



Fire Safety Verification Method Reference Building

SFS 2019

Fire Safety Verification Method

Webinar (Tuesday 13th August)

- Providing a framework for fire engineering
- Multiple scenarios to be considered
- Developing consistency
- Comparative assessment
 - Reference Building

Reference Building

- Multiple question about reference building
- Identical DTS building

Reference Design

- Why does Reference Building have to be identical?
- Could it be a DTS compliant Reference **Design**
- A design that provide an acceptable level of 'risk'



Fire Safety Verification Method



Verification Method

“ 6.6 Derivation of reference building
Using the building description and fire safety strategy (refer Section 5.7) as a starting point it is necessary to define a reference building based on a DTS Solution to provide a benchmark for comparison.

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Principles for selection of a reference building

The reference building should;

- be fully compliant with the NCC *DTS Provisions* including relevant State or Territory variations nominated in the NCC appendices.
- comply with other relevant variations to the NCC *DTS Provisions* specified in relevant State or Territory Acts or Regulations. These must be clearly stated in the PBDB including reference to the legislation.
- have the same footprint, floor area and volume as the proposed building.
- be of the same NCC Class(es) as the proposed building.
- have the same effective height as the subject building.
- require the same Type of Construction as the subject building (based on Clause C1.1 of the NCC).
- have the same occupant numbers and same occupant characteristics as the subject building.
- have the same basic fire load and design fire characteristics (ignition sources and fuel properties) as the subject building (these basic characteristics may be then modified based on the variations from the *DTS Provisions* applicable to the subject building).
- be located the same distance from the boundary or other fire source feature as the subject building.
- have the same size and configuration of openings in external walls.
- have a similar general internal layout (except for identified variations from *DTS Provisions*).
- have the same fire brigade response and arrival time after notification as the subject building.
- have similar configurations of hidden voids, openings and ducts, ventilation and air-movement as the subject building unless these are specific features of the *Performance Solution* under consideration.
- where there are options for fire protection measures, adopt a combination of measures based on sound engineering principles that would be expected to provide an acceptable level of safety.
- be specified in sufficient detail to enable all deviations from the *DTS Provisions* for the subject building to be identified.
- if appropriate, include additional features that may not be addressed or fully addressed through adoption of the current NCC *DTS Provisions*. E.g. provisions for the evacuation of people with disabilities or use of lifts for evacuation.

Verification Method

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- Have the same footprint, floor area and volume as the proposed building.

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- Have the same effective height as the subject building.

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It has also been reported that practitioners have experienced some situations where they have formed the opinion that the Deemed-to-Satisfy Provisions can be shown to not satisfy the BCA performance requirements.

To reduce the exposure of practitioners and demonstrate that the public interest is being adequately addressed, the approach adopted when demonstrating compliance with the performance requirements should be transparent enabling the AHJ and other practitioners to understand as far as practical the level of safety afforded by a design. *An overview of a reasonable approach is provided in Practice Note 10.*

Practice Note 10: The following procedures should be considered by the Fire Safety Engineer, AHJ and other stakeholders in the design and approval of alternative solutions.

The most relevant Deemed-to-Satisfy design shall be identified as the benchmark for the building.

Where more than one Deemed-to-Satisfy design is considered relevant, the design that provides the highest level of safety to the community shall be adopted as the benchmark

Where it is considered that the benchmark provided by the Deemed-to-Satisfy provisions is inappropriate-either because it is considered to be too conservative or unconservative, the reasons for such a decision should be documented by the designer in the Fire Safety Engineering Report. The extent to which the benchmark is being varied should be clearly stated.

The designer or AHJ should inform the owner / developer if in their opinion a Deemed-to-Satisfy Provision that is intended to be used does not meet the relevant performance requirements and propose a suitable alternative solution.

Where significant judgements are required as part of a Fire Safety Engineering Design a Fire Safety Engineering Brief (FSEB) should be developed. Authorities such as the fire brigade and/or local authority may be invited to participate to provide an independent view of the public interest in addition to providing other input. This is particularly important where the Deemed-to-Satisfy Provisions benchmark is being varied, but may also be helpful in the selection of design fire scenarios, acceptance criteria, input data and methods of analysis.

Notwithstanding the above, State and Territory regulations require certain matters to be referred to prescribed authorities such as the fire brigade.

Reference should also be made to the Fire Safety Engineering Guidelines for further details of appropriate procedures and Section 6.5 of this Code of Practice.

SFS Code of Practice

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Where more than one Deemed-to-Satisfy design is considered relevant, the design that provides the highest level of safety to the community shall be adopted as the benchmark

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Fire Safety vs Building Size

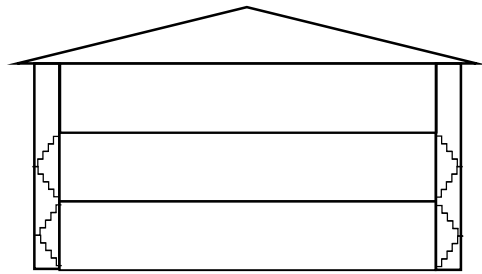
Building size increases

- Number of occupants
- Increasing fire hazards
- Probability increases
- Fire brigade intervention

NCC Provisions

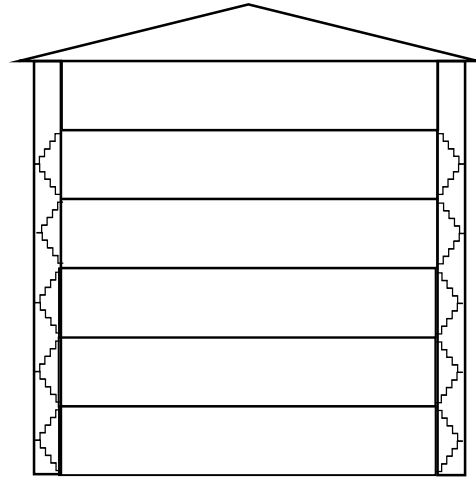
- Type C → Type A
- No detection
- Detection
- Sprinklers
- Number of stairs
- Stair pressurisation
- Zone smoke control

DTS vs Building height



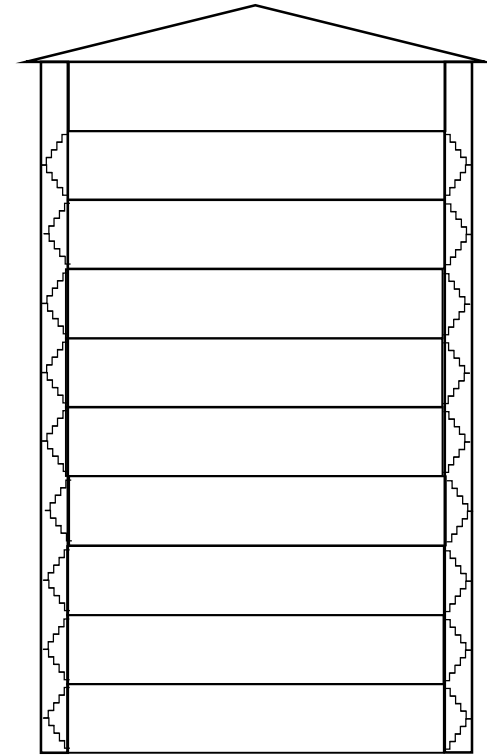
3 Storey

No smoke detection
No sprinklers



6 Storey

Smoke detection
No sprinklers



10 Storey

Smoke detection
Sprinklers
Zone smoke control
Stair pressurisation

5.2 Client and end user objectives

Clients and end user objectives need to be identified and addressed and early consultation will enable a fire safety strategy to be developed that is compatible with these objectives in addition to identifying characteristics of the end users that may impact on NCC fire safety objectives.

5.3 Individual and societal risk

The NCC *Performance Requirements* and *DTS Provisions* have evolved over time in response to, amongst other things, loss of life, and tend to mirror community values and risk appetite in terms of individual and societal risk associated with specific hazards.

In the context of this Handbook, individual risk is interpreted as the frequency at which an individual may be expected to sustain a given level of harm as a result of a fire in the subject building.

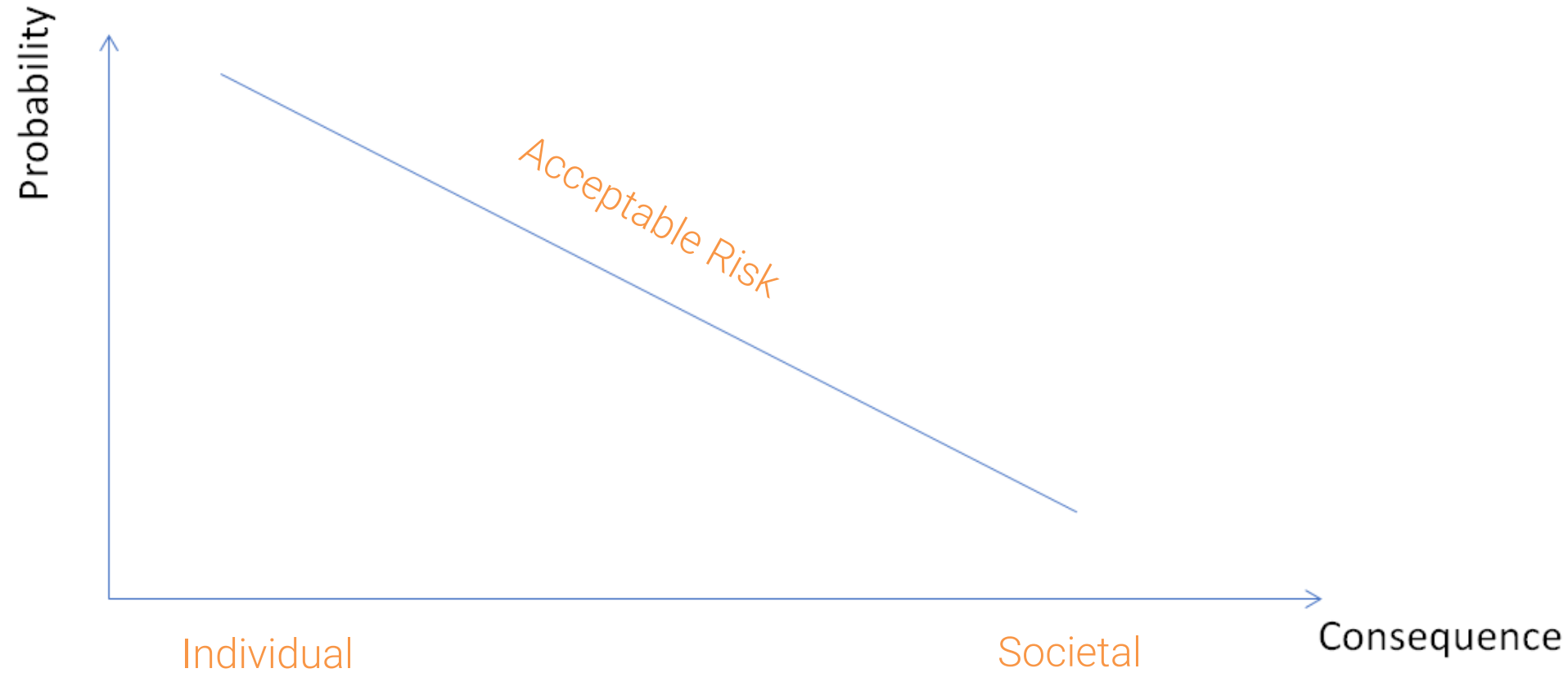
The term 'societal risk' is often used when discussing risks from hazards that can simultaneously (or nearly so) impact large numbers of people. It is the relationship between frequency and the number of people suffering from a specified level of harm in a given population from the realisation of specified hazards. In the context of this Handbook, the "given population" is generally the population of the subject building (and adjacent buildings and surrounding land use where appropriate) unless otherwise noted and the specified hazard is a fire within or involving the subject building (and adjacent buildings and surrounding land use where appropriate).

When developing a fire safety strategy, it is necessary to consider both individual and societal risks and ensure that the proposed design adequately addresses individual and societal risks such that the fire safety level for the proposed *Performance Solution* is at least equivalent to that in a reference building that complies with the DTS NCC requirements.

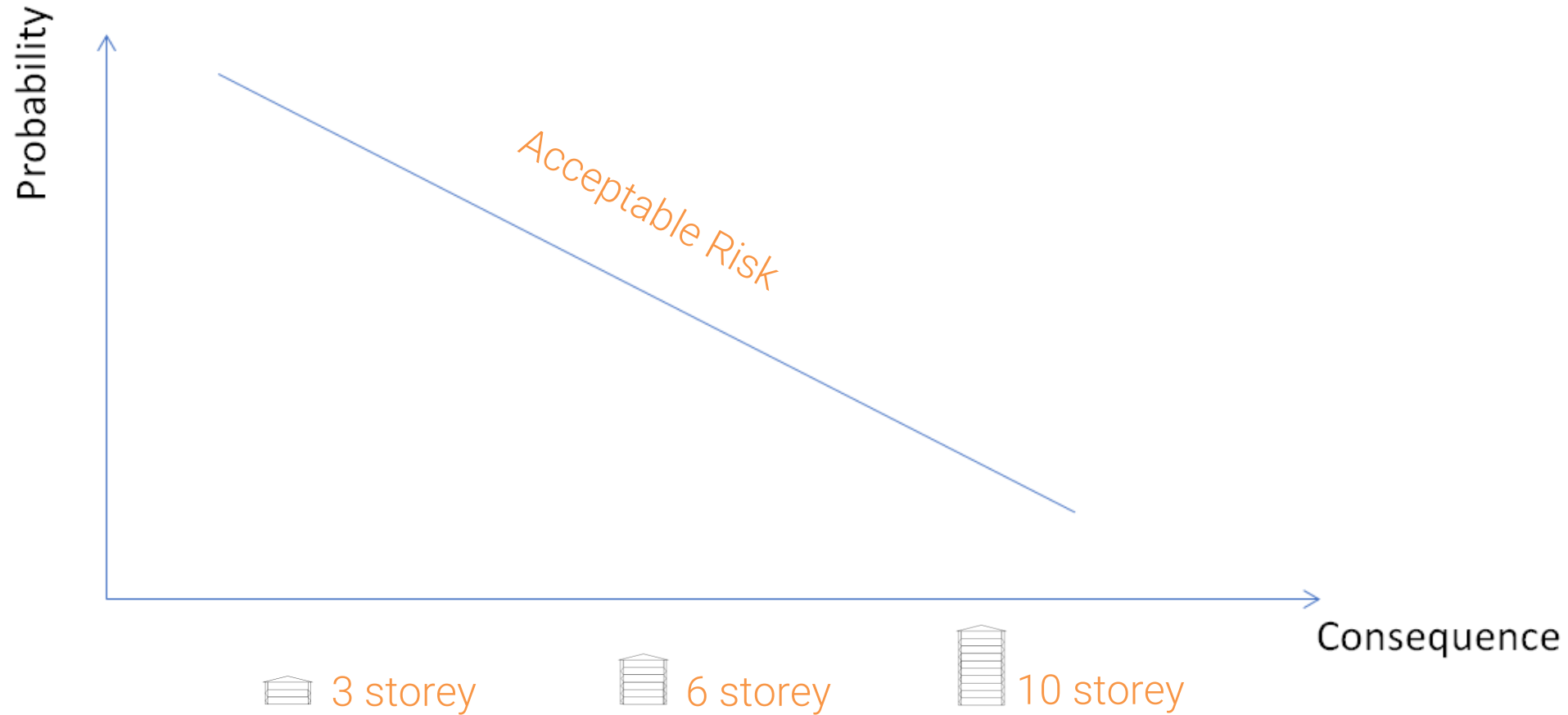
Verification Method - Risk

“ When developing a fire safety strategy, it is necessary to consider both individual and societal risks ”

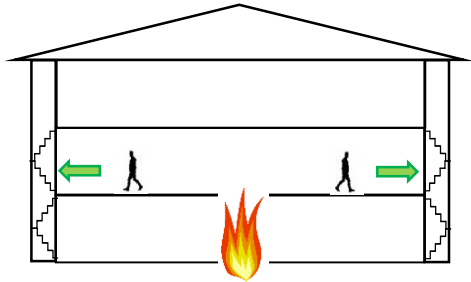
Acceptable Risk



Acceptable Risk

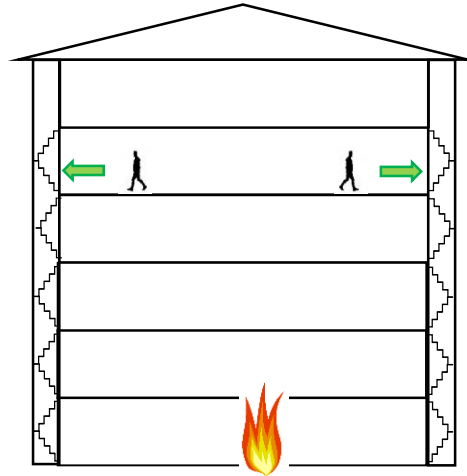


Societal Risk



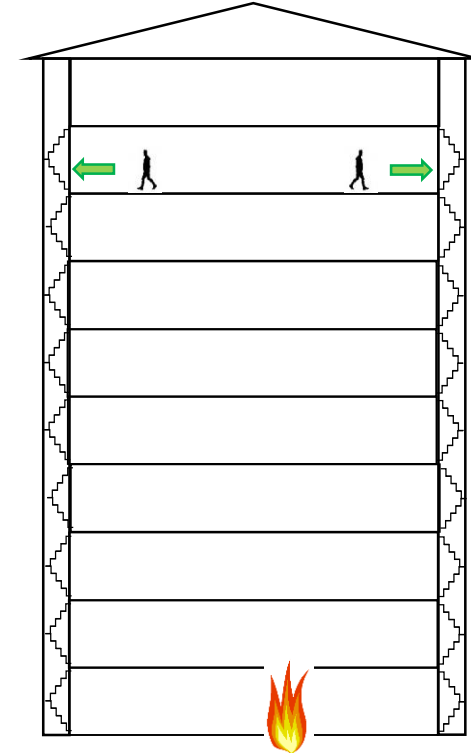
3 Storey

No smoke detection
No sprinklers



6 Storey

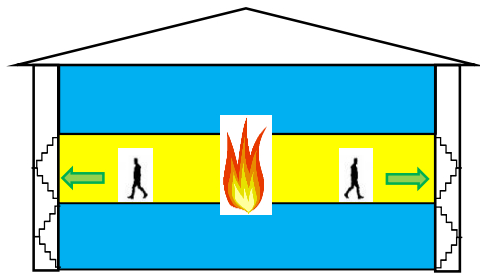
Smoke detection
No sprinklers



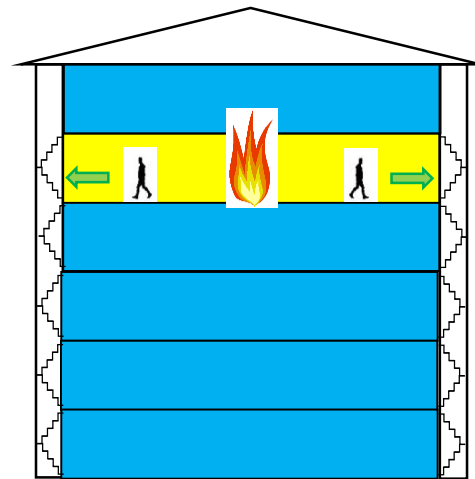
10 Storey

Smoke detection
Sprinklers
Zone smoke control
Stair pressurisation

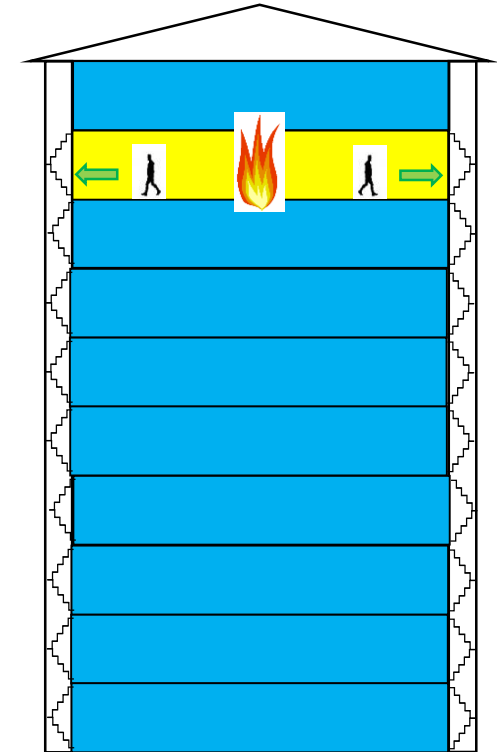
Individual v Societal Risk



3 Storey

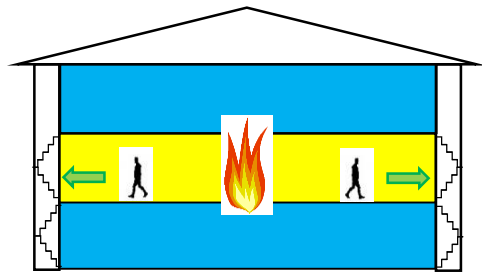


6 Storey

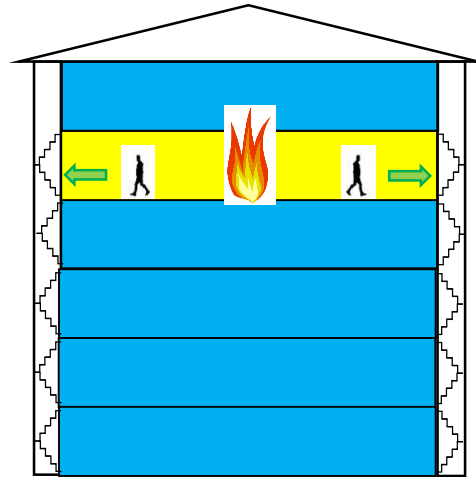


10 Storey

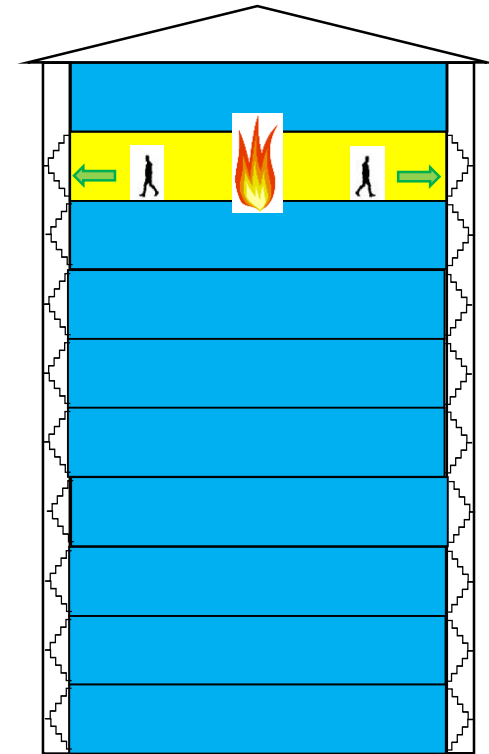
Floor of Fire Origin (FoFO)



3 Storey
Acceptable Safety

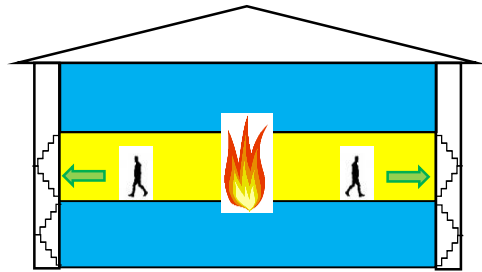


6 Storey
Safer



10 Storey
Even Safer

Floor of Fire Origin (FoFO)

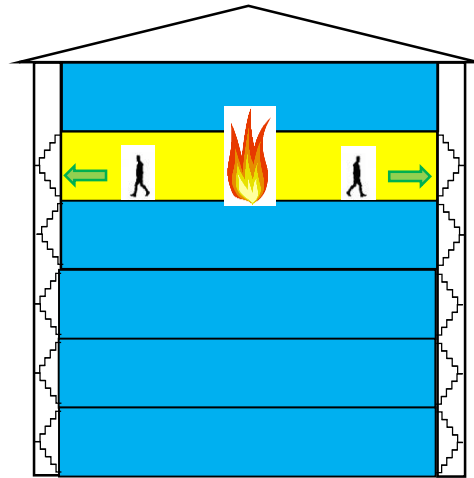


3 Storey

40m travel distance

DTS Compliant

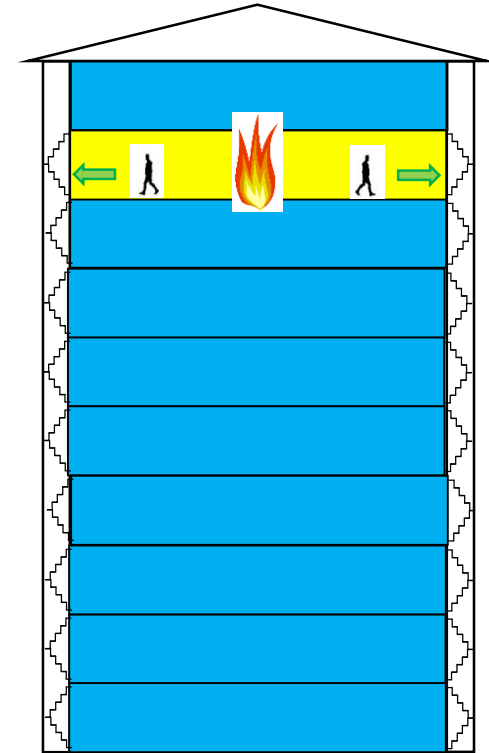
Acceptable level of fire safety



6 Storey

Performance Solution

60m travel distance

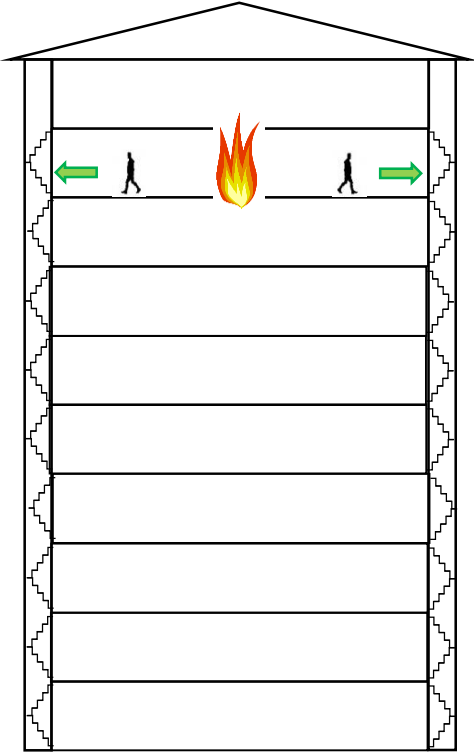


10 Storey

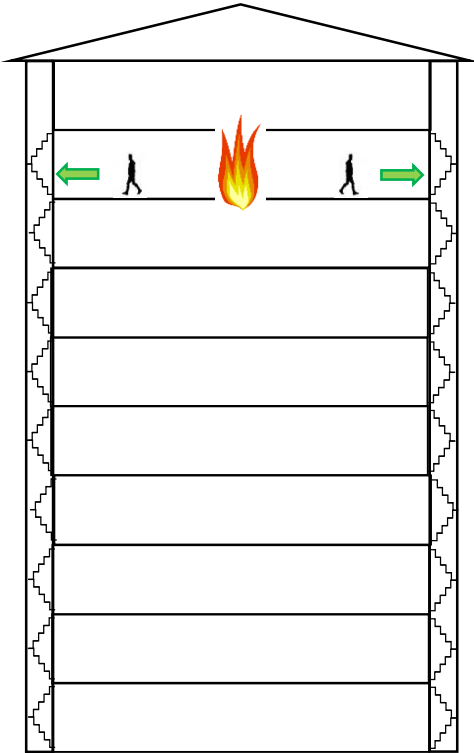
Performance Solution

80m travel distance

Verification Method - Allowed

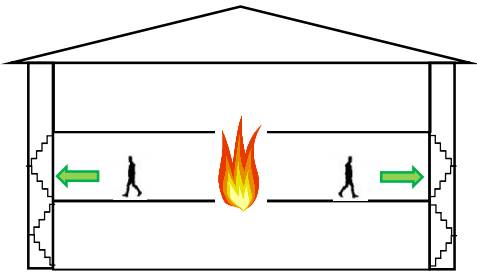
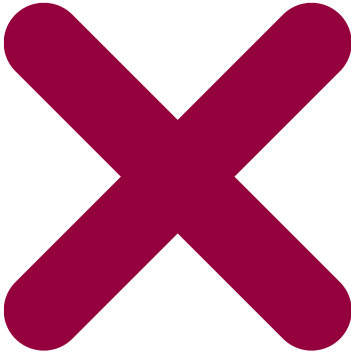


10 Storey
40m travel distance

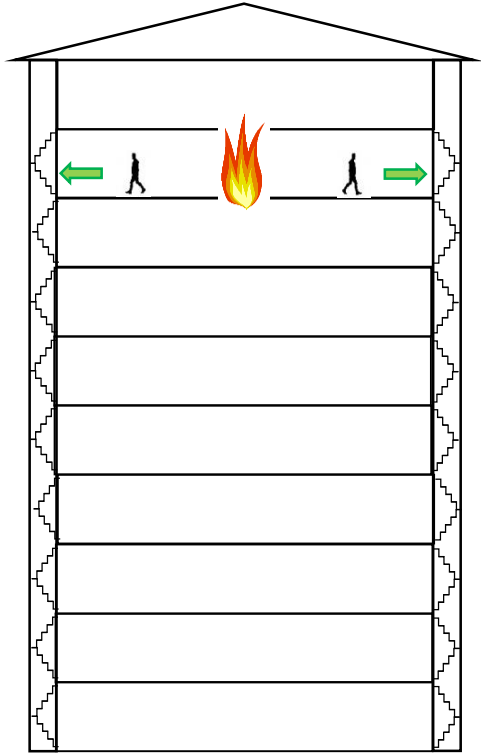


10 Storey
80m travel distance

Verification Method – Not Allowed

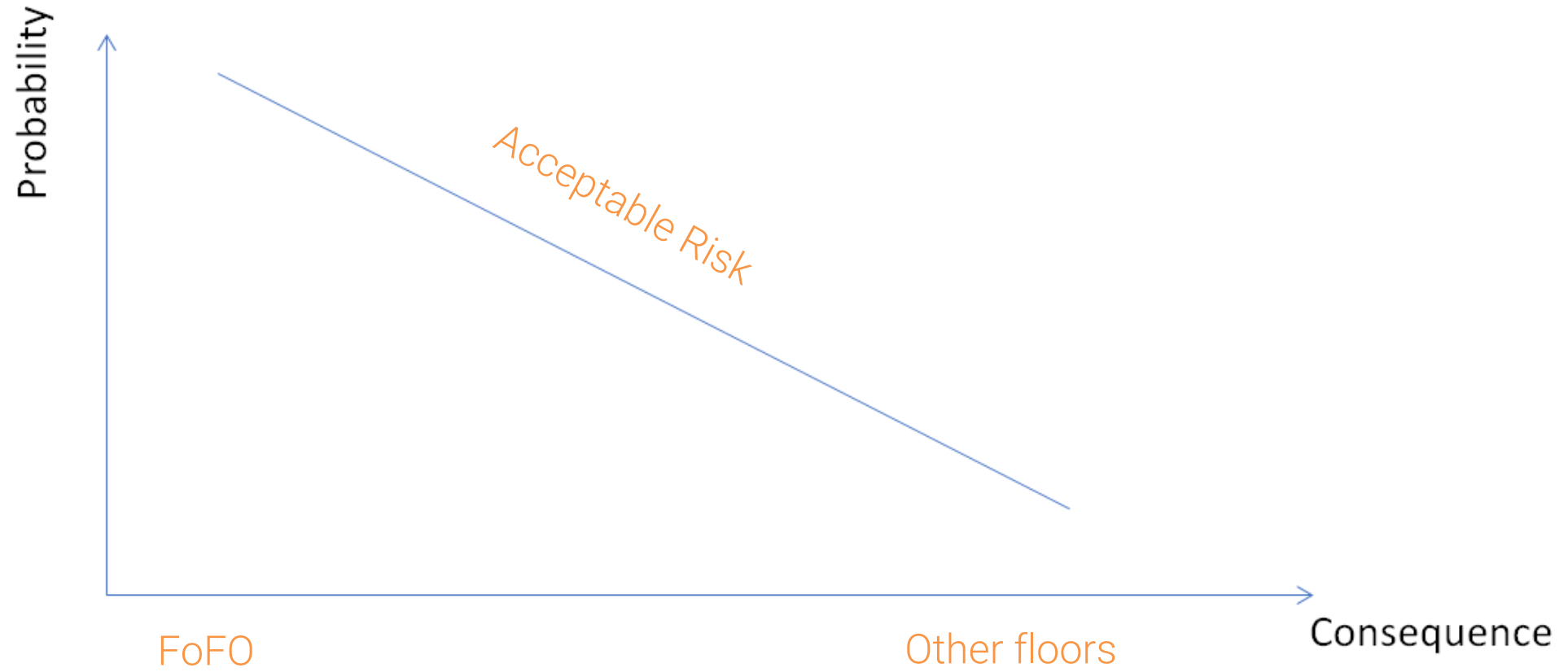


3 Storey
20m travel distance

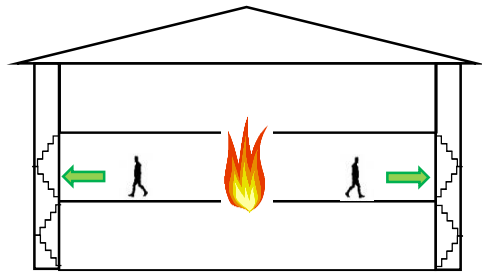


10 Storey
40m travel distance

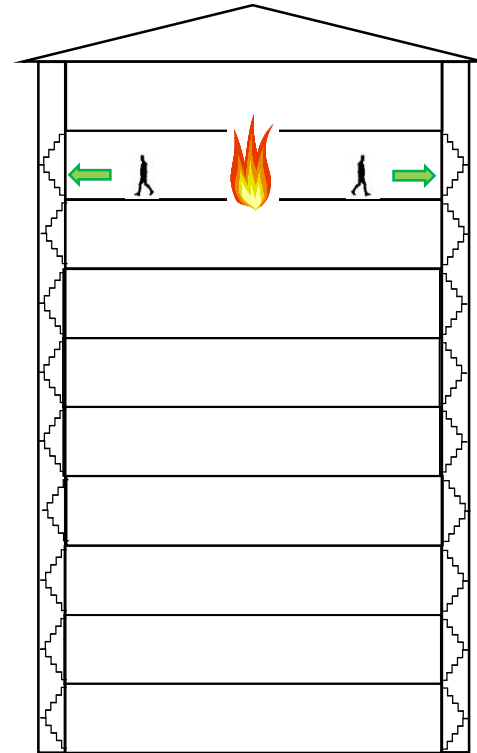
Risk



Verification Method - FoFO



3 Storey
40m travel distance



10 Storey
80m travel distance







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Consulting Fire Engineers

Questions?