

NFPA Requirements

Fire Protection of Aircraft Hangars

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Presentation Outline

- Layout of NFPA 409
- Hangar Group Classifications
- Construction Requirements
- Fire Protection Requirements
- Group III Hangars
- Membrane Fabric Hangars

NFPA 409 Layout

- Chapter 4 Hangar Classification
- Chapter 5 Group I and II Construction
- Chapter 6 Group I Fire Protection
- Chapter 7 Group II Fire Protection
- Chapter 8 Group III Hangars
- Chapter 9 Membrane Hangars
- Chapter 10 Paint Hangars
- Chapter 11 Inspection and Testing

Starting Point

Chapter 4 Aircraft Hangar Groups

Hangar Groups

- Group I (Either)
 - Door Height/Tail Height >28 Feet
 - Single Fire Area >40,000 Ft²
- Group II (Both)
 - Door Height/Tail Height ≤28 Feet
 - Single Fire Area – Table 4.1.2
- Group III and IV
 - Small Hangars and Membrane Fabric Hangars

Construction

- Group I
 - Type I or II construction
- Group II
 - Type I through V construction
 - Also see Table 4.1.2
- Group III
 - Type I through V construction
 - Also see Table 4.1.3
- Group IV – Membrane Fabric Covered Steel

Separations

- Fire Areas – 3 Hour rating between fire areas
- Continuous offices – 3 Hour and 1 Hour
- Offices and parts storage – 1 Hour
- Lean-to or attached structure – 1 Hour

Columns

- Group I and II hangars must have either:
 - Spray-on material for 2 Hour Rating
 - NFPA 15 system specific for columns

Trench Drains

- Size based on maximum flow F.P systems
- Objective – Prevent buildup of flammable liquids over drain inlets
- Must have traps
- Separators – Bypass for F.P. system flow

Group I Fire Protection

- Hangars housing unfueled aircraft
 - Sprinklers only
 - Designed for 0.17 gpm/ ft² over 5000 ft²

Fire Protection

- Group I w/fueled aircraft – 3 Options:
 1. Foam Water Deluge
 2. Sprinklers and low expansion foam
 3. Sprinklers and high expansion foam
- Group II w/fueled aircraft – 4 Options:
 - Above and 4th option of closed head foam

Group II Operating Areas

- No savings for closed head foam
- Operating area Option 1 and 4:
 - Foam water deluge (Option 1) – 100 Ft radius
 - Closed head foam (Option 4) – Entire Floor

Foam and Sprinklers Group I vs Group II Hangars

- Low level foam and sprinklers required
- Group I – 0.17 gpm/ft² over 15,000 Ft²
- Group I – Quick response and 175 F
- Group II – 0.17 gpm/ft² over 5,000 Ft²
- Group II – High temp heads 325-375 F

Detection and Actuation

- Foam water deluge – Heat detectors
 - Rate of rise
 - Fixed temperature
 - Rate compensation
- Supplementary – Actuated by operation of foam water deluge system (optional optical detection)

Detection for Low Level Foam

- Group I low level foam – Actuated by operation of closed head sprinkler system (optional optical detectors)
- Group II low level foam – Heat detectors

Detection Continued

- Preaction – Where provided, actuated by heat detectors
- Manual stations
 - Deluge foam water
 - Supplementary
 - Low level foam

Foam System Requirements

- Foam water deluge system
 - 100 Foot radius rule (6.2.10.2.1)
- Low expansion foam
 - Conventional monitor nozzles
 - Grate nozzles
- High expansion foam
 - NFPA 409 requires air from outside storage and servicing area (6.2.5.5.5)

Grate Nozzle



Grate Nozzles Operating



Supplementary Protection

- Group I
- Only with option 1 (foam water deluge)
- Shadow area over 3,000 Ft²
- Low expansion foam
 - AFFF 0.10 gpm/ft² over shadow area
- High expansion foam
 - Local application
 - 3 Feet within one minute

High Expansion Foam



Acceptance Testing



Pumps and Reservoirs

- Fire pumps – Must have at least 2 (6.2.10.8.2)
- Concentrate pumps – Must have at least 2 (6.2.7.2)
- Reservoirs – At least ½ water supply maintained in service (6.2.10.7)

Group III Hangars

- Limited to one story
- No fire protection system unless there are hazardous operations, then foam required
- Where local ordinance requires sprinklers see NFPA 13 extra hazard group I

Group III Hangar Spacing

- Single Hangar Buildings – Table 8.2.1
- Clusters
 - Fire area limitations – Table 8.3.1
 - Cluster spacing – Table 8.3.3

Group IV Hangars

- Membrane Fabric
 - Flame resistance to NFPA 701
 - Flame spread to NFPA 101, Class A
- Limited to one story
- Separation distance 75 Ft (no clusters)

Group IV Fire Protection

- Areas less than 12,000 Ft² with hazardous operations must be sprinklered
- Areas over 12,000 Ft² for fueled aircraft must have a foam system
- Areas over 12,000 Ft² for unfueled aircraft must have a fire protection system (usually sprinklers, but could be foam)

Inspection and Testing

- Table 11.1.1 provides special criteria which is different than NFPA 25

Conclusion

- NFPA 409 for protection of hangar building
- No fuel = No foam
- Group I different from Group II criteria
- Group III has no fire protection unless there are hazardous operations
- NFPA 409 is logical
- Bids are normally based on economics

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