Fire Protection Design Guidance

17 Dec 2025

ENGINEERING TECHNICAL LETTER (ETL)

AIR NATIONAL GUARD DESIGN OBJECTIVES AND PROCEDURES

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	Date	Location
0	17 Dec 2025	Whole document has been shifted to realign to new ANGETL format. Updated References. • 1-1/1-2 Language modified/added to align across ANGETLs • 2-3.2 Broke out Section for clarity • 2-4 Office symbol change • 6-1 Added clarity to why pre-action systems are discouraged. • 6-1 a. clarified service entrance requirements • 7-1 Previously exiting language has been integrated into other ANGETLs, redundancy removed • 7-3 Provided clarity to sprinkler requirements on small arms ranges • 8-1 b. Provided more consistent guidance by referencing governing code on fire extinguishers • 8-1 c. Clarified FPE means QFPE & DFPE • 9-1 Clarified language regarding specifications coverage of systems and operations identification

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FOREWORD

In accordance with Air Force Instruction 32-1023, the Chiefs of the National Guard Bureau (NGB) and Air Force Reserve develop supplementary instructions and or guidance unique to the Air National Guard (ANG) and Air Force Reserve Component (AFRC) construction programs and oversee management of their respective programs. In accordance with Title 10, U.S.C. Chapter 133 *Service, Supply, Procurement,* the ANG and the AFRC facilities programs are executed under Title 10. U.S.C., Chapter 1803. As such they may coordinate with Air Force Installation Mission Support Center (AFIMSC) and portions of Air Force Civil Engineer Center (AFCEC), but execute under Title 10, U.S.C., Chapter 1803.

Air National Guard Engineering Technical Letters (ANG ETLs) provide requirements (i.e., defined by users and operational needs) and are intended for use with unified technical requirements published in DoD Unified Facilities Criteria (UFC). ANG ETLs are applicable only to the Air National Guard, and do not represent unified DoD requirements. Differences in requirements between DoD Components as well as local and state agencies may exist due to differences in policies and operational needs.

The UFC system is prescribed by MIL-STD 3007G Standard Practice Unified Facilities Criteria, Facilities Criteria and Unified Facilities Guide Specifications and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applicable to the Military Departments, Defense Agencies, and the DoD Field Activities. The UFC System also includes technical and functional requirements for specific facility types. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Systems Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Technical content of UFC is the responsibility of the cognizant DoD working group.

ANG ETLs are living documents and will be periodically reviewed, updated, and made available to users as part of the Military Department's responsibility for providing technical criteria for military construction.

ANG ETLs are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site https://www.wbdg.org/ffc/ang/engineering-technical-letters-angetl

POINT OF CONTACT: The point of contact for this ANGETL is Fire Protection Engineer, NGB/A4IC at (701) 723-6123, DSN 453-6123, MinotANG-NGB.A4IC.Workflow@us.af.mil

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AIR NATIONAL GUARD ETL
REVISION SUMMARY SHEET

Document: ANG ETL 25-01-03, Fire Protection Design Guidance

Superseding: ANG ETL 24-01-03, Fire Protection Design Guidance, 31 Mar 2024

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CHAPTER 1 INTRODUCTION

1-1 PURPOSE.

\0\ Provide guidance in implementing the Air National Guard (ANG) fire protection design policy. \0\

1-2 APPLICABILITY.

\0\ This document is applicable to both Design-Bid-Build (DBB) and Design-Build (DB) projects. Regardless of the execution method (i.e., offload to USACE, NAVFAC, etc.; Appendix 1031; Facility, Sustainment, Restoration, and Modernization Cooperative Agreement (FSRMCA); or Military Construction Cooperative Agreement (MCCA), this document must be referenced and incorporated into **all** agreements and contracts for pre-design; design; post design/pre-construction award; and post construction award services for ANG projects.

This ANGETL is applicable for all new designs, designs for which NGB/A4I formal approval of the Type A-2, 35% (Concept Development) submittal has not yet been issued for, and for all Code and Criteria Reviews (CCRs). \0\

CHAPTER 2 ANG FIRE PROTECTION ENGINEERING DESIGN

2-1 GENERAL.

Air National Guard (ANG) fire protection policy is based on current Federal and Department of Defense criteria. Items noted in this document include guidance, clarifications and preferences for issues specific to ANG facilities. All fire protection designs shall follow current Unified Facilities Criteria (UFC) requirements.

Qualified Fire Protection Engineer shall be required for all projects contained in the UFC 3-600-01, Change 6 or later, and AFI 32-2001. See AFI 32-2001, Fire and Emergency Services (F&ES) Program, AFI 32-2001 Matrix for when to use a QFPE shall be responsible for fire and life safety analysis including infrastructure for each project.

2-2 DEFINITIONS.

Design & Planning are defined within Air National Guard Design Objectives and Procedures ANGETL 24-02 for this document. This ANGETL utilizes terms defined primarily within the UFC 3-600-01. For Air National Guard design, these terms are further clarified within 2-3 Roles.

2-3 ROLES

2-3.1 Authority Having Jurisdiction

The terms “Building Official”, “Code Official”, and “*Authority Having Jurisdiction*” (AHJ) as used in the codes and standards, and referenced in this ANGETL, means the component office of responsibility NGB/A4. The DOD Unified Facilities Criteria (UFC) 1-200-01 has further defined it to the chief engineer office.

NGB/A4IC Civil Engineer Technical Branch (CETB) serves as the Fire Protection Subject Matter Expert for NGB/A4.

The enforcement of the codes and standards as they pertain to facility projects may be delegated to the local Components Office’s Chief Engineer’s Technical Representative at the discretion of the NGB/A4.

When delegated it confers the authority to interpret the codes and standards and not the authority to waive and/or exempt requirements specifically provided in the documented codes and standards.

2-3.2 Designated (or Service) Fire Protection Engineer (DFPE)

The term *Designated Fire Protection Engineer* (DFPE) as used in this ANGETL and other UFCs, means the fire protection engineer of the component office of responsibility such as the Air National Guard, NGB/A4IC Civil Engineer Technical Branch (CETB).

The DFPE responsibilities may be delegated to the local Components Office's Chief Engineer's Technical Representative at the discretion of the component's office. The Technical Representative is preferred to be 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 or at a minimum who meets the requirements of the Civilian Job Series 0804.

2-3.2 Qualified Fire Protection Engineer (QFPE)

Qualified Fire Protection Engineer (QFPE). An individual who is a registered professional engineer (P.E.) who has passed the fire protection engineering examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and has relevant fire protection engineering experience.

The QFPE can act as the designer of record and/or quality control representative for fire protection matters.

ANG projects require a QFPE for the design, review and oversight services as outlined in the UFC 3-600-01 Fire Protection Engineering for Facilities.

For design-bid-build projects, provide a QFPE for the design development including design drawings, specifications, and preliminary calculations. The construction contractor shall provide an independent QFPE during construction for shop drawings, final calculations, inspections and testing.

The QFPE is responsible for all life safety system components and occupant loads to include oversight and approval of recommended deviation to NGB

For design-build projects, provide a single QFPE throughout the project.

\0\ ANG construction (shop) drawings and calculations must be prepared by National Institute for Certification in Engineering Technologies (NICET) III or IV, Senior Engineering Technician (SET), Certified Engineering Technician (CET). These construction (shop) drawings and calculations must be prepared under the immediate supervision of the QFPE.

The QFPE must affix their professional engineering stamp with signature to the shop drawings, calculations and material data sheets, indicating approval prior to submitting including any of the following that are sent to the to the DFPE:

a. The fire suppression
b. Fire alarm systems
c. Emergency Services systems
d. Fire stopping with penetrations of 5 or more through fire rated walls and
e. Systems being shown on a floor plan with wall type and penetration material and Third-party fire stopping design with material shown
f. System shop drawings

The QFPE must monitor the installation of all of the above and witness all testing including fire rated dampers and certify in writing that the fire above system has been constructed and operates as intended in the design plans and specifications. \0\

2-4 EXEMPTIONS AND EQUIVALENCIES

When requesting an Exemption or Equivalency, include written justification in accordance with UFC 1-200-01 DOD Building Code.

Exemptions or equivalencies for operational fire protection must be coordinated through \0\ NGB/AXOF \0\ must be coordinated IAW ANGI 32-2001 & DODI 6055.8

2-5 HIERARCHY

Air National Guard (ANG) fire protection policy is based on codes and standards as outlined in UFC 1-200-01 DoD Building Code (General Building Requirements) in addition to this and other ANGETLs. Other fire codes are applicable only where required, such as per a lease agreement. When conflict occurs between applicable codes the most stringent applies.

The hierarchy of applicable codes and standards is in accordance with UFC 1-200-01 DoD Building Code (General Building Requirements). This ANGETL provides additional design requirements or alternative design methods but does not supersede UFC requirements.

CHAPTER 3 DELEGATED DESIGN

3-1 DELEGATED DESIGN FIRE SUPPRESSION MINIMUM REQUIREMENTS

At minimum, include the following for delegated fire suppression design:

a. A legend defining the symbols and abbreviations used. Fire suppression notation as required for specific design and installation requirements of the system.

b. Provide the available fire water supply and other related requirements such as fire pumps and fire water storage.

c. Plans/layouts indicating sprinkler zones, hazard classifications for each area, design densities and design areas, hose demand, and additional information required to define the performance limitations of the fire suppression systems.

d. All working (shop) drawings, regardless of the type of fire suppression system, must meet the drawing requirements in NFPA 13 for Working Drawings, unless the system specific standard has requirements for working drawings.

e. Where fire pumps are used, provide an enlarged plan locating major equipment such as fire pumps, risers, and major piping runs within the fire protection room.

f. Where a fire pump or more than one riser is used in a building, provide a One-line diagram indicating the intended infrastructure of the system including items such as valves, flow/pressure switches, tamper switches, pumps, riser assemblies, bypasses, backflow prevention, fire department connection, test header, and surge suppression.

g. Fire suppression design specifications

h. Preliminary hydraulic calculations demonstrating an adequate fire water supply is provided. Additional calculations may be required by other UFCs.

3-2 Delegated Design Fire Alarm and Mass Notification Minimum Requirements

At minimum, include the following for delegated Fire Alarm and Mass Notification design:

a. A legend defining the symbols and abbreviations used. Fire alarm notation as required for specific design and installation requirements of the system.

b. Plans/layouts shall be provided to define the performance limitations of the fire alarm system.

c. Indicate the location of items such as fire alarm control units, releasing system fire alarm control units, notification appliance booster panels, amplifiers, pull stations, aspirating smoke detection panels, and spot smoke detection.

d. Provide the location of coordinated fire safety devices such as door hold opens, fire/smoke dampers, and spot smoke detection for elevator recall.

e. The specific location of notification appliances is not required, however indicate what areas require audible and/or visible notification.

f. Coordinate with the fire suppression plans/layouts for connections such as tamper switches, flow switches, and pressure switches.

g. Provide details/elevations as required to relay specific design and installation requirements, such as a start station layout.

h. Provide a one-line diagram showing the intended infrastructure of the fire alarm system. At a minimum, show how panels are connected to each other and associated subpanels. Indicating how each type of device or appliance is connected to its associated panel or subpanel. Showing multiple connections of the same type of device or appliance on a panel is not required.

i. Provide a fire alarm matrix for each fire alarm control unit or releasing system fire alarm control unit demonstrating the functionality of connected devices.

j. When applicable, provide the language for voice evacuation and mass notification messages.

k. Fire alarm specification

CHAPTER 4 DESIGN CRITERIA

4-1 DESIGN CRITERIA

All design and construction projects which involve or impact fire detection and suppression systems for ANG facilities, especially those involving the design of aircraft hangar fire suppression systems, require the designer (A-E or in-house), and contractor to have on staff, or under contract, a qualified and experienced Fire Protection Engineer (FPE). For the purpose of meeting qualification requirements, a qualified FPE is defined as an individual meeting the requirements of UFC 3-600-01, Fire Protection Engineering for Facilities.

UFC 3-600-01, Fire Protection Engineering for Facilities requirements regarding renovations, alterations, rehabilitations and modernizations shall be followed, in addition to more specific guidance provided in this document. Changes in occupancy are required to comply with requirements for new construction.

Use components that are Underwriter’s Laboratory (UL) Listed or Factory Mutual (FM) approved for fire protection service in the design and construction of fire suppression and fire alarm systems. With the following exceptions:

a. Exception: UL Listed or FM Approved components are not required where specifically approved by this ANGETL, other UFCs, or tested by a Nationally Recognized Testing laboratory (NRTL) to the satisfaction of the AHJ.

b. Exception: UL Listed or FM Approved components are not required where specifically exempted in NFPA standards.

CHAPTER 5 FIRE ALARM AND MASS NOTIFICATION SYSTEMS

5-1 FIRE ALARM AND MASS NOTIFICATION SYSTEMS

The fire alarm system shall provide radio based, fiber optic or landline based, remote system reporting to the base central system, and a secondary central receiver. Provide radio based transmission systems for all new base-wide systems. Retrofit installations shall use system equipment that is listed by a nationally recognized testing laboratory, and is compatible with the existing equipment to include the central base transmitting and receiving system. All facility fire alarm systems must also transmit appropriate signals to the responding (host or other) fire department, which in most cases is the ANG fire station.

5-2 FIRE ALARM AND MASS NOTIFICATION DETECTION AND NOTIFICATION DEVICES

Systems shall utilize supervised non-proprietary generic type detection devices and notification appliances and shall be interchangeable with other brands that are readily available to the extent practical.

All detection and terminal devices shall have engraved plastic or metallic alphanumeric identification, which shall be keyed to the posted operations and maintenance instructions.

Manual pull stations shall be provided, at a minimum, at each exit as defined in NFPA 72. Do not provide pull stations on the hinged side of doors except in the case of double doors.

At all locations that a duct detector is installed, provide remote test switch (install at a maximum of 7 feet above finish floor (AFF) elevation) and LED indicator for maintenance and alarm identification.

Emergency eyewash and shower station connection to the fire alarm system will be determined by the Base Fire Chief. If provided with connections to the fire alarm system, these stations shall report as a supervisory alarm and not as a trouble alarm.

5-3 FIRE ALARM AND MASS NOTIFICATION CONDUIT

All fire detection and alarm system conductors shall be run in minimum 3/4 in. electrical metallic tubing (EMT) conduit. Exception would be those locations deemed unsuitable for EMT conduit. In such cases, use rigid or PVC type conduit. Use of flexible metal conduit (FMC) or liquid-tite conduit is not permitted except in areas subject to extreme vibration, and where used, shall be limited to 6 ft. Lengths.

For ICD/ICS design utilize CPVC Pipe and 10 thin wall steel with dielectric break for piping sizes greater than 2 inches in diameter. For pipes below 2 inches in diameter utilize a schedule 40 with dielectric break.

Notification circuits in sleeping areas, and indicating device circuits for sleeping quarters, shall be on Class A or X circuits as defined in National Fire Protection Association (NFPA) 72. Positive alarm sequence shall be used following parameters established in NFPA 72.

5-4 FIRE ALARM PANELS

The fire alarm control panel for each facility's detection system shall be located in a room with outside access, either the fire protection, mechanical, or electrical rooms. Coordinate the locations of the fire panel and annunciator panel (if required) with the BCE and Fire Chief.

Fire Alarm panels shall be field expandable. Panels may be field programmable provided that this can be accomplished at the unit (panel) level, without the use of proprietary software, keys, the changing of electronic hardware, or use of any proprietary device. Any software, device, password or other element used to program any component of the fire alarm system shall be specified to become property of the government, along with the installed program.

CHAPTER 6 FIRE SUPPRESSION SYSTEMS

6-1 FIRE SUPPRESSION SYSTEMS

Fire suppression systems shall be wet pipe or dry pipe, and the design shall be based on the hazard involved. Pre-action systems are strongly discouraged, and wet pipe systems are recommended in lieu of pre-action systems. \0\ This is driven out of concern for the additional long-term sustainment/maintenance of the Nitrogen Generator on Pre-action systems. \0\

In no case shall the A-E use any source data (fire department, water purveyor, or BCE) for water supply information other than an actual test witnessed and accepted by the A-E representative.

The following component details shall be designed into all suppression systems:

a. All steel piping for the fire suppression system shall be minimum schedule 40 thickness.

b. Provide dedicated fire service entrance with back-flow prevention device and indicating shut off valve. \0\ All fire service utility entrance shall be separate from facility domestic water supply utility entrance. This separation of fire and domestic utilities does not need to occur exterior to the building. If spacing permits do not put this separation exterior to the building for maintenance purposes. ANG preference for incoming service is a single stainless-steel service. \0\

c. Fire suppression system auxiliary drain valves shall be fully accessible and located no higher than 7'-0" AFF.

d. For all projects, design of supports for fire protection systems shall comply, as a minimum, with seismic criteria as outlined in the UFC requirements.

e. All wall and floor penetrations for fire protection piping shall be fully sleeved and sealed.

f. Sprinklers shall be located symmetrically within ceiling tiles. Provide architecturally coordinated, single piece sprinkler trim rings in occupied spaces.

g. For fire hydrants, on Air Force and Reserve bases where the ANG is a tenant, follow host base style and color policy.

h. Sprinklers for server rooms shall be standard response intermediate temperature classification.

i. All fire sprinkler risers shall be located in rooms with direct access to the exterior of the building, such as mechanical rooms.

CHAPTER 7 FACILITY SPECIFIC GUIDANCE

7-1 PASSIVE FIRE PROTECTION SYSTEMS (LIFE SAFETY SYSTEMS) - SCIF

\0\ Secure Compartmented Information Facilities (SCIF) and similar spaces shall comply with NFPA Standard 101 requirements for life safety. \0\

7-2 HANGAR FIRE PROTECTION

Piping design shall show consideration (unions or flanged connections) for the removal of pumps, valves and other items for maintenance.

7-3 SMALL ARMS RANGES

\0\ Sprinkle occupancies/usages in accordance with FC 4-179-03F as indicated in Chapter 3 Facility Requirements and Criteria Modules Figures 3-1 through 3-29. This will

result in partial sprinkling of small arm ranges that have support facilities that are integral to the range. \0\

CHAPTER 8 FIRE SYSTEMS APPURTENANCES

8-1 FIRE SYSTEMS APPURTENANCES

Fire protection design for all facilities shall include the following listed features and items.

a. Provide Knox (or equivalent type) boxes, located on the exterior of the building at a location to be determined by the BCE and the Base Fire Chief. The box shall be cast brass, recessed style and suitable for housing appropriate keys.

b. \0\ For fire extinguishers & cabinets implement IAW DAFMAN 91-203 and UFC 3-600-01, Fire Protection Engineering for Facilities. \0\

c. Fire Prevention Inspectors review facility plans to ensure required fire protection features are present, response vehicles have appropriate access, and local emergency response elements are incorporated in design. \0\ IAW UFC 3-600-01 Fire Prevention Inspectors shall not conduct the required Fire Protection Engineer (Both QFPE & DFPE) reviews of technical designs. \0\

CHAPTER 9 SPECIFICATIONS

9-1 SPECIFICATIONS.

The contractor shall provide their own confirming water flow testing where an existing water system is being used in the design.

\0\ Specifications shall outline both system Identification and operations identifications that are to be coordinated with and keyed to the posted operations instructions and the operation & maintenance (O&M) manuals. \0\

O&M manuals shall be completed, submitted and approved by no later than 30 days prior to beneficial occupancy.

Posted instructions shall comply with any UFC/NFPA requirements but also include the following for Air National Guard installations at a minimum:

a. Comprehensive schematics for sprinkler distribution systems.

b. Facility floor plans showing location of all fire equipment and devices with coordinated identification. Show items such as fire walls, fire dampers etc.

c. System diagrams, including isometrics of special equipment and systems.

d. Valve charts.

e. Equipment schedule.

f. Wiring diagrams and schematics.

g. Fire/smoke dampers.

Posted Operations Instructions, framed in heavy gauge extruded metal frames, mounted under glass. These posted instructions shall be water/weatherproof Instructions shall be permanently mounted in the reserved clear wall area (show reserved area in the design drawing details) in each fire protection room or mechanical room.

Posted instructions completed with professionally prepared graphics, printed on full size sheets and shall be in color. Instructions shall be prepared for all fire protection systems and shall include all components.

Training for Base personnel on all fire detection and suppression systems. Training shall be specified to be complete with all materials, fees and tuition paid for by the contractor. Employee travel costs shall be paid for by the government.

ATTACHMENT 1 REFERENCE PUBLICATIONS

Joint Service: All current Unified Facilities Criteria (UFC) requirements located at https://www.wbdg.org/dod/ufc, including, but not limited to the following:

UFC 1-200-01, General Building Requirements

UFC 3-301-01, Structural Engineering

UFC 3-600-01, Fire Protection Engineering for Facilities

UFC 3-601-02, Operation and Maintenance: Inspection, Testing, and Maintenance of Fire Protection Systems

UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings

UFC 4-010-05, Sensitive Compartmented Information Facilities Planning, Design, and Construction

UFC 4-021-01, Design and O+M: Mass Notification Systems

UFC 4-211-01, Aircraft Maintenance Hangars As modified by Air Force Foam Fire Suppression Sundown Policy

UFC 4-211-02, Corrosion Control and Paint Finishing Hangars

FC 4-179-03F, Air Force Indoor Small Arms Firing Range

Tri-Service Fire Protection Engineering Working Group (TSFPEWG) G 3-600-01.01-18. https://www.wbdg.org/dod/supp-tech-documents

AF: All Current AF AFI can be obtained from https://www.e-publishing.af.mil/

AFI 32-1023, Designing and Construction Military Construction Projects

AFI 32-2001, Fire and Emergency Services (F&ES) Program

ANG: All current NGB/A4 ANGETL & Air National Guard Handbook (ANGH) requirements located at https://www.wbdg.org/ang, including but not limited to the following:

ANGETL 24-02, Design Objectives and Procedures

ANGH 32-1084, Facility Space Standards

Other Publications: NFPA standards to the extent referenced by UFC's, including, but not limited to the following:

NFPA 1, Fire Code

NFPA 13, Installation of Sprinkler Systems

NFPA 14, Standpipe Systems

NFPA 20, Stationary Fire Pumps for Fire Protection

NFPA 24, Installation of Private Fire Service Mains and their Appurtenances

NFPA 30, Flammable and Combustible Liquids Code

NFPA 70, National Electrical Code

NFPA 72, National Fire Alarm and Signaling Code

NFPA 75, Protection of Information Technology Equipment

NFPA 80, Fire Doors and other Opening Protectives

NFPA 90A, Installation of Air-Conditioning and Ventilation Systems

NFPA 101, Life Safety Code

NFPA 110, Emergency and Standby Power Systems

NFPA 409, Aircraft Hangars

FM Global Data Sheets