Fire Protection Implementation Guide
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The Fire Protection Implementation Guide was created for the Professional Engineering Schedule (PES) 871, in order to better define the scope of Fire Protection Engineering (FPE) services and to make it easier for an agency to find contractors capable of performing FPE services. In order not to conflict with the FAR Part 36, this guide establishes what is meant by Fire Protection Engineering and clarifies the role of the Fire Protection Engineer as well as range of services that are authorized under the schedule.

Fire protection engineering (also known as fire engineering or fire safety engineering) is the application of science and engineering principles to protect people and their environments from the destructive effects of fire and smoke.

The discipline of Fire Protection Engineering includes, but is not exclusive to:

- Active fire protection - fire suppression systems, and fire alarm.
- Passive fire protection - fire and smoke barriers, space separation
- Smoke control and management
- Escape facilities- Emergency exits, Fire lifts etc.
- Building design, layout, and space planning
- Fire prevention programs
- Fire dynamics and fire modeling
- Human behavior during fire events
- Risk analysis, including economic factors

Fire protection engineers apply science and engineering principles to protect life, property, business operations, the environment, and heritage from fire. Grounded in disciplines such as mechanical, civil, structural, electrical, and chemical engineering and the sciences, they often work in teams to apply cutting edge research tools to address the new challenges of the 21st century. The threats of terrorist attacks, the safe use of new composite materials, the impact of natural disasters are just some of the challenges that today's fire protection engineers are tackling.

Fire protection engineers assist architects, building owners and developers in evaluating buildings' life safety and property fire protection goals. FPEs are employed as fire investigators, including such very large-scale cases as the analysis of the collapse of the World Trade Centers. FPEs are also employed to provide 3rd party review for performance based fire engineering solutions submitted in compliance with local building regulations.

Fire protection engineers do fire experimentation and research. They perform risk analyses of major industrial facilities and consult with architects on buildings ranging from high rise structures to hospitals, hotels and sports stadiums. They engineer safe buildings, ships, trains, and other facilities using the latest principles of performance based design. Fire protection engineers design egress systems based on human behavior and protective components such as fire sprinkler and alarm systems, exit and smoke control systems. They investigate fires and explosions, and assure safety in diverse areas such as the NASA space program, and the US base in Antarctica.

Customer agencies may use fire protection engineers as its principal agent to advise on or manage the process over the project. The Fire Protection Engineer assumes the position of professional adviser or extension of staff to the customer agency. The Fire Protection Engineer frequently helps the customer agency identify issues that protect people and their environments from the destructive effects of fire and smoke. The fire protection engineer expertise is used to temporarily expand the customer agency's capabilities so that the customer agency can successfully accomplish its program or project, while ensuring the safety of its people and property. The Fire Protection Engineer also provides expert advice in support of the customer agency's decisions in the implementation of the project.

- **Fire Protection Engineer** Services can be performed under PES as long as the following are considered:

    - The FPE is acting **solely as** the Agency **(Owner's) Agent**. The FPE functions as an **advisor or consultant** to the owner/Agency to assist with the execution of the project. The FPE is **not involved with** the **designing** the project **or performing the construction of real property**. He is **not the constructor**, and will not construct the project, **nor** is the FPE **a party to the construction contract.**

    - The FPE is **not contractually responsible** for, and does not assume the risk of delivering the project on time and within budget since it **doesn't hold trade contracts** and has no means of holding the trade contractors responsible for the quality of their performance, delay or cost overruns. The FPE does not have control over or charge of the construction means, methods, techniques, sequences or procedures, which are solely the Contractor's responsibility.

    - FPE **takes no entrepreneurial risk** for costs, timeliness, or quality of construction.

- The FPE is not responsible for the Contractor's failure to carry out the Work in accordance with the contract documents.

- The FPE is to determine in general that the Work is being performed in accordance with the Contract Documents, endeavoring to guard the Owner against defects and deficiencies in the work. This level of review does not guarantee the performance of the Contractors or serve to transfer responsibility to the FPE for the Contractors' failure to perform the work in accordance with the contract documents.

- The FPE may recommend Courses of Action to the owner/Agency.

- The FPE will endeavor to guard the Owner against defects and deficiencies in the Work.

- FPE shall not have control over or charge of acts or omissions of the Contractors, Subcontractors, or their agents for employees.

- FPE makes no warranties relating to schedules or completion dates, budgets, cost of Work or Project.

- FPE has no liability for any errors or omissions in the Construction Documents or any defects in the services attributable to the FPE's use of and/or good faith reliance upon the Construction Documents.

- Visits and observations by the FPE's Engineer and the Resident Project Representative are not intended to be exhaustive or to extend to every aspect of the Contractor's Work in progress or to involve detailed inspections of Contractors Work.

- The Engineers role is limited to spot checking, selective sampling, and similar methods of general observation of the work based on Engineer's exercise of professional judgment.

- Engineer shall not supervise, direct, or have control over Contractor's Work, nor haveauthority over or responsibility for the means, methods, techniques, sequences, or procedures of construction selected by the Contractor.

- Review all certificates of inspections, test, and approvals required by Laws and Regulations or Contract Documents.

- Engineer's review will be for the purpose of determining the results certified indicate compliance with the contract documents and will not constitute an independent evaluation that the content or procedures of such inspections, test, or approvals comply with requirements of the Contract Documents.

- PES Services in general do not necessarily require a licensed engineer to perform the services of studies, investigations, surveying and mapping, tests, evaluations, consultations, comprehensive planning, program management, conceptual designs, plans and specifications, value engineering, construction phase services, soils engineering, drawing reviews, preparation of operating and maintenance manuals and other related services (FAR Part 36.601-4(a)(3)). However in the role as a FPE it is often desired in order to be in a position to better communicate with the Design Architect and Construction contractor.

- The FPE is expected to establish all necessary liaisons, coordination, and support with any project related agencies and representatives at the Federal, State, Regional, and Local levels as appropriate for each task order.

- In providing project management services, the FPE acts as the Agency's designated agent and maintains a coordinating relationship with the Agency, its clients, as well as with the architect-engineers, construction contractors and other contractors supporting the government.

- The Architects-Engineers are solely responsible for the project designs and shall perform all design related services in accordance with their contracts with the Government.

- The Construction Contractors are solely responsible for construction means, methods, sequences and procedures used in the construction of the projects, and for related performance in accordance with their contracts with the Government.

- The FPE may provide inspectors and physically inspect work for code compliance and adherence to construction contract requirements, recommend approvals or rejections of materials and workmanship and monitor labor and safety requirements. The FPE should notify the construction contractor and or

Construction Manager orally and in writing when unsafe working conditions are observed.

- The FPE should attempt to resolve problems, act to mitigate circumstances that could lead to claims, and advise the Government of any potential disputes.

- The FPE should exercise due diligence to ensure that work is performed in conformity with applicable requirements (codes, regulations, standards, construction contract plans, and specifications, etc.).

- The following services are allowed under Fire Protection Engineering Services

  - **<u>Design Review Services</u>**

    Perform design reviews for multiple stages of design (e.g., 75%, 95%, 100%, etc.) for various planned building renovation projects and/or new construction projects associated with fire protection and life safety systems. Design reviews, may include, but are not limited to the following:

    - Review design drawings and specifications related to the fire protection and life safety aspects of the design for compliance with Agency fire protection and life safety requirements and applicable national Codes and Standards.
    - Review the continuity of and coordination between drawings and contract specifications related to the fire protection and life safety aspects of the design.
    - Review change orders and RFIs for projects.
    - Review as-built drawings.
    - Develop or review scopes for projects that impact building fire protection & life safety systems.
    - Develop or review project work items.
    - Develop or review cost estimates for fire protection & life safety systems.
    - Develop and review bid documents.
    - Participate in design review meetings. Includes, participating in discussions with Agency personnel, members of the design team, etc., to discuss the design as well as review comments.

  - **<u>Shop Drawing/Submittal Review Services</u>**

Shop drawing/submittal reviews associated with fire protection and life safety systems may include, but are not limited to the following:

- Perform shop drawing/submittal reviews for projects (e.g., shop drawings, calculations, and product catalog data sheets, and other pertinent project information).
- Perform an evaluation to determine that proposed fire protection and life safety systems and equipment and their associated components submitted for review are in are in compliance with the contract specifications, design drawings, manufacturer's recommendations, Agency requirements, and the applicable national Codes and Standards.
- Perform shop drawing/submittal reviews to determine any conflicts with the design contract plans and specifications or any potential design changes that may be needed during the submittal reviews (i.e., additional equipment, relocation of equipment, etc.).

- **<u>Inspection & Testing Services</u>**
    - Review contract documents/drawings and notify contractors of potential mechanical, construction and fire protection and life safety system coordination issues.
    - Develop or review pretesting protocols of fire protection and life safety systems and equipment prior to testing.
    - Perform site investigations to evaluate fire protection and life safety systems and equipment for compliance with national Codes and Standards.
    - Perform contractor performance monitoring (e.g., preventive maintenance contractors, installation contractors, etc.) associated with fire protection and life safety systems.
    - Perform system inspections and analysis of existing fire protection and life safety systems and equipment.
    - Perform microbiologically influence corrosion analysis of fire sprinkler systems.
    - Witness acceptance testing of fire protection and life safety systems and equipment (e.g., fixed fire suppression and control systems, fire alarm systems, emergency communication systems, mass notification systems, smoke control and management systems, normal and emergency power and lighting systems, explosion prevention and control systems, fire and smoke resistant assemblies, means of egress and components, and other active and passive fire protection and life systems and equipment, etc.) and document results, to evaluate operations and to verify adherence to construction contract requirements (or the lease agreement, if applicable),

applicable national Codes and Standards, Agency requirements, and standard industry practices.

- **Construction Inspection Services**
  - Perform site inspection services at various levels of the construction process (e.g., 50%, 75%, 95%, etc.). The inspections may include building construction (i.e., fire and smoke rated walls, shafts, barriers, etc.), fire protection and life safety systems, integrating with other building systems, etc. to verify proper installation in accordance with the contract/design drawings, specifications (or solicitation if the project is lease construction), and applicable national Codes and Standards.

- **Fire & Smoke Modeling/ Analysis Services**
  - Perform fire and smoke modeling to analyze fire growth, smoke development and movement, fuel load, egress times, smoke management designs, suppression system activation, structural fire engineering, etc.
  - Review fire and smoke modeling reports
  - Perform or review fire hazard analysis to determine national Fire Code limitations, commodity compatibility, compartmentalization issues, suppression system design criteria, etc.

- **Loss Investigation Services**
  - Perform site investigation to identify probable causes for losses (i.e., fire, explosions), incident reconstruction, system failures, national Codes and Standards compliance analysis, etc.

- **Technical Consultant Services**

  Perform technical fire protection engineering consultant services which may include, but are not limited to the following:
  - Perform facility fire protection engineering and/or life safety assessments.
  - Perform national building and fire code analysis.
  - Perform analyses of fire protection water supplies, fire sprinkler systems, fire pumps, etc.
  - Perform or review interpretations of requirements in national Code and Standards.

- Perform fire protection water supply testing.
- Perform quality assurance/control and/or oversee fire protection contractors operation, inspection, testing, and maintenance practices.
- Perform accessibility compliance review.
- Perform joint commission assessments.
- Perform fire risk assessments to identify risks, assess risks, and to develop economic strategies to mitigate those identified risks.
- Perform egress analysis, fire and life safety evaluations, human behavior analysis, performance-based analysis, etc.
- Review fire protection policy documents, design guides, etc.
- Review engineering reports or studies which relate to fire protection.
- Review contractor-conducted facility fire protection engineering and/or life safety assessments.
- Review adequacy of occupant egress and other fire protection systems within a facility.
- Review products (e.g., electronic door locking system, polybutylene fire sprinkler piping, flammable liquid container performance, etc.) for national Code and Standards compliance.
- Develop or review risk reduction strategies based on unique characteristics of the facility.
- Develop or review fire protection related specifications.
- Develop or review Agency fire protection technical guidance.
- Develop or review exit calculations, fire pump calculations, risk assessments, hydraulic sprinkler calculations, etc.
- Develop or review alternative design methods for building code compliance.
- Develop or review wildland exposure analysis/wildland interface analysis to identify the fire and life safety hazards of an urban wildland interface area.
- Develop or review fire protection and life safety master plans.
- Develop or review facility occupant emergency evacuation plan.
- Develop or review approaches that integrate various building systems into a comprehensive fire protection and life safety package.
- Develop or review fire protection related training materials for Agency personnel and customers.
- Develop or review fire protection engineering analyses to demonstrate equivalent level of fire safety for office buildings.
- Evaluate capability of existing fire protection and life safety systems and equipment.

    - Evaluate validity of findings and/or citations from AHJ's or other Agencies.
    - Evaluate building systems for feasibility for integrating with fire protection and life safety systems and equipment.

- 871-7 Construction Management
    - Witness commissioning of fire protection and life safety systems and equipment.
    - Perform commissioning of fire protection and life safety systems and equipment.