

GUIDELINES FOR PEER REVIEW IN THE FIRE PROTECTION DESIGN PROCESS

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1.0 GENERAL

These guidelines address the initiation, scope, conduct, and report of a peer review of a fire protection engineering design. In these guidelines, peer review is defined as the evaluation of the conceptual and technical soundness of a design. A peer review may be conducted on any or all components of a design, such as the fire protection engineering design brief, conceptual approaches, supporting analyses, calculations, application or interpretation of code requirements. A peer review is to be performed by appropriately qualified individuals based upon a scope of work agreed upon by the stakeholders.

1.1 Purpose

These guidelines provide guidance to members of the Society of Fire Protection Engineers and others in the fire protection engineering community concerning the peer review process of fire protection engineering designs.

1.2 Introduction

These guidelines address issues such as when to use a peer reviewer, the choice of reviewer, the scope of the review, the agreements needed, the documentation of the peer review, and other related details. These guidelines describe the decisions that a stakeholder should make in establishing and conducting a peer review. As defined in the *SFPE Engineering Guide to Performance-Based Fire Protection*,¹ stakeholders may include building owners, building managers, members of the design team, authorities having jurisdiction, insurance providers, etc.

As performance-based design and other forms of design requiring greater engineering rigor increase, the use of peer review will likely become more prevalent. Peer review is a tool that can be used to help a stakeholder make decisions regarding the suitability of a design.

Typically a peer review is sought by a reviewing authority to provide a second opinion regarding the design's likelihood of achieving the stated objectives. However, other situations may also necessitate a peer review.

Given that the use of a peer review may add time to the critical path of the design process, a stakeholder who wishes the advice of a peer reviewer should begin the process of identifying and contracting for the peer review as early as possible, but no later than at the design review and approval stage. That stage typically involves numerous stakeholders.

2.0 SCOPE OF A PEER REVIEW

2.1 Overview

The scope of the peer review may be a complete review of the entire documentation, including compliance with applicable codes and standards and the appropriateness of the assumptions, engineering methods and input data used to support the design. Alternatively, the scope of the peer review may be limited to specific aspects of the design documentation, such as specific models or methods and their associated input data and conclusions drawn from the output data.

Agreement on the scope of the peer review should be achieved between the contracting stakeholder and the peer reviewer. The scope should be explicitly identified at the time of execution of the agreement to undertake the peer review. Any changes to the scope must be agreed to by both the contracting stakeholder and the peer reviewer.

The peer review should be limited to only the technical aspects of the design documentation.

The peer review should not evaluate the education, experience or other personal aspects of the person or company that prepared the design.

The peer review should examine both the internal and external appropriateness of the design.

External appropriateness considers whether the correct problems are being solved. Internal appropriateness considers whether the problems are solved correctly.

2.2 Third Party Inspection vs. Third Party Review

Some stakeholders may also utilize third parties to undertake inspections of completed installations. As the scope of these inspections is typically related to compliance of the completed installation with the previously-reviewed design documents, such inspections are outside the scope of a peer review as covered by these guidelines.

2.3 Details of a Peer Review

Whether the scope of the peer review is the complete documentation of a project or some specific aspect of it, the peer reviewer should consider the following details, as appropriate to the design being reviewed:

- Applicable codes, standards and guides
- Design objectives
- Assumptions made by the designer (e.g., performance criteria, design fire scenarios, material properties used in correlations or models.)

- Technical approach used by the designer
- Appropriateness of models and methods used to solve the design problem (see Appendix F of the *SFPE Engineering Guide to Performance-Based Fire Protection*)
- Input data to the design problem and to the models and methods used
- Appropriateness of recommendations or conclusions with respect to the results of design calculations
- Correctness of the execution of the design approach (e.g., no mathematical errors or errors in interpretation of input or output data)

3.0 INITIATION OF A PEER REVIEW

3.1 Overview

The decision to initiate a peer review is typically made by a project stakeholder, whose interest may be safety, financial, environmental or cultural. A peer review is often commissioned by an enforcement official; however, other stakeholders may also commission such a review. This decision usually follows the design development of a project and is occasionally a prescribed part of the design review and approval. A determination to initiate a peer review may be made by a stakeholder during a preliminary project meeting, when presented with a project design brief, or when presented with a complete set of design documents.

3.2 When to Conduct a Peer Review

The decision as to whether or not to conduct a peer review is up to individual stakeholders. The motivation may be a desire to have a better understanding of the quality, completeness or the

scientific bases of the design. The decision to conduct a peer review may also be made by a stakeholder who has resource limitations and wishes to bring in outside assistance to evaluate the fire safety features of the design. Another possible reason to initiate a peer review may be to provide additional quality assurance for the design.

3.3 Choice of a Peer Reviewer

The importance of a peer reviewer's independence and technical expertise cannot be overemphasized. The peer reviewer should be objective and have no personal or corporate conflict of interest in the project. Any candidate being considered as a peer reviewer should disclose to the contracting stakeholder any conflict of interest or technical bias.

A peer reviewer should have the necessary knowledge and fire protection engineering or fire science expertise to understand and evaluate the design that is being evaluated. For example, a peer reviewer should at least have the necessary knowledge and fire protection engineering experience to prepare an acceptable design that is similar in scope to the design being reviewed. Section 1.2.1 of the *SFPE Engineering Guide to Performance-Based Fire Protection* identifies one means to assess the abilities of engineers who are qualified to practice fire protection engineering and prepare acceptable designs. Peer reviewers should be able to demonstrate, through documented education and experience, that they are competent to perform the requested peer review. Any specialized expertise that will be necessary to undertake the peer review, for example in using specific tools or models, should be identified.

3.4 Identification of Agreement to Perform a Peer Review

Prior to commencing a review, the peer reviewer should execute an appropriate agreement with the contracting stakeholder. Once this agreement has been formalized, the contracting stakeholder should notify the design engineer of record, and other appropriate parties, of the initiation of a peer review as required by applicable ordinances, engineering practice acts, canons of ethics, etc. A sample agreement of this type is published by the American Consulting Engineers Council² and is available at www.nspe.org. That sample agreement identifies who takes responsibility for design, records retention, confidentiality, dispute resolution and other related topics.

4.0 CONDUCT OF A PEER REVIEW

4.1 Standard of Care for a Peer Review

Peer reviews should be conducted in accordance with the SFPE Canons of Ethics. Within the agreed-to scope, a peer review should be performed to the same standard of care that would be expected of a responsible designer during the evaluation of trial designs. Section 2.3 of these guidelines identifies the attributes of a performance-based design that should be evaluated during a peer review. However, if a peer-reviewer discovers deficiencies that fall outside of the scope of the review, those deficiencies should be brought to the attention of the contracting stakeholder.

A peer review is often intended to ensure that the public's safety goals or the fire protection goals of other stakeholders are met. Generally, improvement of the design or value engineering

is not the purpose of a peer review. The design team will typically accomplish improvement of the design.

4.2 Communications between peer-reviewer and designer

Communication between the peer reviewer and the designer can facilitate the peer review. The methods of communication should be understood by all parties.

4.3 Standard of Reasonableness

Peer reviewers should not be influenced by matters of their own design preference, since there will frequently be more than one acceptable solution to a design problem. Technical issues that the peer reviewer would not expect to have a significant effect on the performance of the design should be identified as observations or findings rather than as deficiencies.

4.4 Tools Required for Review

Peer reviewers should have sufficient documentation of the validity of the tools and data that were used in the development of the design. A full evaluation of a design may require that the designer provide the peer reviewer with access to the tools used to develop the design. In such cases, the peer reviewer should respect any confidentiality issues associated with the tools, and should use the tools only for conducting the specified peer review. In some peer reviews, it may be necessary to use additional tools and data to perform checks on the results that were obtained during the development of the original design.

Some design and analysis may be carried out using commercial software that is licensed to an individual or company and copies of the software may not be available to the reviewer (e.g.

FLUENT, StarCD or ANSYS). There may also be situations where the reviewer is not familiar with or qualified to use the software. Should this occur, it may be necessary to seek persons with appropriate skills and access to the software to assist in determination of the appropriate use of the software and the accuracy of the input and results. Approval for such arrangements may be needed from the commissioning stakeholder.

4.5 Confidentiality

Normally, the results of a peer review should be communicated only to the contracting stakeholder. At the discretion of the contracting stakeholder, the results may be communicated to the design engineer of record. In some instances, when dictated by professional ethics, communication of the results to the appropriate enforcement officials may be necessary.

4.6 Intellectual Property Rights

During the peer review process, the peer reviewer should treat the information and materials as confidential and with privilege, and should not extract, copy, or reproduce through mechanical, electronic, or other means any or all of the concepts or approaches developed by the design engineer.

5.0 REPORT OF A PEER REVIEW

5.1 Documentation

At the conclusion of a review, the peer reviewer should prepare a written record that identifies the scope of the review and the findings. The report should identify whether, in the peer

reviewer's opinion, the design meets the design objectives. The items shown in Section 2.3 of these guidelines should be addressed in the report. Peer reviewers should substantiate any comments on appropriateness by references to published technical documentation.

5.2 Supplemental Information

Resolution of differences in the conclusions between the design team and the peer reviewer may require supplemental technical documentation to resolve the differences. It is not unusual for these differences to take several iterations between the peer reviewer and the designer to resolve. It is important for the designer and the peer reviewer to realize that peer review is only a tool to make an informed decision.

6.0 ADDITIONAL INFORMATION

More information on Fire Protection Engineering, Performance-based fire protection design and peer review in the fire protection design process can be found on the Society of Fire Protection Engineers web page - www.spfe.org.

¹ *SFPE Engineering Guide to Performance-Based Fire Protection*, National Fire Protection Association, Quincy, MA: 2007.

² "Standard Form of Agreement between Owner, Designer, and Peer Reviewers for Professional Services for Independent Peer Review." American Consulting Engineers Council, Washington, 1999.