The Fire Engineering Brief (FEB) Content Guidelines

Purpose of this guideline

The purpose of this guideline is to outline good practice when considering the content that might be included in a Fire Engineering Brief (FEB) document.

The goal of the fire engineering briefing process is to mitigate risk for the fire engineering design, by having early conversations about items of potential uncertainty. Including relevant information in the process of discussing and documenting the fire engineering design brief is beneficial in contributing towards a streamlined 'no surprises' design and consenting process.

Whilst the purpose of this document is specifically intended to discuss the content of a fire engineering brief, an overview of the FEB process is also given and its context within the overall Fire Engineering Design Process (refer to Commentary section). It is important to note that undertaking an effective briefing ***process*** is in itself as important as the specific content, or format of documentation of the fire engineering brief.

The Fire Engineering Brief is not a record of the fire design solution for a building; i.e. it is not "the fire report." It is helpful to clarify this in the FEB document itself, for the benefit of readers who may be unfamiliar with the fire design process.

FEB recommended content: minimum in the context of regulatory approval

General overview

The fire engineering briefing document should outline the general building characteristics and the scope and intent of the project. The FEB should address elements of the fire design where early discussion and clarification of assumptions is important during development of the design – all information that will benefit the progression of the fire design process. This may include:

- Location or legal status of items that affect compliance (e.g. boundaries, shared ownership, easements)
- Design of special-use buildings that require unique consideration (e.g. prisons, hospitals, evacuation to a place of safety inside the building, internal use of open flames or heat sources, theatrical spaces)
- Items that affect future commitment or flexibility for the building affecting owner or tenant (e.g. building classified use, or affecting contractor due to long lead time procurement)
- Items which are known to be subject to interpretation, ambiguity, poorly aligned expectations or extent of application (e.g. choice of design approach and application of Compliance documents; interpretation of Compliance Documents or Code clauses; features not covered by Compliance documents, S112 alteration scope, change of use, application of Act, Gazette Notice No. 49, variables in C/VM2 or other compliance documents where there is a risk depending on use in the context of the project)
- For existing buildings: scope of review, analysis, proposals for 'as near as reasonably practicable' that are subjective and require discussion.
- Agreeing scope of engineering analysis and modelling (e.g. for complex projects; challenging fire locations, computational smoke model to be used, occupant load scenarios)

Specific content considerations

The following is intended as a guide to the content that might be included in the FEB.

Not all the items listed below will be relevant to all buildings. Equally there may be additional important briefing matters to discuss and agree for a particular project. The applicability of each consideration depends on the scale, complexity of project and scope of fire engineered design.

Summary of Fire Engineering Design Concepts

- Fire or smoke compartmentation strategy
- Evacuation strategy
- Extent of fire alarm alerting, detection and suppression systems
- Source of water supplies for fire suppression or fire fighting
- Access and facilities for firefighting operations (attendance point; vehicular and pedestrian access; panels, inlets, information on hazards, etc.)

Building Characteristics

- Bulk and location relative to property boundaries and other buildings
- General building layout and complexities, challenges due to site layout (flat/sloping)
- Intention for internal building subdivision (e.g. unit title, strata title, etc.) or adjacent land subdivision (affecting location of relevant boundaries)
- Building Importance Level (Building Code Clause A3)

Programme and building function

- Timing of any sequential stages for consent submission/approval or construction
- Extent to which existing buildings remain occupied during construction work (spaces, timing)
- Proposed arrangement for independent design review

Fire design methodology/assessment parameters

- Compliance document (e.g. acceptable solution or verification method); engineered solution from first principles
- Occupancy types and any corresponding unusual occupant characteristics; familiarity, mobility, occupant location relative to potential challenging fire locations and effect on choice of pre-movement time (close to or remote from fire location)
- Description of the design considerations or Design Scenarios that apply (e.g. for C/VM2 design) and the strategy for addressing them
- Fire modelling
  - Type of model (and applicability, simplifications, assumptions)
  - Locations of challenging fires, fire growth rate, control or uncontrolled fire (presence and effectiveness of sprinklers); maximum fire size, heat release rate density (intensity of fire); effect of decaying fire on structural response (if applicable)
  - Means of measuring tenability in fire models; relevant ASET occupant and/or fire fighter acceptance criteria (if potentially ambiguous)
- Egress procedures and assessment/modelling
  - Assessment methods and input values for time equivalence calculations of fire severity
  - Evacuation procedures to be used ('all out', prioritised, movement to internal place of safety), needs of occupants who require assistance to evacuate, and effect on egress calculations (including input from building user/evacuation consultant)
  - Allocation of occupants to escape routes; optimistic (e.g. allocated in proportion to flow capacity) or pessimistic

- Sensitivity study related to design assumptions
- Extent to which design and/or system robustness checks apply
- Consideration of any parameter studies for sensitivity analysis (relating to uncertainty in fire and egress modelling, other design assumptions)

FEB content: additional recommended content and considerations

In addition to the content listed above, it is helpful for the FEB to include or identify the following.

Stakeholders and Contributors

- Regulatory compliance – normally the Building Consent Authority
- Fire and Emergency input (search and rescue, fire fighting operations)
- Building fire designer
- Building owner / developer
- Independent design reviewer for regulatory review (if requested by the Building Consent Authority)
- Building insurer (including any insurer requirements for sprinkler protection, façade systems, passive fire protection and fire stopping, e.g. expectations for inspections or upgrades in existing buildings).
- Occupier/tenant, end user/staff
- Evacuation consultant

Relevant documentation

- Documents which are part of the evidence relied on by the fire designer for stakeholder input to the FEB
- Briefing documents prepared by the client
- Briefing documents prepared by others that contain other requirements for the project that influence fire safety (e.g. Ministry of Education, for schools)
- Notes from meetings or discussions – especially Building Consent Authorities or stakeholders, which are relied on to guide future approval of the fire design
- Drawings or sketches to describe the building. (These may not be available if fire engineering briefing discussions commence at a very early stage in the project).

Client future aspirations

- Future subdivision
- Future change of use
- Future extension to the building
- Intended life-span of the building (e.g. a long term building, or intention to demolish or do other major work in the near future).

Record of agreement

It is often helpful to obtain a record of agreement to the content of a Fire Engineering Brief document, as confirmation of involvement and buy-in from the relevant stakeholders. There is no pre-defined method for this; it could be as simple as an email acknowledging that there is no comment or objection to the content of an FEB. If agreement is not reached on critical items, that risk is transferred to the consenting stage.

The Fire Engineering Brief is considered a living document that may evolve over time as the building design, stakeholder briefing matters and fire engineering design progress.

Commentary

Purpose: the role of the FEB in fire engineering design

A Fire Engineering Brief (FEB) is usually prepared early in design development. The FEB outlines and discusses aspects of design that:

- *Are not pre-determined and which influence the design approach or design solutions*
- *Are assumptions and information requiring future validation*
- *Are subject to interpretation.*
- *Benefit from discussion and agreement prior to substantial investment in design resources or prior to significant commitment from a stakeholder (e.g. commitment to plans for Resource Consent which form the basis of future legal sale and purchase or tenancy agreements*
- *Affect commitments to procurement of long lead-time components of a project.*

Accordingly, the FEB may discuss a number of design and/or solution options.

The purpose of the FEB and associated consultation process is to mitigate risk in design related decisions for the benefit of the building owner and the design team (principally the design fire engineer). Therefore, the decision to prepare a FEB and what content to include is made by the design fire engineer, usually in consultation with the building owner (or other key influencers of the design solution). Often the relevant regulatory approval stakeholders (Building Consent Authority, Fire and Emergency New Zealand (FENZ)) would be informed of the decision to undertake the FEB and would be invited to provide input and feedback relevant to their stakeholder role. The fire engineer and/or building owner might also invite other non-Building Code related stakeholders for input into the FEB development process (e.g. insurers, building users) to provide increased assurance that the fire design approach and solution align with other (non-Code related) design expectations.

The FEB consultation process (e.g. as described by IFEG(2005), SFPE(2007) and others) expects fire designers to gain support from stakeholders for the proposed fire engineering design and design assumptions.

For most regulatory stakeholders the FEB process is the principal opportunity to confirm support in principle for design proposals and proposed design assessment methodologies (particularly for Fire and Emergency New Zealand, as they are not consulted for their opinion on matters relating to firefighting or search and rescue operations at time of consent application and approval).

Verification Method C/VM2 fire engineering design

As part of the design process using C/VM2, some Building Consent Authorities expect formal acknowledgement/approval that the FEB describes a 'trial' design (refer International Fire Engineering Guidelines) or proposed fire design solution which, if progressed using the parameters described in the FEB, would achieve Code compliance.

If regulatory approval is to be granted (conditionally or unconditionally) then certain aspects of design and design assumptions should be included in the FEB to give confidence to those who are asked to approve that the completed design is likely to comply with C/VM2 and the Building Code Clauses for Protection from Fire. It is acknowledged that the completed design will likely not (and need not) be exactly the same as a trial design.

Therefore, it is helpful to agree in advance the type of information that needs to be included in the FEB in order that regulatory approval is not unreasonably withheld. This guidance document outlines the likely minimum content of an FEB for that purpose.

The FEB Process: what is it?

In this document a 'Fire Engineering Brief' is a written document. The abbreviation FEB is also used in the same context. However, the document is an outcome of the FEB process, and it is sometimes more helpful to think of the FEB as a process that results in a document of record.

The Fire Engineering Brief (FEB) is a process for structuring a conversation with the key contributors who have an influence in the outcome of a fire engineering solution for a building. The primary purpose of a fire engineering briefing process is to clarify expectations of a design up-front, with the goal of mitigating risks, and streamlining the design and approvals process at consenting stage; i.e. to avoid surprises.

The discussions during a fire engineering briefing process are often documented in a Fire Engineering Brief (FEB). The FEB document outlines the proposed fire design methodology, assessment and acceptance criteria and any other stakeholder inputs. The FEB document is not a record of the fire design solution for a building; i.e. it is not "the fire report." Further to this, the fire design solution is not required to be completed in order to facilitate or prepare an FEB. Generally speaking, the FEB can be thought of as an input document that informs the fire design solution.

A reverse briefing occurs regularly with other design disciplines (e.g. Structural Design Features Report, Building Services Performance Design Brief, Architectural Concept Design Report, etc.). The difference arises for fire engineering design briefing because of the number and range of other design disciplines that affect, or are affected by, the proposed fire engineering design requirements. This includes people-related design features (occupancy type, number of people in the building, mobility and assistance needs, evacuation strategies and egress route provisions), as well as a wide variety of building-related strategies to provide protection against fire and smoke spread (fire rated floor/wall construction, mechanical smoke control, active fire protection systems). The latter includes consideration of life safety, protection of property, as well as potential consideration of business continuity following a fire event.

Hence, the FEB process is useful in maximising collective agreement in all aspects of the fire design, including design assumptions, cost, impact on functionality, appearance, future flexibility, or regulatory compliance. This assists in avoiding disconnects at an unwelcome point on the project timeline, and encouraging favourable project delivery and outcomes.

Stakeholders

The contributing parties – the stakeholders – either have a vested interest in the outcome because of their role or specific expertise, or have a regulatory duty to discharge. The number of parties and extent of involvement will vary from project to project. Stakeholders may include all or some of the following.

- *The client who commissions the work*
- *A building occupier who is directly affected by functionality, safety, etc.*
- *Other designers who are engaged to prepare designs which interact with the fire engineering design)*
- *Regulatory authorities*
- *Fire and Emergency personnel undertaking fire fighting, or search and rescue operations.*
- *Other parties who manage, use or have a direct input towards the day to day use and operation of a building*
- *Evacuation consultant*

Specialist building types may have additional stakeholders.

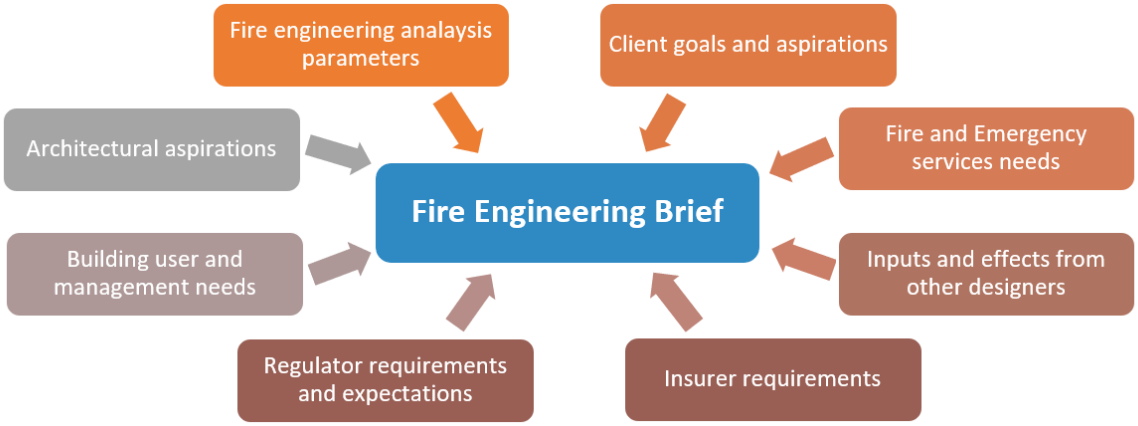

Figure 1 - Inputs to the fire engineering brief

Most projects benefit from at least a basic level of briefing discussion with client and the design team. The formality and rigour applied to this process varies with the complexity of the project, the level of risk involved, predictability of the regulatory environment, the fire engineering solution proposed and the experience of the parties involved.

It should be noted that acceptance of the contents of a Fire Engineering Brief document by regulatory stakeholders does not constitute acceptance or approval of all aspects of a fire design solution.

Application of the FEB in fire design compliance methods

Some Compliance Documents and BCA processes request that an FEB process is undertaken. The FEB is not in itself necessary for demonstrating regulatory (building consent) compliance, although it usually forms a very useful (if not essential) part of the process leading up to submission of plans and specifications for building consent. The FEB document records the outcome of a consultative process and typically does not (or need not) contain information which is relied on for building consent approval.

Regardless of compliance method, the benefits of undertaking an FEB process early in design cannot be understated. The FEB process is a very useful tool in mitigating consenting risks and allowing a fire engineer to progress their design with some assurance that their assumptions and methodologies will be accepted at the consent and approvals stage.

If an FEB process is not carried out, then the fire engineer should acknowledge to their client and design team that various elements of consent risk are being carried through to the consent/approvals stage that may have an impact on design scope and programme.

The fire engineer may wish to include information in the FEB which is relied on for building consent approval (e.g. documenting agreed building operational, management or evacuation procedures). In that case this information would be referred to from the consent application documents and the relevant parts of the FEB would then form part of the plans and specifications submitted for building consent.

Depending on the selected methodology for demonstrating building code compliance, the benefit and value gained from an FEB process may vary.

- ***Acceptable Solution design***
  - *FEB unlikely to be needed to establish the basis of compliance for fire engineering design using a prescriptive compliance methodology; however is useful in design in existing*

buildings where 'as near as reasonably practicable' (ANARP) assessments and solutions are proposed.
  - *Beneficial for clarifying client expectations, regulatory authority expectations for scope of review of existing buildings.*
  - *Useful for clarifying ambiguities as to application of the prescriptive compliance document(s) to the specific building layout.*
- ***Verification Method design***
  - *C/VM2 Paragraph 1.3 (Amendment 4, July 2014) encourages designers to follow a stakeholder consultation process using a Fire Engineering Brief (FEB) to ascertain requirements and establish alignment of design assumptions with the C/VM2 Framework, in order to achieve Building Code compliance.*
  - *Beneficial for clarifying client expectations, regulatory authority expectations for scope of review of existing buildings,*
  - *Useful for clarifying ambiguities, design aspects not covered in the Framework document, and subjective matters such as choice of input parameters, modelling methodologies, robustness checks, and selection and location of design fires for assessment.*
- ***Alternative Solution design***
  This first-principles design approach benefits significantly from a fire engineering briefing process. The design is conducted with at least some element of performance-based design that falls outside of a recognised compliance document.
  - *Fire engineering briefing process/document likely a necessity for outlining input parameters and assessment methodologies and acceptance criteria for demonstrating Building Code compliance.*
  - *Likely beneficial for clarifying client expectations, regulatory authority expectations for scope of review of existing buildings*

Timing

Timing of the steps in the FEB consultation process depends on project complexity and the time frames of design development. The FEB process both informs and responds to a range of fire engineering solutions.

In general the FEB will be prepared prior to substantial design being undertaken, but this is not always the case. For some projects this may occur late in the overall design programme. For many others, the consultation needs to occur early in the design programme to effectively mitigate risk. For routine designs following a performance-based design approach (including design using the C/VM2 Verification Method) the FEB may be prepared to record relatively straightforward design decisions, for the purposes of highlighting information prior to the design team committing to final building consent documentation. In many respects the FEB is not unlike a structural engineers Design Features Report. Alternatively, there may be relatively minor parts of the design solution which do not align with solutions from a prescriptive Compliance Document (e.g. C/ASx) and so the scope of the FEB document is correspondingly narrowed.

Owners, occupiers, regulators and communities' tolerance of risk also affects the fire design, but varies widely. The influence of acceptance of risk on the FEB process is similarly a variable; lower tolerance for risk will usual influence the desire for the FEB process to commence earlier in the design programme.

Reaching agreement

For a variety of reasons confirmation of agreement to the content of an FEB may not always happen or be possible (lack of time, absence of response, differences of expectation or goals). In these circumstances, it is helpful to identify both the reasons for and potential consequences of agreement not being reached.

It is recommended that discussion continue with the relevant stakeholders to determine a path for the design to follow.

For example, if agreement is not reached on a matter relating to building code compliance, it may be appropriate to contact the Building Consent authority, of fire engineering experts in the field for guidance or interpretation on application of the Code. For matters relating to future flexibility, the stakeholders might agree not to provide for future flexibility at the time of original design/construction, recognising the additional costs or disruption that may be incurred if electing not to incorporate features that provide for future flexibility.

References

International Fire Engineering Guidelines (IFEG), Australian Building Codes Board, Canberra, ACT, Australia, 2005

SFPE Engineering Guide to Performance-Based Fire Protection, 2nd Edition, National Fire Protection Association, Inc., Quincy, Massachusetts, 2007

Revision tracking for editorial purposes only – not part of the Practice Advisory

Version	Date	Extent of revision
0.1	5 Apr 2017	First version based on 2014 input from various regulatory, design parties
0.2	10 Oct 2017	Edited for draft issue to SFPE membership
0.3	19 Sept 2018	Updated following feedback from SFPE membership and Engineering New Zealand.