

Part 3

Codes, Standards and Fire Test Protocols



IMO established the foundation

- ***Fire testing as the basis for design of water mist systems***
- ***Criteria for Class B fires in machinery spaces (gaseous system alternative)***
- ***Criteria for Class A fires in accommodation and storage spaces (sprinkler system equivalence)***
- ***Component evaluation for nozzles and other equipment***



FM Approvals

The FMRC 5560 Test Protocols 2005

- **Gas turbines** – gas-turbine enclosures, machinery spaces & special hazard machinery spaces (< 80 m³, < 260 m³)
 - Includes plate cooling test
- **Machinery spaces, special hazard machinery spaces** – gas-turbine enclosures, machinery spaces & special hazard machinery spaces greater than 260 m³
- **Local application systems** (machinery spaces)

Note: FM's "machinery spaces" are not the same as IMO "machinery spaces"



FM Approvals

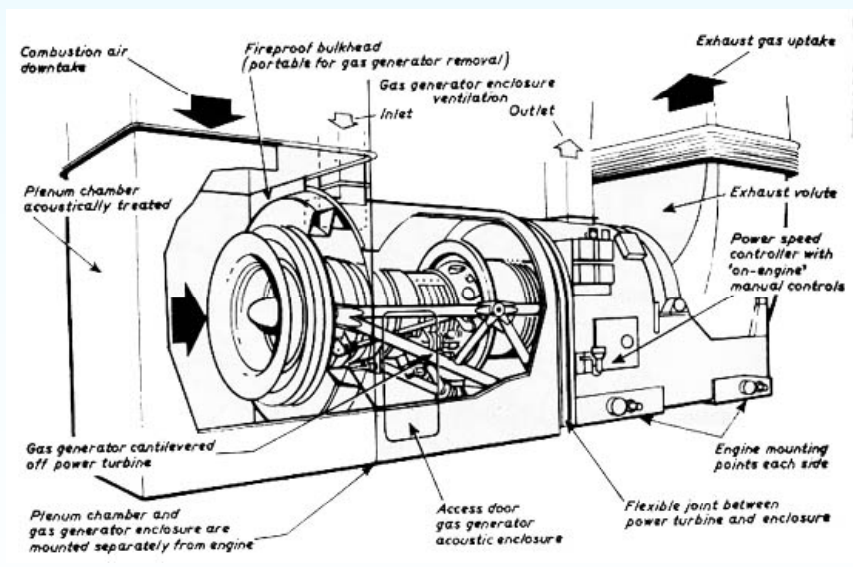
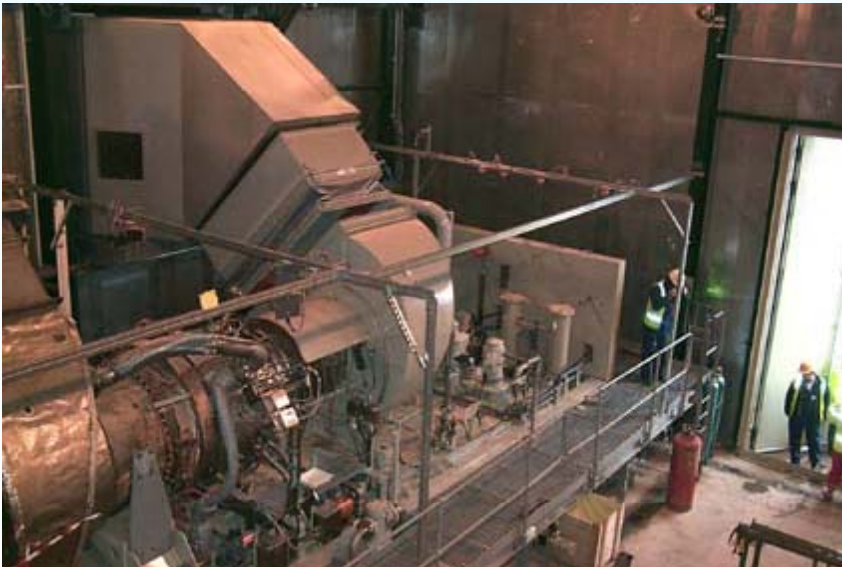
FMRC 5560 Test Protocols

- ***Industrial cookers***
- ***Light hazard (origin in IMO A.800(19) storage areas)***
- ***Wet benches***
- ***Component tests (origin in IMO with additions for specific equipment)***
- ***Data Sheet 4-2 – General Recommendations***

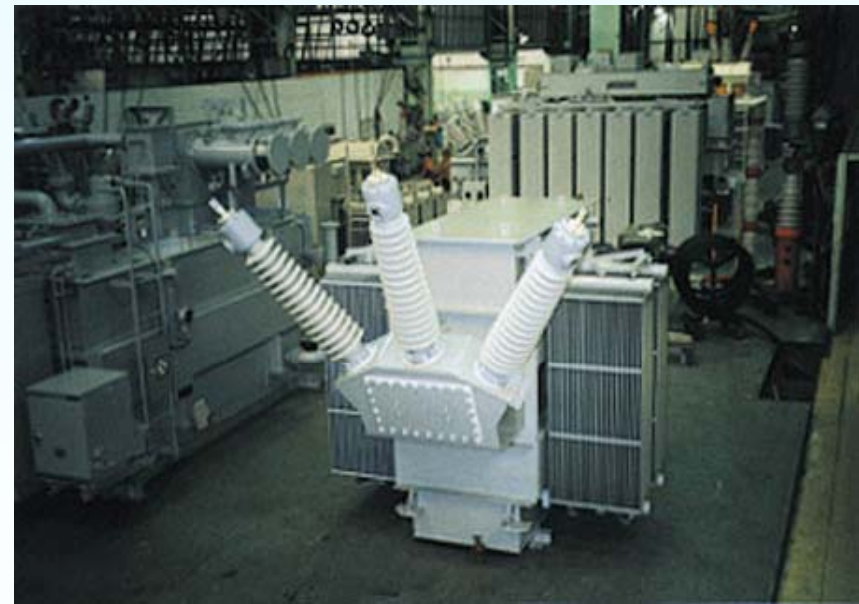
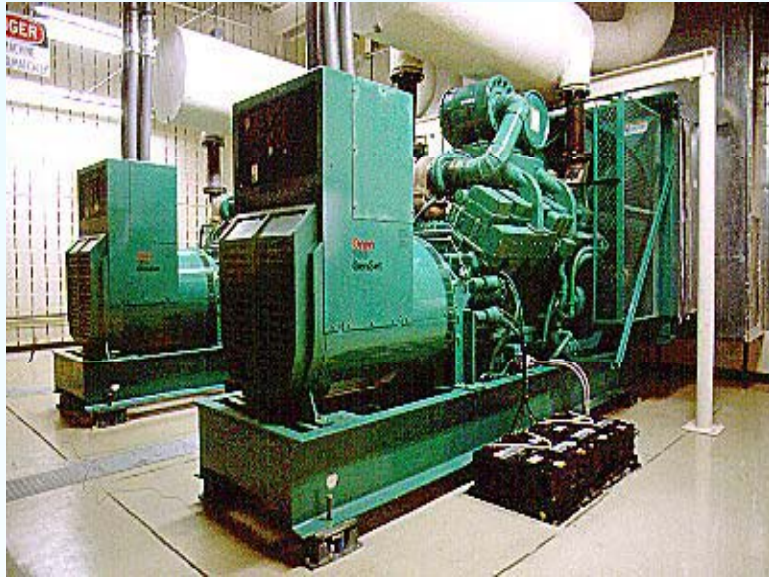


Combustion Turbine Enclosures

80, 260



Machinery Spaces and Special Hazard Machinery Spaces



Light Hazard Occupancies



Fire Tests for Water Mist Systems for the Protection of Light Hazard Occupancies

- ◆ *Fire tests consist of small compartment room and large compartment room with a ceiling height of 2.4 m (8 ft) and an open space with a ceiling height of 5 m (16 ft 5 in.).*
- ◆ *The fuel package for the large compartment, corner crib and simulated furniture tests is the same as the FM Approvals Residential Sprinkler standard Class 2030 to ensure fire test repeatability.*
- ◆ *Ceiling gas and surface temperatures are measured directly above the ignition sources. Peak temperatures are utilized for evaluation rather than a 30 second average.*
- ◆ *Target doorway nozzles are installed in the two doorways.*



Clean room and Semiconductor Wet Benches

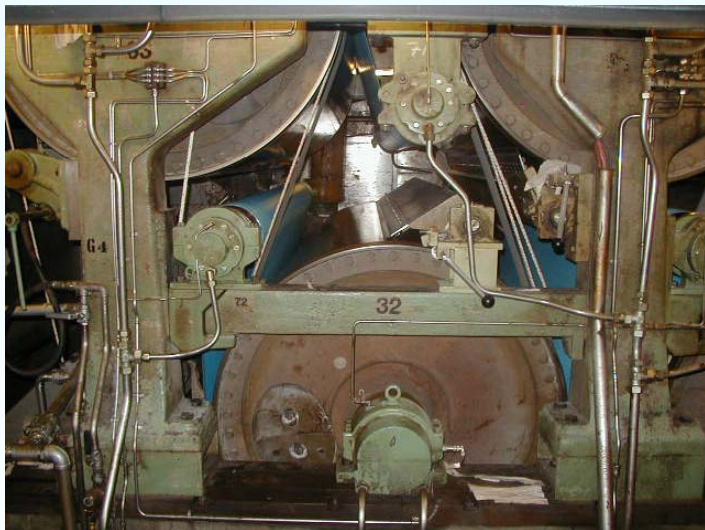
Specific FM Approvals simulated clean room and wet bench mock-up.

Air flow of the open face wet bench shall be the maximum specified by the manufacturer.

Specific configuration of polypropylene and flammable liquid fuels.



Local Application Systems



Fire Tests for the Protection of Local Application Hazards

- ◆ *For protection of special hazard equipment such as flammable liquid spray applications, dip tanks, machining processes, paper machines, printing presses, wave soldering, etc.*
- ◆ *Combination of test fires including pool, spray and pool and spray fires at the maximum and minimum nozzle heights for a total of 46 fires.*
- ◆ *Suitable automatic interlocks are required as part of overall system FM Approval, i.e., electrical system shutdown, fuel supply shutoff and ventilation shutdown.*



Fire Tests for the Protection of Industrial Oil Cookers

Mock-up size determined by manufacturers with sizes of x by y, x by 2y and x by 3y with fire tests for each with an exhaust hood in the up and down positions.

Suitable automatic interlocks are required as part of overall system FM Approval, i.e., electrical system shutdown, fuel supply shutoff and ventilation shutdown.

Extrapolation of the “y” dimension is permitted based on specific condition and results of the fire tests.



Fire test of x by 3y mock-up with hood in the down position.



Fire Tests for the Protection of Computer Room Sub Floors

A telltale fire test.



A cable fire test.



And a test to verify degree of moisture build-up.



FM 5560

Fire Test Performance Pass/Fail Criteria

- ◆ ***Satisfactory Fire Extinguishing and/or Suppression***
- ◆ ***Maximum Peak Temperature Limits***
- ◆ ***Limitations on Commodity Percent Damages***
- ◆ ***Results measured as required in the specific Fire Testing Application Appendix within the Standard.***

- ◆ ***FM 5560 is the basis for acceptance of water mist systems***





NFPA 750 2006 Water Mist Fire Protection Systems

- The purpose of this standard is to provide protection for life & property from fire through the standardization of design, installation, maintenance, & testing requirements for water-based fire suppression systems that use a specific spray (mist) that absorbs heat, displaces oxygen, or blocks radiant heat to control, suppress, or extinguish fires as required by the application.





NFPA 750: 2006 Edition

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NFPA 750

NFPA 750 Standard for Water Mist Fire Protection Systems

- ◆ ***Basis of design = Fire Test Protocol***
 - ~ ***IMO, FMRC, or Custom fire testing***
- ◆ ***Annex provides explanatory material to aid in technology transfer without need to obtain outside referenced material (e.g. NFPA Handbook).***
- ◆ ***Annex describes IMO, FMRC and UL fire test protocols to aid user in comparing performance criteria***
- ◆ ***NFPA 750 provides guidance on equipment, supervision, piping methods, testing methods, calculation methods applicable to all types of water mist systems***



Order of presentation

- 1. Introduction & Fundamentals (20 min)***
- 2. Types of Water Mist Systems and Equipment (15 min)***
- 3. Codes, Standards, Test Protocols (15 min)***
- 4. Future directions (10 min)***
- 5. Discussion, questions (10 min)***

