It is important to test the system at regular intervals but also to inspect on a weekly basis. These inspections and tests assure that the components are in full operational condition and will perform in a fire condition as designed. NFPA 409 – 1995, “Standard for Aircraft Hangars,” requires inspection and testing at regular intervals. (See Figure 3 for a flow chart from frequent inspection and testing requirements.)

Question Three:
What is monitor protection and how can it help protect the aircraft hangar?

The protection provided by the monitor nozzle will be at risk from fire exposure. If the fire is not quickly enough, the fire is not expected to grow to a point where the steel structure will be obstructed by large aircraft. This requires a quick response from the local Authority Having Jurisdiction (AHJ) based on quick response time of these systems to provide coverage for those obstructed areas created by large aircraft. The test manifold on the foam/water sprinkler system allows testing to be performed without discharging the foam/water solution covering a particular area such as the under-wing area that could be obstructed by the overhead sprinkler system. (See Figure 4 for typical monitor and nozzle configuration.)

Fire fighting foam was originally developed in the 1930s to fight flammable liquid fires. Water deluge systems alone will not suppress a large pool fire on the floor of a hangar. This is due to the very high heat release rate of a large pool fire of flammable liquid in an aircraft hangar with a high cool structure. The water alone cannot cool the fuel to create fire suppression. Using foam, which is the aspirator of a water and foam concentrate, will suppress fire by blanketing the fuel and smothering the flames as well as providing vapor suppression. Today there are many different types of foam concentrates including Protein, Fluoroprotein, Film-Forming Fluoroprotein, Aqueous Film-Forming Foam, Alcohol-Resistant Concentrate AFFF and Synthetic Detergent (High/Medium-Expansion). The foam concentrate is combined with water by mechanical proportioning devices in a 3% or 6% solution to form the foam/water solution. Although there are several different types of foam concentrates, the most commonly used in NY AFFF or Aqueous Film-Forming Foam.

Many aircraft hangar owners have converted their water deluge system to foam/water deluge sprinkler systems. NFPA 409 – 1995 makes this conversion a little easier with a few considerations for the highest densities of these foam systems. The standard allows a reduction of the foam discharge duration for the higher density up to 7 minutes and waves the uniform discharge requirement of 150% maximum variation between output of the sprinkler head flow rates.

Question Four:
What is foam used and what does it add to the fire protection of a hangar?

Foam deluge systems are designed to be used with monitor nozzles for fire protection of aircraft hangars. Foam deluge systems work by discharging the foam/water solution from the sprinkler head in a non-disruptive manner to the hangar environment. The protection provided by the monitor nozzle system does not provide the wetting effect on the structural steel that the overhead deluge foam/water system will provide. However, if the foam/water system can be applied quickly enough, the fire is not expected to grow to a point where the structural steel will be at risk from fire exposure.

A foam/water deluge sprinkler system is generally dependent on the quality of design, installation, and service testing/inspection/maintenance. NFPA 409 – 1995 only allows an overhead foam/water deluge for protection of all aircraft hangars. Group 1 Hangars, which does not allow alternate anti-fire systems to provide equivalent level of protection. Hangars have been built and equipped with monitor nozzles as protection in Group 1 Hangars. Supporting this fire protection concept, the U.S. Military is currently investigating the use of floor level systems to replace the overhead foam/water deluge sprinkler systems.

Group 1 Hangars that have been equipped with monitor nozzles for protection have been accepted by the local Authority Having Jurisdiction (AHJ) based on quick response, (flame) detection and fast delivery of foam. The protection provided by the monitor nozzle does not provide the writing effect on the structural steel that the overhead deluge foam/water system will provide. If the foam/water system can be applied quickly enough, the fire is not expected to grow to a point where the steel structure will be at risk from fire exposure.

Question Two:
How do you ensure that your hangar’s foam/water sprinkler system is reliable?

A foam/water deluge sprinkler system is generally dependent on the quality of design, installation, and service testing/inspection/maintenance. It includes fire pumps, foam pumps or bladder tanks, detection systems, deluge valves and other accessory equipment. These components work together as a total system to prevent the hangar against the threat of fire. The system is designed, the design should be performed by a fire protection engineer who has experience in the design and development of these systems. The design should include many contractors: general, electric, mechanical, sprinkler, etc. These contractors must work as a partnership to install an integrated fire protection system that does not allow for the expense of false discharges or lack of operation in a fire emergency.

The most overlooked part of ensuring a reliable system is periodic testing, inspection and maintenance. It is important to test the system at regular intervals but also to inspect on a weekly basis. These inspections and tests ensure that the components are in full operational condition and will perform in a fire condition as designed. NFPA 409 – 1995, “Standard for Aircraft Hangars,” requires inspection and testing at regular intervals. (See Figure 3 for actions and intervals for periodic inspection and testing.)

Question Five:
What is monitor protection and how can it help protect the aircraft hangar?

Monitor nozzles (sometimes called water cannon) discharge a stream of water or foam/water solution covering a particular area such as the under-wing area that could be obstructed by the overhead sprinkler system. (See Figure 4 for typical monitor and nozzle configuration.)

Fixed level nozzles or oscillating monitors are typically used as supplemental systems to provide coverage for those obstructed areas created by large aircraft. Although NFPA 409 – 1995 only allows an overhead foam/water deluge for protection of Group 1 Hangars, which does not allow alternate anti-fire systems to provide equivalent level of protection. Hangars have been built and equipped with monitor nozzles as protection in Group 1 Hangars. Supporting this fire protection concept, the U.S. Military is currently investigating the use of floor level systems to replace the overhead foam/water deluge sprinkler systems.

Group 1 Hangars that have been equipped with monitor nozzles for protection have been accepted by the local Authority Having Jurisdiction (AHJ) based on quick response, (flame) detection and fast delivery of foam. The protection provided by the monitor nozzle does not provide the writing effect on the structural steel that the overhead deluge foam/water system will provide. However, if the foam/water system can be applied quickly enough, the fire is not expected to grow to a point where the steel structure will be at risk from fire exposure.
What are the major differences between protection with a foam/water deluge system and a high-expansion foam system and why would you use a high-expansion foam system?

**Question Seven:**

What are the environmental concerns with foam? Recently, firefighting foams have been analyzed for their environmental impact when released. The National Fire Protection Association’s Technical Committee on Foam formed a task group to study this issue. This task group has determined that firefighting foam should not be restricted, but that the task group encourages the use of foam in an environmentally responsible manner. Foam/water deductible systems do not discharge foam during testing, during an accidental fire, or during a fire. This local jurisdiction may prohibit the foam being discharged if applicable to the foam system. Determining if a containment system is required is based on the location of the facility, the environment, the possible impairment of facility operations, the design of the fixed foam system, the ability of the responding fire department to execute temporary containment efforts, and any local applicable rules or regulations. These conditions could require containment for volumes of 100,000 gallons (378,540 L) or more. Ethylene glycol is a freeze point suppressor and is used in high-expansion foam concentrates. Because of ethylene glycol in excess of 5,000 pounds is reportable under U.S. EPA Comprehensive Environmental Response Compensation & Liability Act (CERCLA) Section 102 (b) and 103 (a). Most foam concentrates are not freeze protected, but check with your foam manufacturer for more information. Glycol ethers are also used in foam concentrates. As of June 12, 1995, the EPA has issued a final rule on several broad categories of chemicals including glycol ethers. The EPA has no reportable quantities for any of the glycol ethers. Additional information is available through Ansul Technical Bulletin No. 60.

**Question Eight:**

What makes an aircraft hanger unique is the large fuel source present, the high value of the aircraft, the aircrew, and the need for rapid fire control and emergency. Aircraft hangar fire protection systems are unique and present a challenge to owners. It is important to understand how these systems work and how to keep them in service. Aircraft hangar fire protection systems are unique and present a challenge to owners. It is important to understand how these systems work and how to keep them in service.

**Question Nine:**

The National Institute For Certified Protection Systems. NICET information can be obtained by calling NICET at:

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