

Certificate of Inspection and Tests

This is to certify that:

A specimen of : A Small Boat Machinery Space Pyrogen Fixed Aerosol Fire Suppression System

manufactured by : Pyrogen Ltd
 Gilnow Mill Business Centre
 Spa Road
 Bolton, BL1 4SF
 United Kingdom

and described in the attached schedule has been examined and tested. The Secretary of State is satisfied that the specimen examined and tested is acceptable for the purpose of complying with the requirements of:

1. The Codes of Practice for the Safety of Small Commercial Motor or Sailing Vessels of up to 24 metres Load Line Length;
2. The Code of Practice for the Safety of Small Workboats and Pilot Boats; and
3. The Fishing Vessels (Safety Provisions) Rules 1975 for craft less than 24.4 metres Registered Length.

provided that the conditions attached to the schedule are fulfilled and the item remains satisfactory in service.

NB. The Pyrogen Fixed Aerosol System is considered suitable for installation in normally unoccupied spaces containing fuel having a flash point of not less than 43⁰ C (closed cup test), of vessels of less than 24 metres load line length, where the space to be protected does not exceed a deck height of 4 metres, or an area of 64 m².

Signed

M.Turek

Issued by the Maritime and Coastguard Agency this 1st day of April 2003

This Certificate is valid until 31st of January 2006.

Note: This Certificate does not apply to equipment, which has been varied or modified from the specimen tested. The manufacturer must submit modified equipment for consideration by this Agency, if they wish to obtain for it a valid Certificate of Inspection and Tests.

Certificate of Inspection and Tests

The Schedule

1. PERFORMANCE TESTING

- (a) The system has been accepted on the basis of its satisfactory performance during a series of trials devised to simulate typical fire scenarios that can occur in the machinery spaces of small craft. The trials were carried out on the 9th December 1999 and the results are contained in document, Test Report PGUK: 3-12/99.
- (b) A series of seven tests were conducted as follows:-
- (i) open pool fire - diesel fuel and small cans – heptane,
 - (ii) hidden spray fire - diesel fuel,
 - (iii) hidden pool fire - lubricating oil,
 - (iv) combined open pool/hidden spray - diesel fuel,
 - (v) combined open pool/hidden pool - diesel/lubricating oil,
 - (vi) combined hidden pool/hidden spray - lube. oil/diesel,
 - (vii) combined open pool/hidden pool/hidden spray - diesel/lube. oil/diesel
- (c) The diesel engine mock-up was constructed of sheet steel together with a floor plate system surrounding the mock-up. Fuel trays were placed beneath the simulated bilge space. The mock-up was placed in a test chamber of length 5.86m, width 2.3m and height of 2.2m (area 13.48m², volume 29.65m³). The test enclosure had two opening doors, located at the front, which were fully opened at the start of each test. In order to simulate 'non-closeable openings', one door was left slightly ajar when the system was operated, which gave an open area of not less than 0.25m². The four Pyrogen bi-directional canisters (MAG-4) were located at ceiling level for each of the tests.
- (d) The engine mock-up was placed centrally in the chamber. The chamber doors remained opened during the 2-minute pre-burn period to ensure that the fires are well established. As the system was designed as a total flooding system the doors were closed immediately prior to system activation. The system was operated with a discharge time of less than 10 seconds, the time of fire extinguishment was recorded via data recorder. No re-ignition occurred.

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2. PRODUCT DESCRIPTION

The Pyrogen Pyrotechnically Generated Fire Extinguishing Aerosol is a mixture of finely divided solid particles and gaseous matter. Solids form 40% and mainly consist of potassium bicarbonate, while gases form 60% and comprise nitrogen gas, carbon dioxide and water vapour. The solid aerosol-generator element, together with the solid chemical element and activation devices is contained in a non-pressurised canister with one or two end-plate delivery nozzles. The canisters are called MAG generators and vary in size depending on the mass of solid aerosol-generating element contained in the generator. Operation of the generator is electrical manual or thermal automatic. The aerosol generated is a whitish gas-like medium that is close in density to air and is non-conductive and non-corrosive.

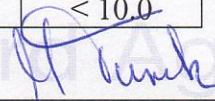
The Pyrogen MAG generators contain four main elements:

1. an electrical ignition device;
2. a block of aerosol-generating composition;
3. a chemical coolant; and
4. a delivery nozzle.

3. MAG GENERATORS

	Mass of Generator grams	Length of Generator, mm	Diameter of Generator, mm	Discharge Time, sec
MAG 02	125	120	40	< 3.5
MAG 1	650	75	75	< 3.5
MAG 2	750	90	75	< 6.0
MAG 3	1,000	135	75	< 7.5
MAG 4	4,000	375	95	< 10.0
MAG 5	2,200	200	95	< 7.5
MAG 11	11,000	180	245	< 10.0
MAG 12	13,500	245	245	< 10.0
MAG 13	19,000	235	305	< 10.0
MAG 14	37,000	260	400	< 10.0
MAG 15	40,000	175	490	< 10.0
MAG 16	50,000	225	490	< 10.0
MAG 17	58,000	285	490	< 10.0

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4. DESIGN

The MAG generators are to be installed in accordance with the Approved Design, Operation and maintenance Manual, P/N: D2000-0010, Rev No 1.3 dated December 1st 2000.

The design of a Pyrogen Fire suppression system should involve the following as a minimum:-

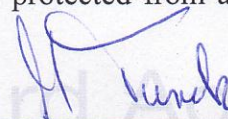
- a) Identify all possible fire hazards within the engine enclosure. Refer to the manual for the list of fire hazards/fuel types that are unsuitable for use with Pyrogen.
- b) Identify possible points of agent loss within the engine enclosure.
- c) Determine the volume of the engine enclosure. Identify if the required coverage extends to the ceiling void and/or raised floor and determine the protected volume.
- d) Calculate the quantity of agent required for the hazard and fuel type within the engine enclosure. The minimum system design factor for class B and surface class A fires is 100 g/m³. Factors such as non-closeable openings, forced ventilation, low altitude, low temperature and other conditions may affect the quantity of agent required need to be considered when calculating the minimum system design factor.
- e) Select the model and quantity of generators required.

5. SYSTEM ISOLATE SWITCH

The discharge of the Pyrogen generators shall be prevented by means of a system isolate switch, or others means, that shall be manually operated when personnel are present within the protected engine enclosure or adjacent areas which could be rendered hazardous by the discharge of the system.

The system isolate switch shall be situated outside the protected area close to the system control panel or adjacent to the main entrance to the engine enclosure, and protected from accidental operation.

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SYSTEM ISOLATE SWITCH (continued)

While the system isolate switch is active and the discharge of the system is inhibited, the fire detection and alarm system shall continue to function and system shall return to full manual control when the switch is reactivated.

The operation of the system isolate switch shall electrically isolate and earth each conductor of the wiring to the extinguishant discharge device and initiate a yellow or amber visual indicator at the system control panel.

The system isolate switch shall be used when there is a possibility that people may enter the protected enclosure for whatever reason.

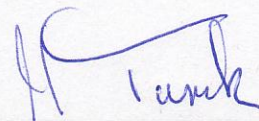
6. CONTROL PANELS

- a) Fire Mermaid X1 Control Panel – Basic panel providing fire indication and manual activation of the MAG generators within the engine enclosure. Installation and user manual, File: 528360 V7, dated 01/16/01.
- b) T159 Control Panel – Panel providing fire detection and manual activation of MAG generator within the engine enclosure. Installation manual for combined Fire Alarm system and Fire Extinguishing system Control Panel, File 801230 T159 Installation B4-UK 230, dated 27/3/00.
- c) Pyrosene SP1 Control panel manufactured by West Control and supplied by Technor asa – Panel providing fire detection together with manual and automatic operation. This panel shall be installed and operated in the manual mode only. Installation manual for the combined fire alarm and fire extinguishing system manual number PYR-DOC-BOAT revision number 1.0 dated June 2002, EMC test report D992 dated September 2002

7. SYSTEM MAINTENANCE

The user should carry out monthly inspections of the fire suppression equipment installed. This should include looking out for obstructions of the discharge nozzles, extension/alteration of the protected enclosure, openings left unclosed that were not catered for during the design, and that the position and orientation of the Pyrogen generators remain in their installed position.

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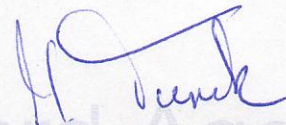
8. SERVICE LIFE

The MAG generators have a service life and should be renewed in accordance with the manufacturer's recommendations.

9. IN ADDITION TO THE GENERAL SYSTEM APPROVAL DESCRIBED ABOVE THE FOLLOWING CONDITIONS ARE TO BE COMPLIED WITH:-

- a) Plans of each intended system together with details of components used and test certificates, are to be submitted to the Maritime & Coastguard Agency prior to installation and survey on the vessel.
- b) The installation is to be to the satisfaction of the attending surveyor. Certificates of commissioning and acceptance testing are to be submitted on completion.
- c) Clear and legible instructions for installation, maintenance, testing and operation, applicable to the specific system fitted on the vessel, should be issued for inclusion in a manual or folder, to be retained on board the vessel; for use by the operating crew.
- d) Clear and legible safety labels shall be placed at the entrance to the protected enclosure, inside the protected enclosure, at the system isolate switch and the manual release point. Also simple operating instructions are to be placed at the system operating position.
- e) Means are to be provided to close all openings, which may admit air to the protected enclosure.
- f) A Normally Unoccupied area is an area that is not occupied by humans under normal circumstances but may be entered occasionally for brief periods. Whenever the space is entered then the isolation method is to be used to de-activate the generators within the space.

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