Open Plan Flats and Fire Safety

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Open Plan Flats – What, Why, How?

– What is an open plan flat?

– Why do people want them?

– How do we achieve them?

– Are they safe?
Open Plan

– Open plan flats can be considered to be flats that do not contain a protected entrance hall

– Escape from a flat is via an accommodation room – such as the living room
Why Open Plan?

– The market wants open plan flats
  – Buyers
  – Architects
  – Investors

– Maximise the use of space within flats

– American flats have been open plan for many years
UK Building Regulations

– We build to meet the functional requirements of the Building Regulations 2010.
UK Building Regulations

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– Approved Documents
UK Building Regulations

- We build to meet the functional requirements of the Building Regulations 2010.

- Approved Documents

- BS 9991 – Fire Safety in the Design, Management and Use of Residential Buildings
Approved Document B: Volume 2

- Covers the design of flats

- Requires a 9m protected entrance hall
Approved Document B: Volume 2

- Covers the design of flats

- Requires a 9m protected entrance hall

- OR

- 9m internal travel distance to furthest point
Approved Document B: Volume 2

- Covers the design of flats

- Requires a 9m protected entrance hall

- OR

- 9m internal travel distance to furthest point

- OR

- Alternative means of escape from the part containing bedrooms
BS 9991

- Allows open plan flats

- Based on NHBC “Open plan flat layouts: Assessing life safety in the event of a fire” – Research conducted by BRE.
BS 9991

- Requires LD1 alarm system
- Automatic water fire suppression system
- No greater than 16m x 12m
- Single level
- Enclosed kitchen after flat exceeds 8m x 4m
- Minimum ceiling height
BS 9991

- Allows open plan flats

- Based on NHBC “Open plan flat layouts: Assessing life safety in the event of a fire” – Research conducted by BRE.

- Restricted to values within the research
  - NHBC document states that this was purely the results that were studied due to cost
Current Position

– Therefore, open plan flats are currently considered to meet the Building Regulations when they comply to BS 9991.

– However, is this considered to be far reaching enough?

– What about
  – Larger open plan flats?
  – Multi level flats?
Fire Engineering

– Fire engineering solution required to justify deviations from the guidance in BS 9991

– Often requires “evidence” that a solution will provide the same level of safety as a code compliant solution

– Modelling of the proposed layouts are usually produced
Modelling

– Comparative approach

– Deterministic approach
Comparative Approach

– Compare the proposed solution to a code compliant ADB or BS 9991 solution

– Proposed should demonstrate conditions that are no worse than a compliant solution
Deterministic Approach

- Demonstrate conditions within the flat, using a worse case scenario, as discussed with Building Control

- Up to discussions with the Approving Authorities as to what method should be used
Computer Modelling

- Usual method would be to use Fire Dynamics Simulator

- Tried and tested. Extensive validation

- Outputs are left to end user and Approving Authority to graph and interpret
Computer Modelling

- BRE also make use of in house software, CRISP
  - Computation of Risk Indices by Simulation Procedures

- Provides probabilities of risk, rather than estimated internal conditions

- CRISP was used for the NHBC research that forms BS 9991
CRISP

– Takes into account random variables
  • Fire type and location
  • Door and window status
  • Glass breakage
  • Human decisions

– Can run more scenarios within a given time than FDS

– Output = Risk of death - pr(FED > 1.0)
CRISP
Are they safe?

– Generally speaking, it appears the addition of sprinklers makes the design as safe, if not safer, than an ADB compliant flat

– Open plan appears to be no worse than leaving flat doors open in an ADB compliant solution
  • Previous BRE study shows that protected entrance hall doors are left open 60% of the time
Are they safe?

– Other mitigation measures may be required – such as ventilation

– However, solutions require occupants to keep the items maintained

– Yet, a smoke detector will not help if not maintained either
Thoughts

– “We” have decided that new builds require alarms, but there is no requirement to maintain them

– Do “we” therefore make the same decisions in regard to the protected entrance hall and sprinkler systems?

– After all, occupants can remove these once they own the property
Conclusions

– Open plan flats can be built to BS 9991 or by using a fire engineered justification

– The justification is likely to be either a comparative or deterministic assessment (occasionally a hybrid of the two)

– BRE have carried out research into open plan layouts and show that these can be equivalent to an ADB compliant solution
Key Points

– Layout requires a BS 9251 compliant sprinkler system throughout the flat

– Flats larger than 12m x 16m or multi level require a fire engineered justification

– All of this should be discussed with the Approving Authorities at an early design stage
Thank you

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