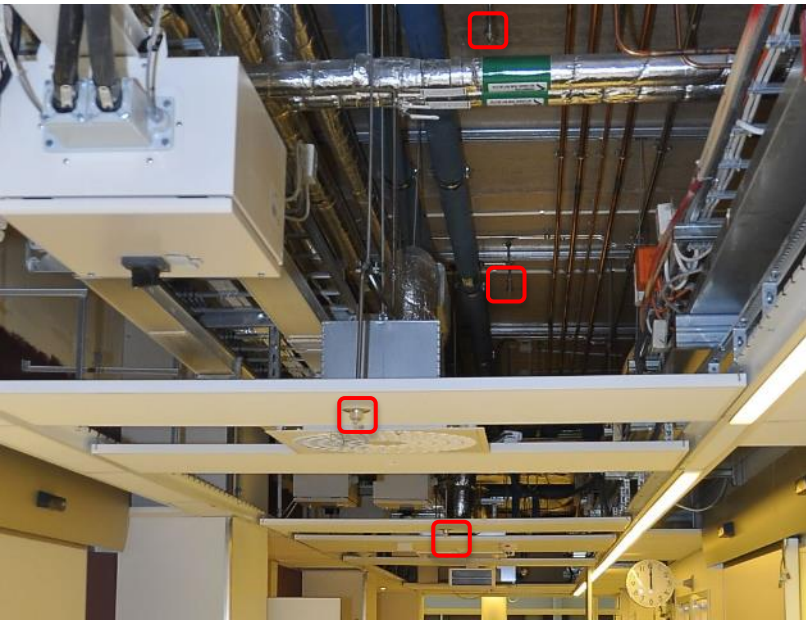


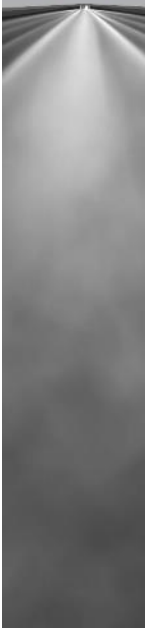
Example Installations





Example Installations.





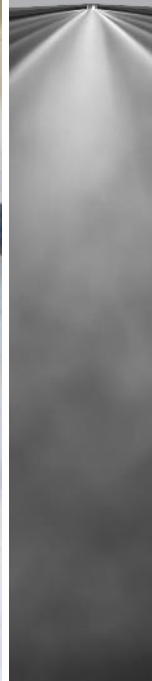
Example Installations





Example Installations





Example Installations





Installation Testing





Installation Acceptance

Commissioning
Ultra Fog

Project: _____

Customer: _____

UF Project: _____

Class society: _____

Capacity (l/min): _____

Design pressure: _____

Power supply (V, Hz): _____

PLC & DP software: _____

No. of HP-Pumps: _____

No. of electrical sections: _____

No. of hydraulic sections: _____

Executive Commissioning engineer: _____

Date: _____

Witnessed by: _____

U
FIRE

Commissioning procedure For Ultra Fog
Customer response before initial start

Pipe system: _____

Flush valves: _____

Bilge foam: _____

Sirens: _____

Pump unit: _____

Section valves: _____

Accumulator unit: _____

System Supply: _____

Automatic functions: _____

Manual functions: _____

Alarms: _____

Notes & Remarks: _____

ULTRA FOG
FIRE EXTINGUISHING SYSTEM

Pipe system:

Nozzles:
All nozzles mounted according to actual sprinkler
All nozzles have right K-value
All accommodation nozzles have right temperature

Flush valves:
Flush valves are located in a reachable spot

Bilge foam:
Check installation
Open bottle by turn the bolt on top counterclockwise

Sirens:
Check sound and light function in actual **0800/0800**

Procedure:
Visual check of system
Flush the pipes by putting the system on standby, outlet and drain out the air.

Pump unit:

HP-pumps:
Drain out the air
Check rotation
Make sure the pumps build up correct pressure

Level sensor in pump station:
Swap Feeder pump
Start Feeder pump
Low level alarm
Empty level

Water inlet filter _____ *Make sure filter is*

Procedure:
Trip circuit breaker for HP pumps but not for FW pump start and fill the unit. When the level is over "empty level" is over "low level alarm" it's possible to reset

ULTRA FOG
FIRE EXTINGUISHING SYSTEM

Redundancy flow sensor, _____
Pressure regulator, _____
Temp regulator, _____
Main filter valve, _____
Spare filter valve, _____
Filter alarm sensor, _____
Pilot pump, _____

Test by open the test valve. Calibrate app. _____
Adjust the pilot pressure to app. 20bar. _____
Check function by adjust temp. _____
Open when level in tank is at "Feeder pump start" level. _____
Open when tank empty or main filter clogged. _____
Give alarm for clogged filter and switch over to spare inlet valve. _____
A pneumatic booster (1-4) pump that keep standby pressure in system _____

Section valves:

Electrical section valves:
Verify valve and sprinkler section. Check by blow air in the system. _____
Check for leakage _____
Test solenoids _____

Hydraulic section valves:
Verify valve and sprinkler section. Connect a hose on FW and open with stand by pressure. _____
Open section valves _____
Calibrate flow sensors _____
Connect security wire _____

Accumulator unit: _____
Nitrogen pressure gauge _____
Nitrogen release valve _____

Supply system:

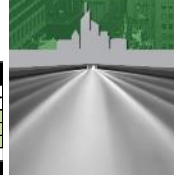
Fresh water supply:
Drain the air out _____
Check rotation _____
Water level in ships tank _____

Sea water supply:
Sea water valve _____
Sea water pump _____

Compressed air supply:
Air regulator _____
Compressed air supply switch _____

Open the plug on outer side and put stand by pressure on system. _____
Energize the solenoid. _____
Give an alarm when N² pressure below 160 bar. _____
Release when main power off. Test by close the N²-valve, turn power supply of and activate system. _____
Release when pumps disabled. Test by close the N²-valve, trip circuit breaker and activate system. _____
By plugs on HP-pumps _____
Check signal in cooperation with the yard. _____
Simulate empty tank and activate system. _____
Simulate empty tank and activate system, check flow. _____
Adjust air inlet pressure to pilot pump app. 1bar. _____
Give alarm when compressed air is to low. _____

System Maintenance.



Maintaining an Engineered Water Mist system.


E

4 ALBERT ENLIGHTENMENT
LONDON SE17SR
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MSC 1432: 1432
31 May 2012

**REVISED GUIDELINE
FIRE PRO**

1 The Maritime Safety C considered a proposal by the recognizing the need to make advancements in fire protection the maintenance and inspection of fire protection systems.

2 Member Governments maintenance, testing and inspection after 31 May 2012 and bring the chapter other and new and old.

3 This circular is prepared


E

4 ALBERT ENLIGHTENMENT
LONDON SE17SR
Telephone: +44 (0)20 7756 7611 Fax: +44 (0)20 7757 5212

MSC 1432: 1516
8 June 2015

AMENDMENTS TO THE REVISED GUIDELINES FOR THE MAINTENANCE AND INSPECTION OF FIRE PROTECTION SYSTEMS AND APPLIANCES (MSC.1432)

- 1 The Maritime Safety Committee, at its ninety-fifth session (3 to 12 June 2015), approved amendments to the Revised guidelines for the maintenance and inspection of fire protection systems and appliances (MSC.1432), as set out in the annex, concerning testing of automatic sprinkler systems, prepared by the Sub-Committee on Ship Systems and Equipment, at its second session.
- 2 Member Governments are invited to use the amendments when applying MSC.1432 and to bring the amendments to the attention of ship designers, suppliers, shipowners, system manufacturers and all parties concerned.

TC/ENC/MS/Circular/1432/2015

<https://www.imo.org/eng/Meetings/Events/MS/Circular/1432/1516/20150608>

4 Weekly Inspection		HPWM (pump)
W1	verify all fixed fire-extinguishing system control panel indicators are functional by operating the lamp/indicator test switch;	Y
W2	verify all control section valves are in the correct position;	Y
W3	verify all control panel indicators and alarms are functional;	Y
W4	visually inspect pump unit and its fittings; and,	Y
W5	check the pump unit valve positions, if valves are not locked, as applicable	Y

5 Monthly Inspection		HPWM (pump)
M1	Verify containers/cylinders fitted with pressure gauges are in the proper range and the installation free from leakage.	Y
M2	Verify all control, pump unit and section valves are in the proper open or closed position;	Y
M3	Verify sprinkler pressure tanks or other means have correct levels of water;	Y
M4	Test automatic starting arrangements on all system pumps so designed	Y
M5	Verify all standby pressure and air/gas pressure gauges are within the proper pressure ranges; and	Y
M6	Test a selected sample of system section valves for flow and proper initiation of alarms. (Note – The valves selected for testing should be chosen to ensure that all valves are tested within a one-year period.)	Y

7 Annual Inspection		HPWM (pump)
A11	Verify proper operation of all water mist, water-spray and sprinkler systems using the test valves for each section;	Y
A12	visually inspect all accessible components for proper condition	Y
A13	Externally examine all high pressure cylinders for evidence of damage or corrosion;	Y
A14	check the hydrostatic test date of all high pressure cylinders	Y
A15	functionally test all fixed system audible and visual alarms;	Y
A16	flow-test all pumps for proper pressure and capacity;	Y
A17	test all antifreeze systems for adequate freeze protection	Y
A18	test all system cross connections to other sources of water supply for proper operation.	Y
A19	verify all pump relief valves, if provided, are properly set;	Y
A20	examine all filters/strainers to verify they are free of debris and contamination;	Y
A21	verify all control/section valves are in the correct position;	Y
A22	blow dry compressed air or nitrogen through the discharge piping of dry pipe systems, or otherwise confirm the pipework and nozzles are clear of any obstructions. This may require the removal of nozzles, if applicable.	Y
A23	test emergency power supply switchover, where applicable	Y
A24	visually inspect all sprinklers focusing in areas where sprinklers are subject to aggressive atmosphere (like saunas, spas, kitchen areas) and subject to physical damage (like luggage handling areas, gyms, play rooms, etc.) so that all sprinklers are inspected within one year;	Y
A25	check for any changes that may affect the system such as obstructions by ventilation ducts, pipes, etc.;	Y
A26	test a minimum of one section in each open head water mist system by flowing water through the nozzles. The sections tested should be chosen so that all sections are tested within a five-year period; and	Y
A27	test automatic sprinklers and automatic water mist nozzles in accordance with the following flow chart:	Y
A28	during basic testing, and extended testing when applicable, of automatic sprinkler heads/nozzles as outlined in subparagraph 17, water quality testing should be conducted in each corresponding piping section. Note – should a tested sprinkler fail, assessing the corresponding water quality at that time would assist in determining the cause of failure.*	Y

9 Five Year Inspection		HPWM (pump)
5Y2	flush all in-cock deck deluge system piping with water, drain and purge with air;	Y
5Y3	perform internal inspection of all control/section valves; water quality testing should be conducted in all corresponding piping sections, if not previously tested as outlined in paragraph 7.5.18 within the last five years;	Y
5Y4	check condition of any batteries, or renew in accordance with manufacturer's recommendations;	Y
5Y5	for each section where the water is refilled after being drained or flushed, water quality should meet manufacturer's guidelines. Testing of the renewed water quality should be conducted and recorded as a new baseline reference to assist future water quality monitoring for each corresponding section	Y



Maintaining an Engineered Water Mist system.

	
SPARE PARTS FOR 1 YEAR SERVICE MASTER PUMP SYSTEM	
Manufacturer	Master Pump System
Part No.	Parts required for a One Year Service
00-00-00-00	Filter 25 micron O2
00-00-00-00	Foam 1% AFFF (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Nozzle Spray Nozzle (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Nozzle Accommodation Single Flow (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Nozzle Accommodation High Flow (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Nozzle Total Flooding (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Nozzle Local Application (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
00-00-00-00	Antifreeze To be Replaced Annually (Look in Project Folder for Quantity. To Construct Quotation Go To Spare Parts List)
Please note	
IMO 74	Yacht maintenance and testing in conjunction with UP technician annual service. The onboard maintenance and inspection in conjunction with the manufacturer's maintenance and inspection guidelines should be followed as stated in the IMO guidelines. The level of water quality should be maintained onboard the vessel in accordance with the manufacturer's guidelines
	Please ensure that the vessel has its Onboard Maintenance and Inspection Log Book available to the technician.
	Confer with vessel there are no problems and no other spare parts to require before servicing
IMO 74	Testing for foam system (note procedure required). Two gauges need to be installed either side of flow restrictor to measure pressure)
	All yachts need to have the foam charged annually under new IMO guidelines
	Water level in all tanks and cylinders must be checked
	Large Vessels: Note: Need to be notified that foam systems require foam samples taken for quality testing.
	A digital flow test and pressure reading needs to be conducted at each section. Fee applies 200 Euro

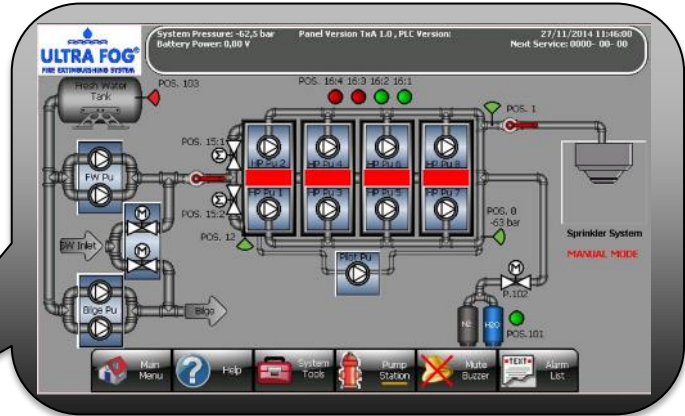
IMO 7.5.1	Verify proper operation of all water mist, water-spray and gas roller systems using the test valves for each section;	
IMO 7.5.2	Visually inspect all accessible components for major condition;	
IMO 7.5.3	Externally examine all high pressure cylinders for evidence of damage or corrosion;	
IMO 7.5.4	Check the hydrostatic test date of all storage containers;	
IMO 7.5.5	Functionally test all fixed system audible and visual alarms;	
IMO 7.5.11	Verify all contraindication valves are in the correct position;	
IMO 7.5.16	Check the connections of all pilot release piping and tubing for tightness;	
IMO 7.5.7	Examine all flexible hoses in accordance with manufacturer's recommendations;	
IMO 7.5.8	Test all test shut-off controls connected to the protection systems for proper operation;	
IMO 7.5.9	The boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that have created undesirable openings that would render the system ineffective	
IMO 7.5.13	Visually inspect all accessible components for proper condition	
IMO 7.5.3	Externally examine all high pressure cylinders for evidence of damage or corrosion;	
IMO 7.5.4	Check the hydrostatic test date of all high pressure cylinders;	
IMO 7.5.5	Functionally test all fixed system audible and visual alarms;	
IMO 7.5.9	Flow test all pumps for proper pressure and capacity. Flow test pumps, pressure test pumps, have flowmeter and digital pressure reading equipment with them	Technicians
IMO 7.5.7	Test all antifreeze systems for adequate freeze protection. Note: Antifreeze onboard yachts is to be replaced every service.	
IMO 7.5.8	Test all system cross connections to other sources of water supply for proper operation.	
IMO 7.5.10	Verify all pump relief valves, if provided, are properly set;	
IMO 7.5.19	Examine all filter strainers to verify they are free of debris and contamination;	
IMO 7.5.11	Verify all contraindication valves are in the correct position;	
IMO 7.5.12	Blow dry compressed air or nitrogen through the discharge piping of dry pipe systems, or otherwise confirm the pipework and nozzles are clear of obstructions, debris and contamination. This may require the removal of nozzles, if applicable;	
IMO 7.5.13	Large vessels: Note: need to be notified that foam systems require foam samples taken for quality testing.	
IMO 7.5.17	Test emergency power supply switchover, where applicable	
IMO 7.5.14	Visually inspect all sprinklers focusing in areas where sprinklers are subject to aggressive atmosphere (like saunas, spas, kitchen areas) and subject to physical damage (like luggage handling areas, gyms, play rooms, etc.) so that all sprinklers are inspected within one year.	
IMO 7.5.15	Check for any changes that may affect the systems such as obstructions by ventilation ducts, pipes, etc.;	
IMO 7.5.16	Test a minimum of one section in each open head water mist system by flowing water through the nozzles. The sections tested should be chosen so that all sections are tested within a five year period;	
IMO 7.5.17	Test a minimum of two automatic gas rollers or automatic water mist nozzles for proper operation.	
IMO 7.5.18	During basic testing, and scheduled testing when applicable, of automatic gas roller heads/nozzles as outlined in section 9.17, water quality testing should be conducted in each corresponding piping section. Note: should a tested sprinkler fail, assessing the corresponding water quality at that time would assist in determining the cause of failure.;	
IMO 7.5.16		
IMO 7.4.3	Foam system: check flow test by checking system pressure. Ensure all piping is thoroughly flushed with fresh water after service	

Maintaining an Engineered Water Mist system.

- Easy change RTI bulb



Control Panel.

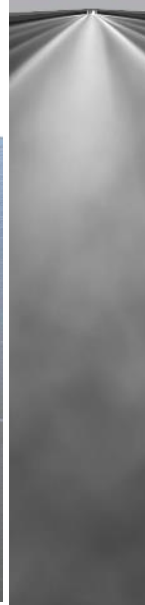




Maintaining an Engineered Water Mist system.

- Ultra Fog Bulb nozzle Test Tool.





Maintaining an Engineered Water Mist system.

Connect test tool.

Raise the piston to enable flow/ bleed.

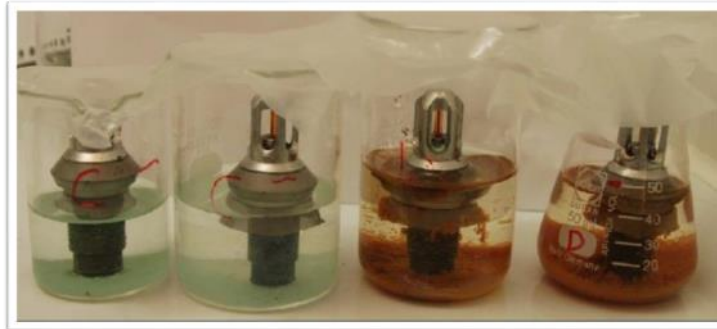


Lower piston and dis-connect.

Quality Improvements...

CIP - Water Quality Analysis.

- >6 month Chloride (Cl^-) test.



Concentration 100 mg/L Concentration 50000 mg/L

Major ion composition of seawater (mg/L)			
	Typical Seawater	Eastern Mediterranean	Arabian Gulf at Kuwait
Chloride (Cl^-)	18 980	21 200	23 000
Sodium (Na^+)	10 556	11 800	15 800
Sulfate (SO_4^{2-})	2 649	2 950	3 200
Magnesium (Mg^{2+})	1.262	1.403	1.765
Calcium (Ca^{2+})	430	423	500

CIP - Water Quality Analysis.

- >6 month Chloride (Cl^-) test.



Concentration 100 mg/L



Concentration 50000 mg/L

Water mist quality – FAQ's.



Requires high purity water to avoid nozzle blockage.

- N/A to Ultrafog, potable water, integrated filter within the nozzle, dual filter in pump station.

Poor installation/maintenance.

- DIOM, and manufacturers instructions must be followed.

Water mist fire suppression systems are incompatible with electronics.

- 3rd Party IP23 Tests with DNV.

Can there be Water Mist protection during construction?

- Ship builders protect 1st decks during construction.



SUMMARY

- 25 to 35 years old (new)
- Designed and tested to International standards.
- Not all systems/supplier are the same.
- Watermist needs to be given “the opportunity”.
 - “Specifications” can be restrictive: pressure/flow/piping.
 - What do you specify now? → How can we better it?
- Innovative.
- **Established product, its not only the future, its now!**



Thank you for your attention.