

# FIRE MARSHAL TOOLKIT

## Storage Hangar

A storage hangar simply stores private and corporate jets.

No maintenance or hazardous operations are performed in a storage hangar.

## FBO Fixed Base Operator

An FBO is the primary service provider to general aviation aircraft operators.

An FBO can provide aircraft fueling services, hangaring (interior parking), tie-down, cabin cleaning, aircraft washing, flight training, or minor maintenance.

Major aircraft repair, overhaul or hazardous operations (hot work, etc.) are typically not performed at an FBO but, rather, at an MRO. In addition, aircraft battery charging, particularly lithium-ion batteries, is typically not performed in the hangar bay.

There are more than 3,500 FBOs at airports around the country.

## MRO Maintenance Repair and Overhaul

An MRO performs major aircraft maintenance and hazardous operations, such as engine overhaul, fuel cell bladder repair, landing gear repair and similar operations.

While an airport may have storage hangars and an MRO facility, storage hangars are not MRO facilities.



## TYPES OF FOAM

### Aqueous Film Forming Foam (AFFF)

Low expansion (small bubbles)

Provides a foam film layer between the fuel and air to help suppress the fire.

AFFF is mixed with water in 1%, 3% or 6% concentrations with 3% being the most common.

Typically sprays no higher than waist height to cover the hangar bay.

### High-Expansion (High-Ex)

Large bubbles (like a bubble bath)

Separates fuel source from oxygen (air) through a large layer of foam bubbles.

Is typically mixed with water in 2% or 2.75% concentrations (based on the foam manufacturer).

Typically designed to fill the hangar to 1 meter in depth in 4 minutes.

## AVIATION FUEL FACTS



### Jet A Fuel

Used by turbine engines (jet aircraft)

- Essentially kerosene
- Class II combustibile liquid (flash point at least 100°F)
- Significantly less volatile than Avgas and automobile gasoline



### Avgas Fuel

Used by piston engines (typically fewer than 6 seats)

- Essentially gasoline with other additives
- Class IB flammable liquid (flash point less than -35°F)

# FIRE MARSHAL TOOLKIT



## Aircraft Hangar Fire Protection Regulations

- Most jurisdictions require compliance with National Fire Protection Association (NFPA) Standard 409, *Standard on Aircraft Hangars*. NFPA 409 classifies aircraft hangars into four “groups” (See chart below).
- Hangars storing fueled aircraft must have a foam-water fire suppression system. Unfueled aircraft can be protected by water-only sprinklers.
- The purpose of a foam fire suppression system is to control/extinguish a fire related to a fuel spill. The overhead fire sprinkler system is designed to control fires not related to a fuel spill.

## NFPA 409 Classifies Aircraft Hangars Into Four “Groups”

GROUP I	GROUP II	GROUP III
Door height greater than 28 feet OR Fire area (hangar bay) greater than 40,000 square feet	Door height 28 feet or less AND Fire area (hangar bay) less than 40,000 square feet	Door height 28 feet or less AND Fire area (hangar bay) typically less than 12,000 square feet (actual area based on construction type)
<i>Most FBOs and Storage Hangars fall under the Group II classification, however, some may be classified as Group I.</i>		

## Fire Protection System Requirements

<p><b>OPTION 1</b> Deluge (open-head), AFFF-water sprinkler system with low-level foam system if the aircraft wing area is greater than 3,000 square feet</p> <p><b>OPTION 2</b> Closed-head, water only sprinkler system with low-level, AFFF foam system</p> <p><b>OPTION 3</b> Closed-head, water only sprinkler system with low-level, high-expansion foam system</p>	<p><b>OPTION 1</b> Any system permitted for a Group I hangar</p> <p><b>OPTION 2</b> Closed-head, AFFF-water sprinkler system</p> <p><b>OPTION 3</b> Closed-head, water only sprinkler system with low-level, AFFF foam system.</p> <p><b>OPTION 4</b> Closed-head, water only sprinkler system with low-level, high-expansion foam system</p> <p><i>Note: The IBC exempts a Group II FBO hangar, storing transient aircraft only, from foam requirements.</i></p>	<p>Water-only sprinkler system if required by building code</p> <p>For hazardous operations, provide any system permitted for a Group II hangar</p>
		GROUP IV
		<p>Membrane covered hangars, regardless of size</p> <p>Fire area (hangar bay) greater than 12,000 square feet: low-level AFFF or high-expansion system.</p> <p>Fire area (hangar bay) less than 12,000 square feet and hazardous operations: Automatic sprinkler system.</p>