UFC 3-600-1: Fire Protection Engineering for Facilities - Complete Rewrite

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Session Overview

• Purpose of UFC 3-600-01
• Reason for Rewrite
• Key Highlights
• Q&A
• Allied Revised UFCs
Purpose of UFC 3-600-01

- Unified Facilities Criteria
- Tri-Services Document
  - Army, Air Force and Navy all in one document
  - Used by other three- and four-letter agencies
- Minimum Standard for DoD Facilities – Leased and Owned
- Primary Fire Protection Criteria Reference Document
  - Used by A&Es and DoD for Planning, Design, Construction and Commissioning
Reason for Rewrite

- UFC 3-600-01 Originally Published in April 2003
- Most Criteria Pulled from MIL-HDBK-1008C
  - Essentially just took MIL-HDBK-1008C and tweaked for different services
  - No thorough review of criteria
- Multiple Revisions With Changes Mostly Reactionary
Reason for Rewrite

- Change August 2003
- Change January 2004
- June 2006
- September 2006
- Change 1, July 2009
- Change 2, February 2013
  - Added FM Data Sheet 3-26
- Change 3, March 2013
  - Mostly editorial
- August 2016
- Change 1, November 2016
- Change 2, March 2018
- Change 3, May 2019
Reason for Rewrite

• Needed Top-to-Bottom Scrubbing of Document
• DoD Fire Protection Working Group
  • USACE, AF, NAVFAC, USMC, WHS, NGA, NRO, NSA, CIA, DLA, Army Medical
  • NASA along for ride
  • Attempt to get everyone on similar page related to criteria
Where to Begin

• Review Everything
  • Correlation between IBC and NFPA 101
  • Interaction between NFPA 13 and FM Data Sheet 3-26
  • What about existing buildings?
  • DoD and A&E roles/responsibilities
  • Address CCRs
  • Look at all technical requirements
  • Simplify
  • Limit service exceptions

• Overall user-friendliness
Key Highlights

• Format Follows IBC Chapters
• TOC Has 34 Chapters
  • Some chapters state no FP revisions to IBC
• Intent Was User-Friendliness for Design Community
  • Aligns a little with UFC 1-200-01
• Clarified Role of Government FPE (DFPE) and A&E FPE (QFPE)
• Added Section on Planning (Chapter 1)
• Added Chapter for Definitions (Chapter 2)
  • All defined terms are italicized
Authority Having Jurisdiction (AHJ)

- The term ‘AHJ’ as used in this UFC and the codes and standards referenced in this UFC means the “Fire Protection Engineer assigned to the Military Service or Defense Component office of responsibility”

- U.S. Army - HQ USACE/CECW-CE
- U.S. Navy - NAVFACENGCOM HQ Code CHE
- U.S. Marine Corps - HQMC Code LF
- U.S. Air Force - AFCEC/CO
- Defense Logistics Agency (DLA) - DS-IE
- National Geospatial-Intelligence Agency (NGA) - Security and Installations
- National Reconnaissance Office (NRO) - MS&O/ESO
- Washington Headquarters Services (WHS) - Office of the Pentagon Fire Marshal
- All other DoD Components - Deputy Under Secretary of Defense for Installations
Authority Having Jurisdiction

- Equivalencies to UFC 3-600-01 and Performance Based Fire Safety Design are ONLY permitted to be issued by the AHJ
- Exemptions must be submitted to the Service Signature Authority for determination
- Remember, the AHJ is NOT the installation fire department
- Exemptions or equivalences approved by the installation fire department, DPW or BCE means your design DOES NOT comply with UFC 3-600-01
DFPE – Designated Fire Protection Engineer

- Used to be called Cognizant Fire Protection Engineer
- DoD Fire Protection Engineer
  - USACE – District or Center FPE
  - NAVFAC – Facilities Engineering Command FPE
- Involved in project planning
- Involved during design/construction
- Document makes many references to where DFPE is required to provide direction or make decision
QFPE – Qualified Fire Protection Engineer

- A&E or Consultant FPE (Non-DoD)
- Engineer of Record, Designer of Record or FP QC Engineer
- “An individual who is a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and has relevant fire protection engineering experience.”
- No SFPE member status needed
QFPE Role

• Required on Major Projects (1-6.1.1)
  • A project that includes any one of the following:
  • Addition to an existing facility
  • Renovation, reconstruction or alteration of 50 percent or more of the total floor area of an existing facility
  • Design or construction of a new facility
  • New installation or modification of an area of construction greater than 5,000 SF of floor area that involves existing or new fire barriers or fire-rated construction; life safety systems; fire alarm or detection systems; fire suppression systems
  • Note: Modification of 20 or more existing sprinklers is considered a major project
  • New installation, or modification of existing HVAC systems, that remove or install the duct work passing through fire-rated or smoke partitions/barriers or interconnected plenum areas serving an area greater than 5,000 SF of floor area
QFPE Role (Con’t)

• “A QFPE must be involved in every aspect of the design, construction and testing/commissioning as it relates to fire protection and life safety. This includes, but is not limited to, building code analysis, life safety code analysis, design of automatic fire alarm, detection and suppression systems, water supply analysis, a multi-discipline review of the entire project, construction inspections and witnessing of fire protection acceptance testing/commissioning.”

• Use of multiple QFPEs on the same project is permitted, but not preferred
QFPE Role (Con’t)

- Qualifications:
  - “For the purpose of this UFC, the QFPE shall submit, upon request, a written copy of their resume indicating education, professional registration and work experience, along with a letter attesting to their compliance with the requirements of this Section. The letter must include an imprint of their professional engineering stamp with signature.”

- Simplified Proof of Qualifications
Planning (1-11)

- Entire Section Devoted to DoD Project Planning
  - During development of DD1391
- Installation Water Supply, Storage and Distribution
  - “It is DoD’s responsibility to determine whether or not the Installation infrastructure is adequate to support the project.”
  - No more “provide a water tank if one is needed”
- Flow Testing
  - “Conduct water-flow tests, in accordance with the procedures contained in NFPA 291, to determine available water supply for the water-based fire extinguishing systems. The flow test must be performed under the direction of the DFPE. Advertisement of the project must not occur without obtaining water supply.”
Planning (1-11)

• Fire Flow
  • “When the required Fire Flow cannot be provided by the existing infrastructure, a cost and benefit analysis must be conducted by the DFPE, or their representative, to determine if additional fire protection systems, features, or design changes that provide more favorable factors, such as type of construction or sprinkler protection, are more cost-effective than providing the required Fire Flow.”
Planning (1-11)

• Fire Pumps
  • “The DFPE must determine the need for a fire pump in the planning stages of a project in order to ensure adequate space is available at the Facility.”
  • “The DFPE must determine if a Reliable Power Source is available to the Installation or Facility in the planning stages of the project in order to ensure that the cost and space associated with secondary power is considered and included in the project.”

• Power Reliability Is NOT the Responsibility of the QFPE
Planning (1-11)

• Sprinklers
  • “The DFPE must determine if an automatic sprinkler or other fire suppression system is required for the Facility based on mission, hazard of contents, value of contents or other criteria. This determination must be included in the contract documents for design services or design-build services.”
  • Deleted use of term “Mission Essential”
  • DFPE to make that determination during planning
Planning (1-11)

- Clean Agent Systems
  - DFPE to determine if reserve supply required
- Rural Facilities
- MOOUT Trainers (Shoot Houses)
- Warehouse and Storage Facilities
  - “The DFPE must determine the commodity classification and maximum storage height and include this information in the contract documents when this information differs from the minimum noted in the section on ‘Warehouse and Storage Facilities’ in this UFC.”
- Existing Facilities
Chapter 3

- Use and Occupancy Classification
- Clarified Interaction Between IBC and NFPA 101
  - (Or at least tried to)
- Medically Funded Projects Comply with NFPA 101
- HazMat Complies with NFPA 400
  - Provided cross-reference between NFPA 400 and IBC
Chapter 4

• What Used to Be in Chapter 6
• Occupancy-specific Requirements
• Alphabetized for Ease of Locating
  • Just wait for Change 4!
• Electronic/Telecom Areas
  • Clarified that it is not for data closets
• Elevators
  • No requirements for machine room-less. MRL elevators are not approved by DoD
Chapter 5

• General Building Height And Areas
• Follow IBC Except for Incidental Use
• Clarifies NFPA 101 Not To Be Used for Occupancy Separation
  • Except medically funded
• Clarifies (change 3) NFPA 101 Not To Be Used for Occupancy Location in Building (Story)
• Incidental Use
  • Follow NFPA 101 for separation of hazards
  • Do not follow IBC
Chapter 6

• Types of Construction
• No Specific UFC 3-600-01 Changes
Chapter 7

- Fire and Smoke Protection Features
- IBC Chapter 7 applies ONLY when it is referenced in IBC Chapter 5 or 6
  - If a requirement in Chapter 7 is not referenced in Chapter 5 or 6, it does not apply
- Clarification on SFRM
- HVLS Interlocked to Shut Down on Waterflow
Chapter 8

• Interior Finishes
• Attempted to Clarify Insulation Requirements
Chapter 9

- Fire Protection Systems
- Greatest Number of Revisions
- Pulled All Fire Protection Criteria into Chapter 9
  - Except occupancy-specific
Fire Department Access

When/Where Access Roads Required
• At least one road, terminates within 33 feet of facility

Aerial Apparatus Access
• Buildings 4 stories or more and warehouses
• On two sides, parallel to at least one side
• Not specific to residential occupancies
Fire Flow

- Sprinklered Buildings: 1,000 gpm at 20 psi
- Non-Sprinklered Buildings: Follow NFPA 1
- Change 3 Brought Back Aircraft Parking and Refueling Facilities and Family Housing (oops)
Water Mains

• Adjusted “Service Main” and “Service Lateral” terms to correspond with AWWA

• Service Lateral
  • “A pipe that connects to the Service Main and terminates at a fire hydrant or a Facility. A service lateral to a Facility is permitted to have no more than two fire hydrants. A service lateral does not connect from one Service Main to a second Service Main. A service lateral is a private service fire main as used in NFPA 24.”
  • Service laterals are not looped
  • 10 ft/sec velocity limit applies to non-PVC pipe only
Water Mains

• Service Main
  • “A pipe that transports water from the Distribution Main to the Service Lateral. A service main can be connected to a Distribution Main, Service Lateral or another service main. A main with three or more fire hydrants connected to it is a service main. A main from a fire pump to more than one building is a service main.”
  • Service main is looped
  • No dead end permitted

• Downstream of Fire Pump is Neither Service Main or Service Lateral
Facility On-Site Water

- If Water Storage Is Required
  - Single tank only
  - USACE requirement for dual tanks dropped in change 2
  - Does not apply to aircraft hangars
- Sized at 120% Fire Water Demand
Fire Pumps

- Power Reliability to Be Determined by DFPE
  - See Planning section
  - Should be your first RFI
- Pumps Sized to No More than 140% of Rated Capacity
- Redundant Pump Requirement Eliminated for Mission-Essential
  - “Mission-Essential” term eliminated—see Planning section
- Minimum 3 ft Clearance on One Side of Pump
- Reserve Pump only Permitted when Approved by AHJ
  - DLA always requires reserve pump
Fire Suppression Systems

- Section 9-6
  - Requirements apply to ALL fire suppression systems
- Section 9-6.3, Plans and Calculations
  - Significant detail of what must be included in shop submittals
  - Change 3 revised pressure requirements for RPZ (12 psi) and double check (8 psi) backflow preventers
- Section 9-6.4, Flow Testing
  - Performed under the direction of QFPE
  - Not required to be performed by QFPE
  - QFPE must take ownership of test
Sprinkler Systems

• Section 9-7
• All References to FM Data Sheet 3-26 Removed
• Requirements Pulled into Document, Not Referenced
• Used Terms “Light Hazard,” “Ordinary Hazard” and “Extra Hazard” in Lieu of HC-1, HC-2 and HC-3
  • Better aligns with NFPA 13
• Limited Use of Galvanized Piping (9-7.6.1.1)
  • Only permitted for deluge systems
  • Trim and exterior drain piping
Sprinkler Systems

- Preaction Systems
  - Must use nitrogen
- Dry Pipe Systems
  - Must use nitrogen
- Floor Control Valve Assemblies Required for Three Stories or More
- Disinfection Only Required Upstream of Backflow Preventer
  - Not required downstream of backflow prevention device
Fire Extinguishers

• General purpose portable fire extinguishers are not required when the facility is provided with complete automatic sprinkler protection and a fire alarm system in accordance with this UFC
  • PFE must be provided in all detention/correction and medical facilities, regardless of the DoD component
Fire Alarm Systems

• Section 9-18.2, Plans and Calculations
  • Significant detail of what must be included in shop submittals

• Detection
  • Only provided when required by other sections of the UFC or NFPA 101

• Clarifies When Strobes Are Required
  • Unoccupied rooms greater than 900 SF
  • Offices designed for, or may contain, more than four persons
Fire Alarm Systems

• Strobes
  • Labeled “Alert”, not “Fire”
  • Conflict with UFC 4-021-01

• Pull Stations
  • At every exit doors. NFPA 101 200 ft travel distance not required

• Class B is Minimum Permitted/Required
  • All conductors in conduit
  • Conductors solid or stranded copper
Carbon Monoxide

- Section 9-19 Provides Requirements
- Required in Facilities with Combustible Fuel Burning Equipment Only
- Located in Each Room/Space where Equipment Is Located
- At Least One Detector in Each HVAC Zone Served by Different AHU
  - Downstream of unit (intent is at or before first diffuser)
- Not Required in Large Open Spaces Greater than 12 Feet in Height (change 3)
- Temporal 4 Alert Tone
 Means of Egress

• Chapter 10: Follow NFPA 101 Exclusively
• Radioluminous Exit Signs Not Permitted
• Photoluminescent Exit Signs Are Permitted
• Supplemental Occupant Load Factors (10-3)
  • Specific to DoD facilities
Miscellaneous

• FRT Wood
  • Allowed where permitted by IBC
  • Not permitted as part of any roofing system

• Air Handling Systems
  • Comply with NFPA 90A
  • UFC 1-200-01: “Use UFC 3-600-01 for Fire Protection Features for Mechanical Systems.”
Chapter 34

• Significant Change in Process for Existing Buildings
• Comply With NFPA 101 For Existing Buildings
• UFC 1-200-01 Requires Conformance with IEBC
  • “Use IEBC Chapter 14 with UFC 3-600-01. If conflict occurs between IEBC Chapter 14 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.”
  • Hmmm…

• Needs wholesale rewrite from its current form (on my to do list)
Appendices

• Appendix A: References
• Appendix B: Sprinkler Hazard Classification
• Appendix C: Performance Based Design
• Appendix D: IBC & NFPA 220 Equivalents
• Appendix E: Recommended Fire Alarm and Emergency Notification Messages
• Appendix F: Abbreviations and Acronyms
• Appendix G: Criteria for Projects in Japan (change 3)
Other UFC Revisions

- UFC 1-200-01: General Building Requirements
  - Change 2, November 2018
- UFC 4-021-01
  - Anticipated on the street 2016…2017…2018…2019…
- UFC 4-211-01
  - On the street April 2017
  - Change 1, November 2017
UFC 1-200-01

• “New” Version, not Change 2
• Added Information on UFC Hierarchy
  • Use 100 series first, then 300 series then 400 series
  • 400 series supersedes 300 series if discussed
  • Example: UFC 4-510-01 (Medical Facilities) vs. UFC 3-600-01
• Updated to 2015 IBC
• Clarifies Role Between UFC 1-200-01 and UFC 3-600-01
UFC 4-021-01 Revisions (Proposed)

- Assumed to Be a “New” Version, not Change 2
- Intended to Be a Complete Rewrite
- Eliminating Use of Amber Strobes
  - Only white “alert” strobes (similar to NAVFAC)
  - Expansions of existing systems?
- Adding LED Textual Displays
  - Similar to NAVFAC
  - Do displays require secondary power?
- Possible LOC Changes - Rumors Only
UFC 4-211-01

- Completely New UFC
- Based on UFC 4-211-01N
- Tri-Services (Air Force/Navy/Army)
  - Incorporates 4-211-01N, AF ETL 02-15, Army
- Covers All Aircraft Hangar Criteria, Not Just Fire Protection
- General Hangar Criteria Chapter
- NAVFAC-, Air Force-, and Army-Specific Chapters
  - Supersedes general chapter requirements
UFC 4-211-01 Highlights

• Maximum Fire Pump Size 2,500 gpm
• Single Building
  • AF/Navy: No redundant pump required
  • USACE: Redundant pump required
• Multiple Buildings
  • Two pumps of equal capacity (total flow), plus
  • One redundant pump matching largest size pump
• Redundant Foam Supply Not Required
• Automatic Air Vents at All High Points in Sprinkler System
• Fire Alarm Strobe Coverage Not Required For Center of Bay
UFC 4-211-01 NAVFAC Highlights

- No Significant Change to Current Design
- Low-level AFFF and Overhead Sprinklers
- Grate Nozzles
- Inductors and Atmospheric Tanks
- Must Use Detronics IR3 Detectors
UFC 4-211-01 Air Force Highlights

- Matches a Lot of NAVFAC Criteria
  - “Foam rooms the same. Outside foam room NAVFAC goes down; we go up.”
- Low-Level High-Expansion Foam and Overhead Sprinklers
- Inductors and Atmospheric Tanks
- Flow Control Valves and Abort Stations
- Blue Rotating Beacons Fed From Emergency Bus
- Be Careful of Pressure Requirements
UFC 4-211-01 Army Highlights

• Low-Level Hi-Ex and Overhead Sprinklers
• Redundant Fire Pump
• Foam Pumps and Atmospheric Tanks
  • Bladder or inductors not permitted
• Optical Detectors Required
• Activation of Two Devices
  • Waterflow detector and one optical detector
  • Two optical detectors
• Blue Rotating Beacons Fed From Emergency Bus
• Flow Control Valves and Abort Stations (via General Chapter)
UFGS Revisions

• Almost All FP in Revision
  • Will use “tailoring” in Specsintact
• Wet Pipe, Dry Pipe, Preaction, Deluge
• AFFF
• Clean Agent
• Fire Pump
• Fire Alarm (All)
• Firestopping
• Fireproofing
Summary

• UFC 3-600-01 Completely Rewritten
  • No sentence left untouched/unreviewed
  • Change 3, May 2019
• New Version Follows IBC Format to Match UFC 1-200-01
• UFC 1-200-01, 4-021-01 and 4-211-01
  • 1-200-01: Change 2, November 2018
  • 4-021-01: Sometime in 2019???
  • 4-211-01: Change 1, November 2017
• Most Fire Protection Related UFGS Being Rewritten