SOCIETY OF FIRE PROTECTION ENGINEERS (SFPE)
POSITION STATEMENT 2020-1

THE ENGINEER AND THE ENGINEERING TECHNICIAN DESIGNING FIRE PROTECTION SYSTEMS

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Endorsing Organizations:

ABET
AUTOMATIC FIRE ALARM ASSOCIATION (AFAA)
AMERICAN FIRE SPRINKLER ASSOCIATION (AFSA)
AMERICAN SOCIETY OF CERTIFIED ENGINEERING TECHNICIANS (ASCET)
FIRE SUPPRESSION SYSTEMS ASSOCIATION (FSSA)
NATIONAL COUNCIL OF EXAMINERS FOR ENGINEERING AND SURVEYING (NCEES)
NATIONAL FIRE SPRINKLER ASSOCIATION (NFSA)
NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS (NSPE)

Approved October 21, 2020. Replaces 2008 position statement.

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1 Preface

Fire protection is a rapidly evolving technological field. Whether protecting the built or natural environment, and whether using standardized approaches or performance-based design, the professionals involved must be qualified for their role in the process. The fire protection industry must accommodate a regularly changing environment while maintaining the fundamental objective: *Applying scientific and engineering principles to protect people and the environment from destructive fire.*

This position statement has been created to outline the recommended roles of engineers and engineering technicians in the design of fire protection systems for projects involving both parties. This document, as a position statement for all Endorsing Organizations, does not advocate or recommend a position on when an engineer or engineering technician should be required for a specific fire protection system design. The applicable laws and regulations for a jurisdiction govern when an engineer or an engineering technician are required for a fire protection system design. The qualifications for an individual to be an engineer or engineering technician are also regulated by the jurisdiction.

2 Introduction

The Society of Fire Protection Engineers (SFPE) is credited with the original development of this document. This revision will update and replace the version issued in July 2008. The Endorsing Organizations to this position statement are ABET, the Automatic Fire Alarm Association (AFAA), American Fire Sprinkler Association (AFSA), the American Society of Certified Engineering Technicians (ASCET), Fire Suppression Systems Association (FSSA), the National Council of Examiners for Engineering and Surveying (NCEES), the National Fire Sprinkler Association
(NFSA), the National Society of Professional Engineers (NSPE), and the National Institute for Certification of Engineering Technologies (NICET). This paper was created to develop a unified position statement regarding the reasonable and prudent roles and responsibilities of licensed Professional Engineers (PE) and Certified Engineering Technicians (CET) when designing fire protection systems for installation in the United States and globally, as applicable. Local laws dictate the specific rules that are applicable in each jurisdiction. This document provides a recommended model for adopting jurisdictions and agencies.
The term "fire protection engineering" should be viewed as synonymous with the terms "fire safety engineering" and "fire engineering." These terms apply to the application of engineering principles to prevent and mitigate the unwanted impact of fire. For practical purposes, only the term "fire protection engineering" is used in the remainder of the document.

The Endorsing Organizations recognize that defining fire protection system design in terms of the roles and responsibilities of engineers and engineering technicians is a sensitive undertaking. Each has capabilities and responsibilities that contribute to the relationships in a design project. Moreover, the Endorsing Organizations recognize that fire protection engineers and engineering technicians play an important role in protecting the health, safety, and welfare of the public.

This Position Statement describes the critical relationship of engineer and engineering

technician. Engineers and engineering technicians may overstep their respective roles if they participate in aspects of design and layout for which they are not qualified by education, experience, and/or credentials. This Position Statement explains the relative roles of those in the field of fire protection who contribute to public safety, including licensed Professional Engineers and Certified Engineering Technicians.

Fire protection systems are both active and passive systems. Active systems include, but are not limited to water-based fire suppression systems, foam systems, gaseous fire suppression systems, dry chemical fire suppression systems, hybrid fire suppression systems, aerosol fire suppression systems, oxygen reduction systems, special hazard systems, fire alarm and signaling systems, emergency communication systems, smoke control systems, and explosion protection systems. Examples of passive systems can include, but are not limited to interior finish, structural fire resistance, fire barriers, compartmentalization, vertical openings, protection of openings, fire doors, fire proofing, fire and smoke dampers, firestopping, and assessing means of egress (accounting for exits, occupancy, occupant loads, emergency lighting, and signage). Throughout this document, the phrase "*fire protection systems"* is used inclusively unless otherwise indicated.

3 Evolution of Licensing and Certification

In the interest of public safety, jurisdictions adopt and enforce building codes, fire codes, and standards that mandate fire protection systems. There is a need for personnel qualified in the design of these systems.

Historically, the principal, nationally recognized qualification criteria for engineers in this profession was found in the membership requirements of SFPE. In the United States, there were no nationally recognized programs for licensing or certifying those who designed fire protection systems.

Beginning in the 1980s, several professional organizations contributed significantly to the process of establishing roles and responsibilities of engineers and engineering technicians in designing fire protection systems, including the development of the NICET certification programs for engineering technicians in the field of fire protection engineering technology.

SFPE, NSPE, NCEES, and ABET worked together to support fire protection engineering as a recognized professional engineering discipline.

- SFPE defined and established qualifications for licensed Professional Engineers in terms of the minimum education, training, and experience necessary to competently practice fire protection engineering. (Also see SFPE's *Recommended Minimum Technical Core Competencies for the Practice of Fire Protection Engineering,* December 2018.)

- NCEES, an independent federation of state engineering licensing officials (boards), works closely with SFPE to maintain a national professional engineer licensure program for fire protection engineers and recognizes that fire protection systems play an

important role in protecting the health, safety, and welfare of the public. This was reiterated in the NCEES *Manual of Policy and Position Statements*, Position Statement 22 *Fire Protection Systems* dated August 2018.

- ABET is an organization that accredits programs in the disciplines of applied and natural science, computing, engineering, and engineering technology at the associate, bachelor's, and master's degree levels. Having accredited programs in fire protection engineering and fire protection engineering technology is pertinent to the development and sustaining of licensure.

NSPE, through NICET, offers programs for certifying engineering technicians in fire protection in fire alarm systems, water-based systems layout, and special hazards systems, as well as inspection and testing of fire alarm systems and inspection and testing of water-based systems.

However, licensure and certification alone are insufficient to ensure quality; thus, professional organizations further developed codes of ethics and professional responsibility. (See Appendix A: Code of Ethics/Professional Responsibility.)

4 Describing the Project Team Members & Their Tasks

4.1 Project Team Members

Throughout this document, references to licensed Professional Engineer and Certified Engineering Technician are intended to convey the following:

4.1.1 Licensed Professional Engineer

As defined by NCEES, a fire protection engineer is a licensed Professional Engineer (hereinafter referred to as an "Engineer") who demonstrates sound knowledge and judgment in the application of science and engineering to protect the health, safety, and welfare of the public from the impacts of fire. SFPE further defines a fire protection engineer in the *Recommended Minimum Technical Core Competencies for the Practice of Fire Protection Engineering* as:

> ***"A Fire Protection Engineer is an individual who, by formal training and professional experience, carries the necessary competency, and has the skills to provide guidance and direction to protect life, property, and environment from threats posed by fire and its related mechanism."***

This includes the ability to apply and incorporate a thorough understanding of fundamental systems and practices as they pertain to life safety and to fire protection, detection, alarm, control, and extinguishment. This could include:

Fire Science

- Fire Dynamics Fundamentals: An ability to apply principles of fire dynamics as related to fire and smoke behavior, fire growth, combustion, materials properties, and heat transfer.

Human Behavior and Evacuation

- Egress & Occupant Movement: A basic knowledge of human response principles as related to evacuation movement, human response to fire cues, and timed egress analysis.

Fire Protection Systems

- Passive: A working knowledge of the principles of building construction as they relate to fire protection.

- Active: An ability to assess and design active fire protection systems

Fire Protection Analysis

- Fire Protection Management: A basic understanding of the capabilities and limitations of design, facility impairment procedures, and inspection frequencies.

- Risk Management: A basic understanding of hazard analysis, risk analysis, and economic analysis techniques.

- Building and Fire Regulations and Standards: A working knowledge of codes and standards, occupancy and hazard classifications, fire test methods, and the interpretation of fire test data.

Further details and descriptions of knowledge areas can be found in SFPE's *Recommended Minimum Technical Core Competencies for the Practice of Fire Protection Engineering.*

The Engineer's responsibilities for the design can include, but are not limited to:

A. Evaluate the broad range of hazards and protection schemes required to develop a workable, integrated solution to a fire safety problem.

B. Prepare engineering documents for fire protection systems. This may include:
    - Conceptual and detailed engineering documents
    - Hazard and risk analyses
    - Performance-based design analyses
    - Integrated building systems analyses
    - Fire protection system drawings
    - Calculations for all fire protection systems, as necessary
    - Technical specifications indicating general, product, and execution requirements
    - Affix a professional stamp or seal with signature and date to documents prepared under the Engineer's direct supervision and control.

C. Review work by engineering technicians to ensure conformance with the Engineer's design including fire protection installation drawings, calculations, and submittals.

   Note: Installation drawings may also be referred to as shop drawings, working drawings, or layout drawings.

D. Develop commissioning and acceptance requirements, if not specifically required by standards.

E. Observe the installation and testing of fire protection systems.

F. Verify compliance of the fire protection systems with the relevant codes and standards.

The Engineer must maintain competency through continuing education. Many jurisdictions implement mandatory requirements for continuing education to demonstrate continued competency. Refer to each credentialing board for specific continuing education requirements.

4.1.2 Certified Engineering Technician

A certified engineering technician who has achieved NICET Level III or IV certification [1] or approved equivalent in the appropriate subfield and who has the knowledge, experience, and skills necessary to layout and detail the applicable systems hereinafter is referred to as a "Technician" for the purposes of this paper.

The Technician may perform tasks required by the engineering documents, together with applicable codes and standards[1] including, but not limited to:

A. Perform the system layout and prepare installation drawings.

B. Prepare material submittals.

C. Perform calculations and other functions.

D. Support the installation of fire protection systems.

It is recognized that some jurisdictions have enacted regulations that allow the Technician to layout the system and prepare installation drawings without the involvement of an Engineer. In such cases, an Engineer might not be involved with the project. The Technician is then additionally responsible to ensure that the fire protection system(s) criteria are in accordance with all applicable codes and standards.

Technicians are responsible for their work and must maintain competency through continuing education.

[1] Such as those published by the National Fire Protection Association (NFPA), or the International Code Council (ICC).

4.1.3 Authority Having Jurisdiction

The Authority Having Jurisdiction (AHJ) is the individual or agency that has legal, contractual, or other responsibility for reviewing the design for conformance with applicable codes and regulations. Examples of AHJs that typically review the design include the fire/building officials, an insurance underwriter, owner's representative, and an approved third party. For more complex designs, the review may be performed by another fire protection engineer as part of a delegated third-party review.

The AHJ is expected to:

- Review engineering documents for conformance with the applicable codes and regulations.
- Review installation drawings and submittals for conformance with the applicable codes and regulations.

4.2 Tasks

Throughout this document, references to *engineering documents* and to *installation drawing* development are intended to convey the following:

4.2.1 Engineering Documents

The Engineer is responsible for the preparation of engineering documents that establish the objectives and design criteria of the system(s). The engineering documents shall be of sufficient clarity to indicate the location, nature, and extent of the work proposed and show that they conform to the provisions of relevant laws, codes, ordinances, rules, and regulations. To establish minimum design quality in the engineering documents, the documents should include, as a minimum, the following information when applicable:

- Identify the scope of work
- Identify applicable codes and standards including the specific edition
- Conform with the applicable building code(s)
    - Identify applicable code and referenced standard requirements.
    - Identify any trade-offs allowed based on the installation of a suppression system, or some other compensatory factor.
- Identify occupancy type(s), areas to be protected (or omitted), and hazard classification(s)
- Water-based suppression systems: a) Select type of system(s) and components; b) classify the hazard(s), storage arrangements, and commodities to be protected; c) establish the design criteria; d) determine and confirm the available water supply including any necessary adjustments; e) create a conceptual system layout and hydraulic calculations to verify adequacy of proposed water supply arrangements; f) set criteria regarding systems structural support including seismic documentation (as appropriate); g) identify water quality or other environmental factors that would affect the proposed systems; and h)

establish zoning with consideration to building elements (e.g. horizontal exits) or other fire protection/life safety systems (e.g. smoke control).

- Fire alarm system: a) Select type of system and components; b) identify fire alarm panel location; c) create system concept riser diagram(s); d) identify interface(s) required with fire safety functions, other fire alarm systems, and other building systems; e) determine average ambient sound level; f) determine minimum candela ratings and placement of strobes; g) determine output settings of all speakers to ensure audibility and intelligibility; h) identify location and quantity of panels requiring primary power supply; i) identify all initiating device and notification appliance locations; j) determine sequence of operations; and k) integrate with other systems.

- Special hazards systems (including but not limited to CO_2, halocarbon and inert gas clean agents, hybrid systems, aerosol, oxygen reduction, and dry chemical systems): a) Select type of system and components; b) classify the hazard area and hazards to be protected, including fire barrier and fire damper requirements; c) determine the minimum design concentration, normal cylinder storage temperature, cylinder location, and control panel location; d) identify system interfaces and customer requirements; and e) create a system input/output matrix.

- Smoke Control Systems: a) Select the design fire based on building conditions; b) determine type of design to be used (i.e. stair pressurization, space pressurization, atrium exhaust, etc.); c) calculate airflow required to meet design goals; d) determine makeup air requirements; e) identify initiating system activation; f) select system components (fans, dampers, doors, windows, controls, etc.); g) prepare special inspection procedures; and h) create a system input/output matrix.

Based on this design criterion, the Engineer prepares and/or supervises the preparation of engineering documents.

4.2.2 Installation Drawing and Submittal Development

The Engineer or the Technician develops installation drawings and submittals based upon the engineering documents, specified standards, and manufacturer listings. These packages of information could include:

- Water-based suppression systems: a) detailed layout of risers, cross mains, branch lines, sprinklers/nozzles, and hangers; b) size of pipe; c) hydraulic calculations in accordance with the engineering documents; d) technical data sheets and details for the specific equipment being furnished for installation; and e) requirements of applicable codes and referenced standards.

- Fire alarm systems: a) layout, final circuiting, and placement of initiating devices, notification appliances, notification appliance settings, power supplies, amplifiers, nodes, modules, and other system components; b) riser diagram(s); c) notification appliance circuit voltage drop calculations; d) battery calculations for secondary power; e) technical data sheets and details for the specific equipment being furnished for

installation; f) sequence of operations; and g) requirements of applicable codes and referenced standards.

- Special hazard systems: a) layout, circuiting, and placement of initiating devices, notification devices, release stations, cylinders, and other system components; b) detailed isometric and plan layout of piping, hangers, and nozzles, including calculation nodes; c) hazard volume, agent concentration, and flow calculations; d) detailed wiring and control diagrams indicating all system interfaces and points of interconnection; e) technical data sheets and details for specific equipment being furnished for installation; and f) requirements of applicable codes and referenced standards.

- The installation drawings and submittals may require approval by the Engineer or the Technician depending on project or jurisdiction criteria.

4.2.3 Installation Quality Control

The Engineer and/or the Technician should monitor the installation and acceptance testing of all fire protection systems. Installation quality control should be documented.

4.2.4 As Built Installation Drawings

The Technician should maintain accurate as-built installation drawings reflecting all field changes. At the completion of the project, the Technician should provide these as-built installation drawings to the owner. The Engineer should spot-check the accuracy of these as-built installation drawings during their periodic construction observation site visits.

Appendix A – Code of Ethics/Professional Responsibility

Typically, codes of ethics and professional responsibility are developed within professional organizations to serve as guideposts for professional performance and conduct.

A.1 Code of the Engineer

The Engineer subscribes to a code of ethics required from a regulatory viewpoint and designated by a state board of registration.

The NSPE publishes a model code of professional ethics, commonly followed by state boards of registration, which can be read on their website: www.nspe.org[2].

The SFPE *Canon of Ethics for Fire Protection Engineers* can be found on their website: www.sfpe.org/CodeofEthics[1].

A.1.1 Stamps and Seals

The Engineer should sign or seal only those documents for which they were in responsible charge.

A.1.2 Engineer of Record (Responsible Engineer)

There can only be one Engineer of Record for each fire protection system design. An Engineer who modifies or reuses already sealed engineering documents or installation drawings shall take full responsibility for the documents as though they were their original work.

A.1.3 The Role of NFPA Standards in the Fire Protection System Design

Standards published by the National Fire Protection Association, such as NFPA 13, *Standard for the Installation of Sprinkler Systems,* and NFPA 72, *National Fire Alarm & Signaling Code*, are widely adopted by building and fire codes. NFPA standards are recognized as providing minimum requirements for a reasonable degree of protection for life and property through standardized design requirements, which define much of the engineering criteria used to design fire protection systems. In many cases, these standardized design requirements are sufficient for projects, but standardized design criteria are not available for many buildings and hazards. An Engineer is the only legally authorized entity to evaluate fire protection needs and determine whether the design is appropriately based on a standardized or special approach. Even where a special design approach is utilized, the Engineer will largely reference and rely upon standardized criteria from documents such as NFPA standards in establishing the engineering design. The standardized criteria include many of the detailed requirements carried into the development of installation drawings.

The Engineer may also recognize local or special conditions that would warrant a departure from strict adherence to the applicable NFPA or adopted standard. The NFPA standards, as examples, recognize such possibilities and contain language as follows to allow variances:

> **NFPA 13[4]**
>
> *1.5 Equivalency. Nothing in this standard is intended to prevent the use of systems,*

methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed in this standard.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.7.1 Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

NFPA 72[5]

1.2.3 This Code establishes minimum required levels of performance, extent of redundancy, and quality of installation but does not establish the only methods by which these requirements are to be achieved.

1.5 Equivalency
1.5.1 Nothing in this Code shall prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability and safety over those prescribed by this Code.

1.5.2 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.3 The systems, methods, devices or appliances that are found equivalent shall be approved.

Although the role of the AHJ is recognized in the above references, the Engineer is ultimately responsible for the adequacy of the design.

The Engineer should review the installation drawings and submittals and require correction of features or details that are inconsistent with the engineering documents and/or which contain unauthorized departures from the requirements of applicable NFPA standards.

A.2 Professional Code of Certified Engineering Technician

While Technicians are not commonly required by law to subscribe to a code of ethics for professional behavior, NICET has established a code of ethics for revoking a certificate if violation of that code is proven[3].

The *NICET Code of Ethics* [3] closely parallels the NSPE *Code of Ethics for Engineers*. It can be found on the NICET website: www.nicet.org.

A.2.1 Stamps and Seals

NICET covers seals and stamps in Policy 28 (revised September 2016) as follows:

> *The use of any seal or stamp conveying the full NICET name, logo or certification mark on technical documents or drawings prepared, checked or reviewed by a NICET certificant is not authorized by NICET.*
>
> *If there is a requirement that a NICET certificant(s) who prepared or reviewed technical documents or drawings must identify their credentials within those documents/ drawings, that information must be contained within the title block of the document/drawing, or within a square or rectangular box near the title block.*
>
> *NICET certificant information provided must include the certificant's full name, their NICET certification number, the relevant certification practice area attained, the level of certification held within that practice area, and their certification expiration date.*
>
> > *Example:*
> >
> > *(Drawing/Document) (prepared/reviewed) by:*
> > *John Q. Public*
> > *NICET Certification No. 123456*
> > *Water-Based Systems Layout - Level III*
> > *Certification Expires: October 1, 2019*
>
> *The use of any seal or stamp that resembles or might be construed as the seal or stamp of a licensed professional engineer is unacceptable.*

NICET conveys that a certificant (individual) only seals or stamps a drawing or document in this fashion when required by the jurisdiction or entity overseeing the project. That mark does not mean that NICET has reviewed the drawings or documents. The mark must also be different in appearance so that it is not mistaken for a PE seal/stamp.

A.2.2 Working with Codes and Standards

The system layout and detail within working plans or installation drawings must be consistent with the Engineer's design regardless of whether the design is fully addressed within the applicable standards, such as those published by NFPA. Technicians preparing installation drawings have an obligation to adhere to the standards referenced in the Engineer's design.

Appendix B – NCEES Position Statement 22

SFPE, NSPE, and NICET support the National Council of Examiners for Engineering and Surveying (NCEES) Position Statement (PS) 22 *Fire Protection* (reissued in August 2018), and have issued this position paper as a more detailed examination of the issue. The NCEES Position Statement is as follows:

PS 22 Fire Protection

NCEES recognizes that fire protection systems — including fire detection, alarm, and suppression systems — play an important role in safeguarding the health, safety, and welfare of the public. NCEES also recognizes the design and calculation of fire protection systems to be the practice of engineering.

NCEES recommends that member boards actively pursue enforcement of state statutes and rules with local permitting authorities having jurisdiction regarding the engineering supervision over the specification, design, and calculation of fire protection systems.

To implement the above, the following is recommended:

A. Contract drawings should include a set of fire protection drawings that are sealed by a licensed professional engineer.

B. Supervision by a licensed professional engineer is required in the review of fire protection installation shop drawings for compliance with the engineer's design and specifications.

C. Oversight by a licensed professional engineer is required in the installation of an original permitted design.

Appendix C – Sample Review Stamp

SUBMITTAL REVIEW

A ☐ NO EXCEPTIONS TAKEN
No further review of Submittal is required

B ☐ MAKE CORRECTIONS AS NOTED
Incorporate corrections in work: resubmittal is not required. If Contractor cannot comply with corrections as noted, revise to respond to exceptions and resubmit. Record Drawings shall reflect corrections.

C ☐ REVISE AND RESUBMIT
Revise as noted, and resubmit for further review.

D ☐ NOT REVIEWED: STATE REASON _____

This submittal has been reviewed only for the limited purpose of checking for general conformance with the design concept as expressed in the Contract Documents, subject to the requirements of the Contract Documents. Nothing in this review is intended to authorize any aspect of work that is not in accordance with state and local code requirements.

XYZ FIRE PROTECTION ENGINEERING INC.

By _____ Date _____

Project No. _____ References _____

References

[1] *Code of Ethics for Fire Protection Engineers,* Society of Fire Protection Engineers. 3 February 2018. www.sfpe.org/CodeofEthics

[2] *Code of Ethics for Engineers*. Publication #1102, National Society of Professional Engineers. Revised January 2003.

[3] *NICET Code of Ethics*. National Institute for Certification in Engineering Technologies. Obtained at: https://www.nicet.org/about-us/code-of-ethics/. Viewed 13 April 2020.

[4] *Standard for the Installation of Sprinkler Systems*. NFPA 13. (2019). National Fire Protection Association, Quincy, MA. 2018.

[5] *National Fire Alarm & Signaling Code*. NFPA 72. (2019). National Fire Protection Association, Quincy, MA. 2018.

[6] *SFPE Recommended Minimum Technical Core Competencies for the Practice of Fire Protection Engineering*, Society of Fire Protection Engineers. December 19, 2018. https://cdn.ymaws.com/www.sfpe.org/resource/resmgr/docs/core_competencies/Minimum_FPE_Competencies_FIN.pdf