

## WATER MIST / SPRINKLER HEADS FAILURES

### Background:

There have been recent cases of passenger vessels with very high rates of water mist / sprinkler / hi-fog heads and nozzles failures (some times exceeding 20%), which lead to issues with renewals of Passenger Ship Safety Certificates (PSSC). Most of these were due to contaminated water and corrosion in the system due to various factors (including shared and dual purpose potable water/sprinkler tanks, dead legs in the pipework unable to be flushed etc).

Filter blockage



Internal moving components of the original nozzles subject to corrosion

### References:

- 1) SOLAS Ch.II-2, Reg.10 "Fire Fighting"; IMO MSC Circ. 1432, as amended by MSC.1. Circ.1516 ref. "Maintenance and Inspection of Fire Protection Systems and Appliances"
- 2) BMA Bulletin 150 "Inspection and Testing of Automatic Sprinkler Systems"
- 3) VMS: [Fleet Ops](#) > [9.0 Safety Management](#) > 9.7 Fire, Fire Prevention and Fire Fighting Appliances; SAF03A "FFA Planned Maintenance Chart"

## ACTIONS REQUIRED

### All Vessels:

- 1) Follow IMO/SOLAS requirements, Flag Bulletins, manufacturer guidance for maintenance and testing
- 2) Follow VMS procedures and Planned Maintenance, specifically:
  - a) quarterly –assess water quality in header tank and pumps, per manufacturer guidelines, as a min. for pH, conductivity, chloride – *consider use of shipboard kit and equipment*

Note: If the system manufacturer has not specified acceptable values, use as guidance the following limits as issued by Marioff for Hi-Fog: pH 7.0-9.0, chloride <50 ppm (mg/l), conductivity < 400µS/cm

- b) annually – basic and extended testing of heads/nozzles (or during PSSC renewals) including a min. of one section by flowing water through nozzles and functional test of min. 2 heads/nozzles – see Attachment 1- text **highlighted in yellow** therein for all tests required and the organogram on pages 6 and 7 of the IMO Circular
- 3) Record testing outcomes and analyze water sampling results

### Attachments:

- 1) IMO MSC.1 Circ.1516 - "Maintenance and Inspection of Fire Protection Systems and Appliances" [revision for sprinkler /water mist systems tests]

Completed

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**AMENDMENTS TO THE REVISED GUIDELINES FOR THE MAINTENANCE  
AND INSPECTION OF FIRE PROTECTION SYSTEMS AND APPLIANCES  
(MSC.1/CIRC.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.1/Circ.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.1/Circ.1432 and to bring the amendments to the attention of ship designers, shipyards, shipowners, systems manufactures and all parties concerned.

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## ANNEX

### AMENDMENTS TO THE REVISED GUIDELINES FOR THE MAINTENANCE AND INSPECTION OF FIRE PROTECTION SYSTEMS AND APPLIANCES (MSC.1/CIRC.1432)

- 1 Paragraph 3.4 is amended to read as follows:

"3.4 In addition to the onboard maintenance and inspections stated in these guidelines, manufacturer's maintenance and inspection guidelines should be followed. The quality of water in automatic sprinkler systems is of particular importance and should be maintained in accordance with manufacturer guidelines. Records of water quality should be maintained on board in accordance with the manufacturer's guidelines."

- 2 A new paragraph 6.5 is added after the existing paragraph 6.4, as follows:

**"6.5 Water mist, water spray and sprinkler systems QUARTERLY**

**Assess system water quality in the header tank and pump unit against the manufacturer's water quality guidelines."**

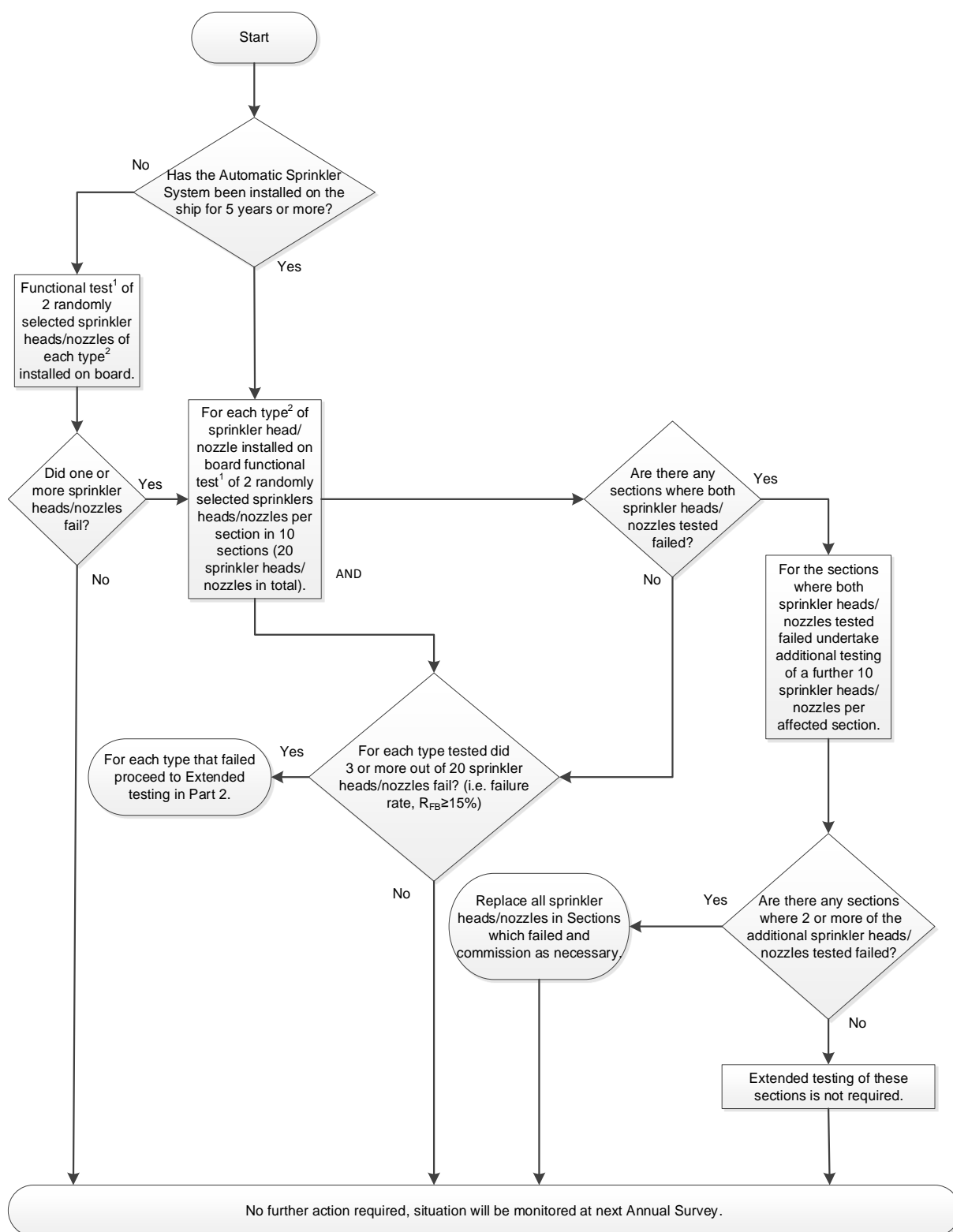
- 3 Paragraph 7.5 is amended to read as follows: **ANNUALLY**

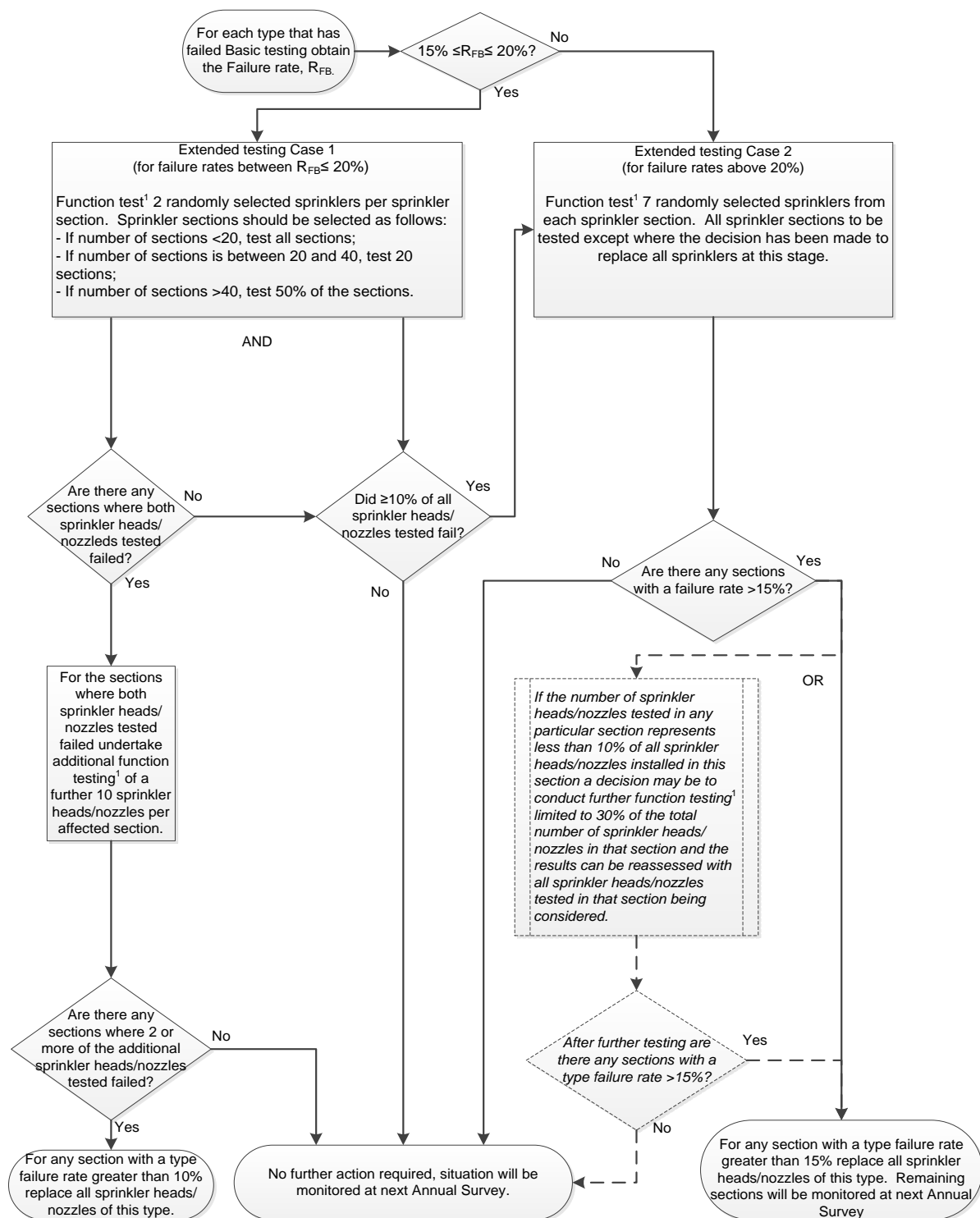
**"7.5 Water mist, water spray and sprinkler systems**

- .1 verify proper operation of all water mist, water-spray and sprinkler systems using the test valves for each section;**
- .2 visually inspect all accessible components for proper condition;**
- .3 externally examine all high pressure cylinders for evidence of damage or corrosion;**
- .4 check the hydrostatic test date of all high pressure cylinders;**
- .5 functionally test all fixed system audible and visual alarms;**
- .6 flow test all pumps for proper pressure and capacity;**
- .7 test all antifreeze systems for adequate freeze protection;**
- .8 test all system cross connections to other sources of water supply for proper operation;**
- .9 verify all pump relief valves, if provided, are properly set;**
- .10 examine all filters/strainers to verify they are free of debris and contamination;**
- .11 verify all control/section valves are in the correct position;**

- .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 any obstructions. This may require the removal of nozzles, if applicable;
- .13 test emergency power supply switchover, where applicable;
- .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. Sprinklers with obvious external damage, including paint, should be replaced and not included in the number of sprinklers tested in subparagraph .17;
- .15 check for any changes that may affect the system such as obstructions by ventilation ducts, pipes, etc.;
- .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;
- .17 test automatic sprinklers and automatic water mist nozzles in accordance with the following flow chart:

## Part 1 - Basic Testing



**Part 2 - Extended testing**

### Explanatory notes to the flow chart

- 1 *Functional test* is defined as a test that demonstrates the operation and flow of water from sprinkler head/nozzle.
- 2 *Type* is defined as each different manufacturer model of sprinkler head/nozzle.
- 3 *Static/standby pressure* is defined as the constant pressure maintained in the system at all times prior to activation.
- 4 All testing should be carried out at static/standby pressure.
- 5 *Failure rate* ( $R_{FB}$ ) is the number of sprinkler heads/nozzles to fail testing divided by test sample size multiplied by 100; and

.18 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."

- 4 Paragraph 9.3 is replaced by the following: FIVE YEARLY

#### "9.3 Water mist, water spray and sprinkler systems

- .1 flush all ro-ro deck deluge system piping with water, drain and purge with air;
- .2 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;
- .3 check condition of any batteries, or renew in accordance with manufacturer's recommendations; and
- .4 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."