



Aircraft Hangar Fire Protection

Introduction

Agenda

- › Who am I and why am I talking?
- › Challenges of Aircraft Hangars
- › Types of Hangars
- › Fire Protection Strategies
- › Open discussion and questions

Introduction

Who Am I?

- › Fire Protection Engineer – C&S Companies
- › Adjunct Professor – Fire Protection Technology
- › Firefighter/ EMT – 19 years in fire service
- › Past President – SFPE NY Empire Chapter
- › Certified Fire Protection Specialist – NFPA
- › OSHA Authorized Outreach Trainer
- › M.S. – Safety, Security & Emergency Management
- › B.S. – Fire & Safety Engineering Technology

Overview of Aircraft Hangars

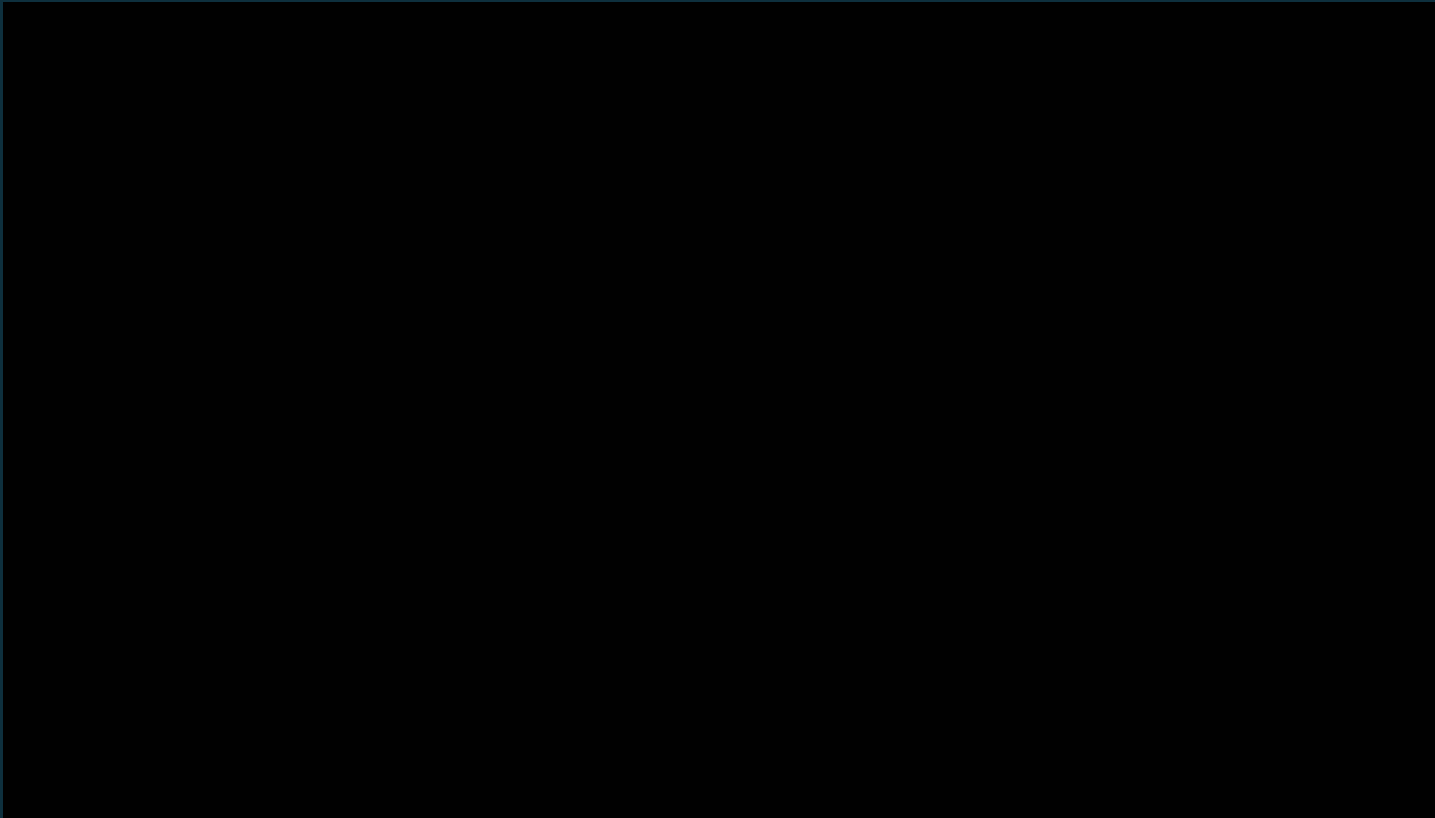
Aircraft Hangars

Overview



Aircraft Hangars

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Aircraft Hangars

Overview



Classification of Aircraft Hangars

Aircraft Hangars

Classification

- › NFPA 409 Standard on Aircraft Hangars
 - › Group I
 - › Group II
 - › Group III
 - › Group IV

- › UFC 4-211-01 Aircraft Maintenance Hangars
 - › Air Force
 - › Army
 - › Navy/ Marine

Aircraft Hangars

NFPA 409 Group I

- › Aircraft access door height over 28'
- › Single fire area in excess of 40,000 ft²
- › Aircraft with tail height over 28'

Aircraft Hangars

NFPA 409 Group II

- › Aircraft access door height of 28' or less
- › Single fire area not larger than 40,000 ft²

Table 4.1.2 Fire Areas for Group II Aircraft Hangars

Type of Construction	Single Fire Area (Inclusive)	
	m ²	ft ²
Type I (443) and (332)	2,787–3,716	30,001–40,000
Type II (222)	1,858–3,716	20,001–40,000
Type II (111), Type III (211), and Type IV (2HH)	1,394–3,716	15,001–40,000
Type II (000)	1,115–3,716	12,001–40,000
Type III (200)	1,115–3,716	12,001–40,000
Type V (111)	743–3,716	8,001–40,000
Type V (000)	465–3,716	5,001–40,000

Aircraft Hangars

NFPA 409 Group III

- › Aircraft access door height of 28' or less

Table 4.1.3 Maximum Fire Areas for Group III Aircraft Hangars

Type of Construction	Maximum Single Fire Area	
	m ²	ft ²
Type I (443) and (332)	2,787	30,000
Type II (222)	1,858	20,000
Type II (111), Type III (211), and Type IV (2HH)	1,394	15,000
Type II (000)	1,115	12,000
Type III (200)	1,115	12,000
Type V (111)	743	8,000
Type V (000)	465	5,000

Aircraft Hangars

NFPA 409 Group IV

- › Membrane-covered rigid, steel frame structure



Aircraft Hangars

UFC 4-211-01

- › All military hangars are classified as NFPA 409 Group I
- › Specific design requirements for individual branches

Aircraft Hangars

UFC 4-211-01

- › Air Force
 - › ET02-15 – Fire Protection Engineering Criteria for Aircraft Maintenance, Servicing and Storage Facilities.
- › Army
 - › Army Standard for the Aircraft Maintenance Hangar (HGR) Complex
- › Navy/ Marines
 - › ITG 2003-01 – Aircraft Maintenance Facility Design
 - › F35 or C Supplement

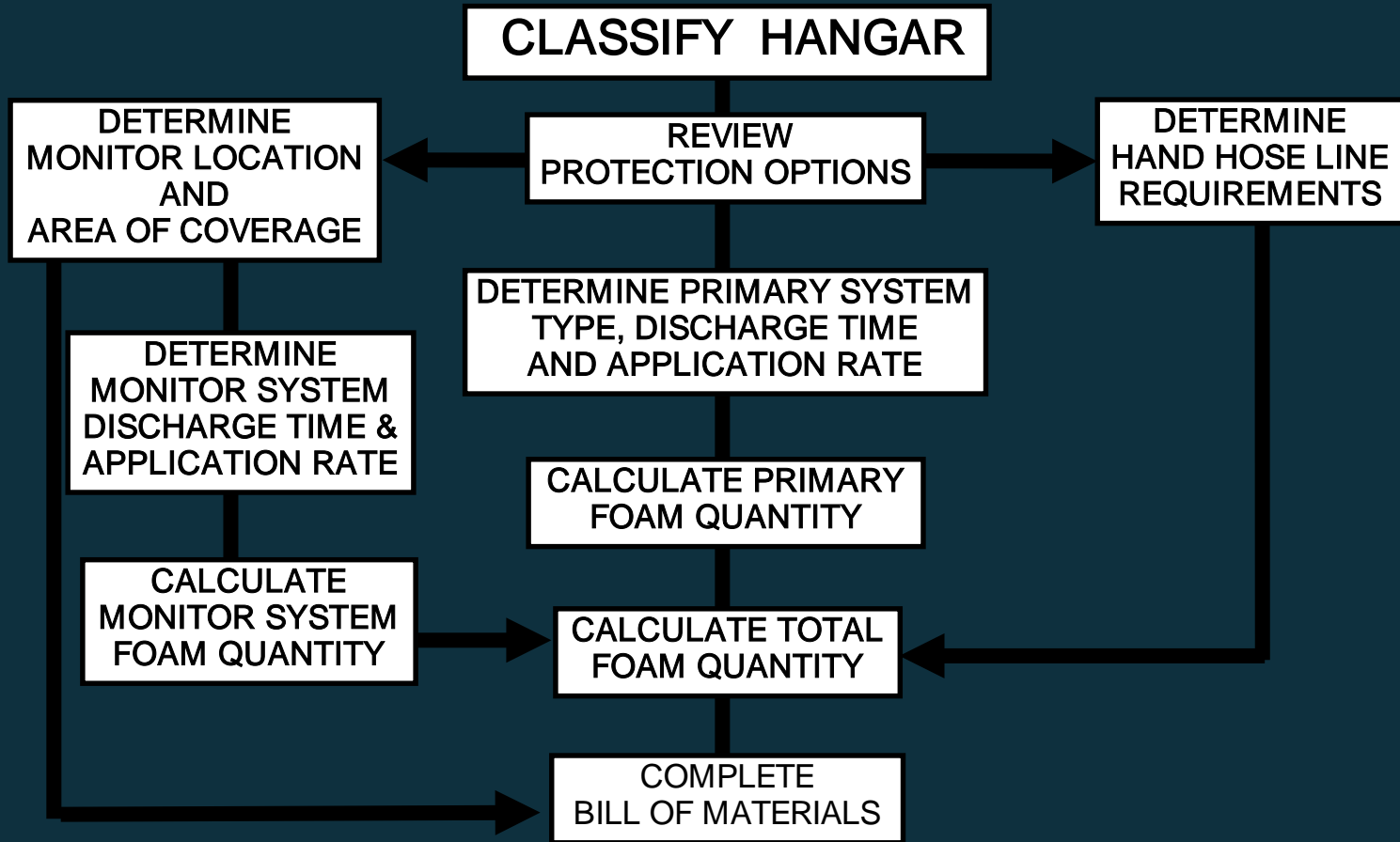
Fire Protection Strategies

Overview

- › Provide a reasonable degree of protection from fire for life and property..based on sound engineering principles, test data, and field experience.
- › Protect Life
- › Protect Aircraft
- › Protect Building

Fire Protection Strategies

Decision Tree



Fire Protection Strategies

NFPA 409

- › Primary Foam-Water Sprinkler Systems
 - › May require supplemental oscillating monitors
- › Foam monitor systems
- › High Expansion Foam System
- › Supplemental Requirements for all above:
 - › Foam-Water Hand Hose Line Systems

Fire Protection Strategies

Unified Facilities Criteria

- › All military hangars are classified as a Group I application in reference to NFPA 409 however they follow a specific design application.
- › **Airforce/ Airguard** – High Expansion systems with foam inductor proportioning and an atmospheric poly tank for foam storage.
- › **Army** – High expansion system with main and reserve foam pump proportioning and atmospheric poly tank for foam storage.
- › **Navy/ Marine (NAVFAC)** – AFFF foam systems with foam inductor proportioning, trench nozzle discharge device and atmospheric poly tank for foam storage.
- › All hangars require a dead man switch to stop foam

Case Studies



Case Study # 1

Group II Hangars

- › Private Aviation Facility
 - › Design & Construction of new hangar
 - › Design/ Building contract
 - › FP Contractor brought in late – no FPE involved
 - › Big ticket item missed early (No Foam!)
 - › Owner consulted with multiple FPEs
 - › All had similar conversations (consistency is good)
 - › Business plan changed (no maintenance)

Case Study # 2

Two Group II Hangars

- › Private Aviation Facilities
 - › Expansion of existing (operational) hangar (+6,000 SQ FT)
 - › Insufficient fire suppression system
 - › Adjacent (operational) hangar with similar issues
 - › Water supply concerns (pressure and volume)
 - › Owner challenges
 - › Scope change – owner education
 - › Convert to wet-pipe/ hi-ex foam (both hangars)
 - › Update fire alarm/ detection
 - › 3 Fire pumps & new building

Case Study # 3

Two Group II Hangars

- › Stewart IAP
 - › Competing stakeholder interest
 - › Army hangars
 - › Air base,
 - › NYS Police
 - › NY/ NJ Port Authority
 - › Convert existing water deluge to wet-pipe & high expansion foam
 - › Design-Build contract/ Restricted budget
 - › Known water supply deficiencies
 - › New Contractors

Case Study # 4

Two Group I Hangars

- › Plattsburgh IAP
 - › Two 26,000+SQ FT nose docks
 - › Complete renovation (we've done this before)
 - › Modification to operational hangar
 - › Wet-pipe sprinklers, hi-ex foam, hose reels, alarm, and detection
 - › Tight construction schedules & budgets
 - › Scope change via addendum
 - › Wet-pipe sprinklers, alarm & detection
 - › Extend existing pre-action, alarm & detection

Case Study # 5

Group I Hangar

- › Confidential Aviation Hangar
 - › New hangar design
 - › Three bays – one fire area
 - › Wet-pipe sprinkler, hi-ex foam, hose reels, pumps, alarm & detection
 - › AHJ initiated design change late
 - › AFFF deluge sprinklers
 - › 6 zones
 - › 5 operate with design fire
 - › Water supply impact (7,800 +/- gpm)
 - › Contractor relationships

Case Study # 6

Group I Hangar

- › Melbourne MRO
 - › Design & Construction new hangar
 - › Design/ build contract
 - › Experienced construction & design team (new partnership)
 - › 30% design for proposal
 - › Multiple approaches
 - › Issues with bidding process (TBD)

Closing

Presentation Take Away:

1. Determine Water Supply Early
2. Communicate Expectations to Stakeholder
3. Performance vs Prescriptive

- Questions
- Open Discussion
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