ACTIVE FIRE PROTECTION GUIDE
Water Foam Monitors

This document has been produced by the RISCAuthority Active Suppression & Detection working group to provide information and outline guidance on the application of Water Foam Monitors.

Summary

Refer to AFPG-01 *Active Fire Protection Guide – All Technologies*, and AFPG-12 *Migration of foam-enhanced fixed sprinkler and drencher systems to use fluorine-free alternatives*.

Water foam monitors are principally used for:

- the suppression of fires in harsh environments where a heavyweight response is required
- the control of large liquid fuel fires (Class B) that might manifest in industrial processing, fuel storage, and aircraft crash response
- blanketing of fuel that might become involved in fire (bunds and spills)
- structural cooling
- escape route security
- aircraft hangar protection – one of four acceptable options for foam delivery
- runway crash response.

Water foam monitors are characterised by:

- a manual, automatic, or remotely steerable branch that may be fixed, portable, or vehicle mounted
- the application of foam as a directed jet or fan within an arc of coverage that blankets the supply of oxygen to the fuel, controls fuel vapours, and cools the fuel and surrounding structures, preventing reignition and preserving stability
- delivery of water foam mixtures in the range 500 to 20,000 LPM
- operating pressures between 4-16 bar
- throw distances which can be in excess of 100m
- placement of multiple monitors to cover the assets with their collective arcs of foam distribution.

This guide considers monitor systems delivering water and water/foam mixtures for the purposes of firefighting and structural cooling. The terms 'monitor' and 'cannon' are often used interchangeably. When used to protect equipment and infrastructure, a monitor system's prime objective is to keep the target's temperature below 100°C. Any surface above 100°C will become difficult to cool as water will boil off and not 'wet', resulting in hot spots that may endanger a vessel's contents or beam's integrity leading to structural failure or rupture.

Types of water foam monitor system

The key types of foam water monitors are typically defined by their means of operation.

Fixed Monitors: are used with foam for firefighting, or just water for structural cooling protection. They are generally used in purpose-built fire protection systems although they can also be trailer mounted to adapt to changing risk scenarios.

Hand Monitors: are installed with their aim locked in place but can be manually manoeuvred once in operation by means of a steering arm. The forces can be substantial at higher pressures so are often fitted with a counterweight to assist the user.

Geared Monitors: these allow accurate aiming through the use of a geared system controlled by hand-wheels that overcome the forces that make operation of hand monitors difficult at higher pressures.

Water/Foam Monitors: are geared monitors that, through the use of separate barrels for water and expanded foam delivery, gives the user freedom to provide a response optimised to the situation (firefighting and structural cooling).

Oscillating Monitors: are used in the most hazardous situations. They can be turned on remotely via a water valve enabling the operator to remain at a safe distance. The automated sweeping action enables the monitor to cover a wide area. The oscillating action is powered by the water pressure, so no electrical connection is required.

Remote Control Monitors: can be located within the hazard zone and operated from a remote location powered by hydraulics or electric motors. They are often used to protect escape routes in jetty terminals and marine docks. Smaller version may be vehicle mounted to assist with rapid response to crash sites.

Portable Monitors: are quick deployment devices used for applying foam to bunds and small tanks.

Some newer implementations in waste recycling and treatment plants combine them with stereoscopic IR detectors to automatically control direction and operation, thereby providing an autonomous robotic response.

Components of a water foam monitor system

The components of a water foam monitor system include:

Water supply: sized for the required duration of protection.

Fire pump set: which may include both electric and diesel options sized to deliver water at the appropriate rate from all protection devices in the network required to operate simultaneously.

Foam tank: sized to supply all monitors in the protected zone (and any other foam delivery systems).

Foam proportioning device: which might be integral to the tank and pipework (bladder tank), or separate, such as a pump, or venturi type device.

Distribution pipe network: supplying the monitor network.

The monitors: mounted to cover the area in a series of overlapping arcs.

Key applications

Water foam monitor systems are used in special hazard installations requiring large quantities of water and foam to control a fast-developing fire or protect fuel, equipment, and people from it. They are commonly found in applications where liquid fuels may be burning in large quantities, or where fuels and structures are at risk from involvement in fire require protection.

Typical applications include:

- refineries
- fuel distribution depots
- chemical plants
- warehouses
- helicopter landing pads
- aircraft hangars and maintenance centres
- loading jetties
- process plant
- industrial process areas
- shipping
- vehicle mount (responders).

Challenges and considerations

Usage: water foam monitors may be unused for many years, but when required in an emergency must operate with peak performance.

Corrosion: often used in harsh environmental conditions, such as oil rigs, it is vital that the correct materials of construction are chosen for the application. Bronze and stainless steel are commonly used.

Manual Control: at high pressures hand monitors can be difficult to direct. Geared monitors are easier to manoeuvre and support greater directional accuracy.

Wind: prevailing wind direction and speed can have a significant impact on monitor throw distances and should be considered during set-up. This is critical for fixed oscillating and remote control monitor systems. An assessment of the required flowrate to overcome wind direction/speed should be considered. Flow/distance graphs typically state 'still air' conditions as a benchmark. Jet (or solid streams) settings are less affected than fog settings by wind direction/speed, which can be significant.

Configuration: with particular reference to self-oscillating canon systems, it is often very difficult or in some cases impossible to access and adjust these monitors during emergency operation, therefore careful assessment and design, particularly in respect of area of coverage should be made.

Fluorine free foams: augmentation of the system with firefighting foam for managing flammable liquid fires is common practice. However, with the removal of AFFF foam on environmental grounds, there is a need to replace them with fluorine free alternatives. These foams are unlikely at the current time to be 'drop-in' replacements. See AFPG-12 Migration of foam-enhanced fixed sprinkler and drencher systems to use fluorine-free alternatives for further guidance.

Foam selection and use: foams need to be matched to the solvent protected (alcohol resistant foams), and the effective shelf life of foams needs to be considered which might reduce with stored time impacting extinguishing capability and 'burn-back' time (reignition prevention).

The introduction of foam into the monitor stream typically reduces the distance of throw (by 10% or more) and should be assessed.

Applicable standards

NFPA 11: Standard for Low, Medium, and High Expansion Foam.

EN 13565-1: Fixed firefighting systems - Foam systems - Part 1: Requirements and test methods for components.

EN 13565-2: Fixed firefighting systems - Foam systems - Part 2: Design, construction and maintenance.

ISO 7076-2: Fire protection - Foam fire extinguishing systems - Part 2: Low expansion foam equipment.

Russian Maritime Register of Shipping.

Det Norske Veritas (DNV).

Bureau Veritas.

Lloyds Register of Shipping (LRS).

Kuwait Fire Service Directorate (KFSD).

ISO 13702 'Petroleum and natural gas industries - Control and mitigation of fires and explosions on offshore production installations – Requirements and guidelines'.

Schemes

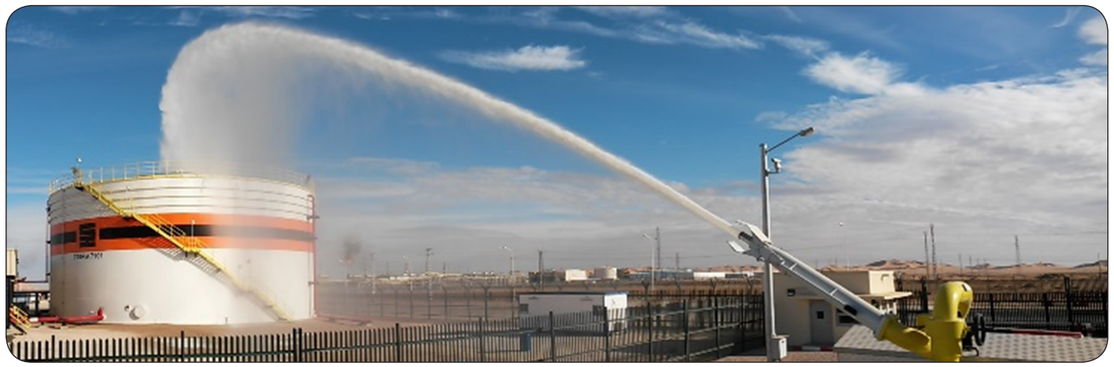
Kiwa Fire Protection Systems: assessment scheme for the testing, inspection and certification of fire protection systems.

FM Approvals.

BRE Certification.

Warrington Certification Ltd FIRAS Scheme.

IFC Certification Scheme.



Approvals

Underwriters Laboratory Solutions, Underwriters Laboratory Canada, FM Global, Loss Prevention Certification Board, VDS Schadenverhutung, Lloyds Register of Shipping, Det Norske Veritas, Bureau Veritas, Russian Maritime Register of Shipping, Kuwait Fire Service Directorate.

Best practice

All water foam monitor systems should be certificated to a recognised quality scheme.

Fire Services should be consulted on their requirements and necessary provisions for supporting water foam monitor systems.