

Recent Trends in Fire Safety Design of Houses and Apartments

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- Guidance

- Houses
 - Different Uses
 - Open Plan Living
 - Large Houses
 - 3 & 4 Storey Houses
 - Roof Terraces

- Apartments
 - Duplex / Maisonette Units
 - Access Decks
 - Basements
 - High Rise

- Construction Techniques

- Technical Guidance Document-B (2006)
 - Came into effect from June 2006

- BS 5588-1:1991
 - Amended Sept 1993 & Dec 2004

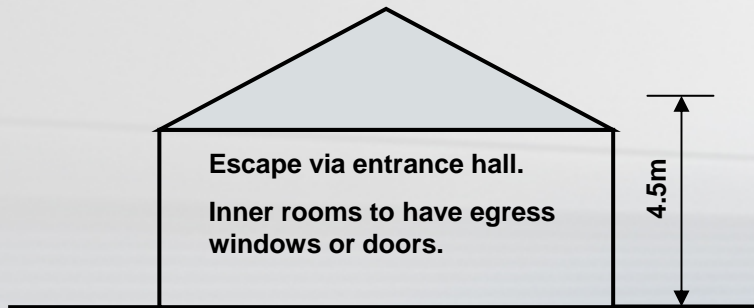
- Approved Document-B Part 1
 - Dwellings (2006)
 - Comes into effect from April 2007

- Approved Document-B Part 2
 - Buildings other than Dwellings (2006)
 - Comes into effect from April 2007

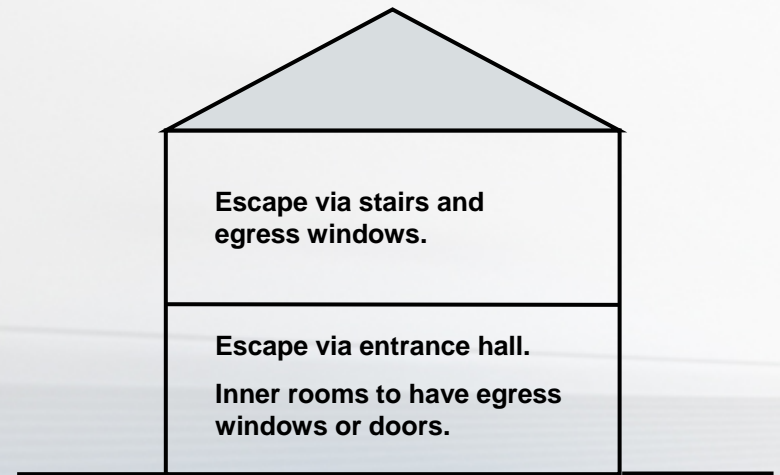
- DHELG Guides
 - Crèches
 - B&B / Guesthouse
 - Gaeltacht Housing

- Care in the Community
 - DHELG Guide: 1987 / HTM 88: 2001

- Sheltered Housing

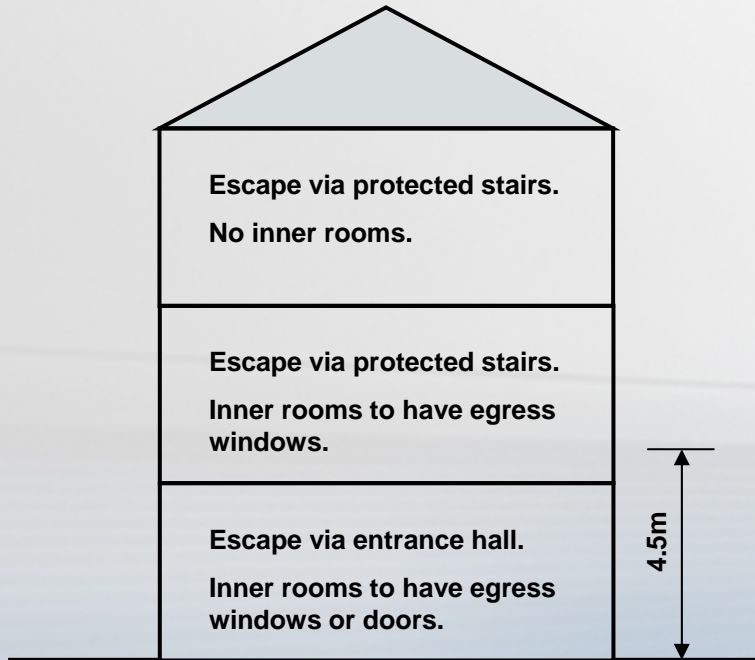


Single Storey House

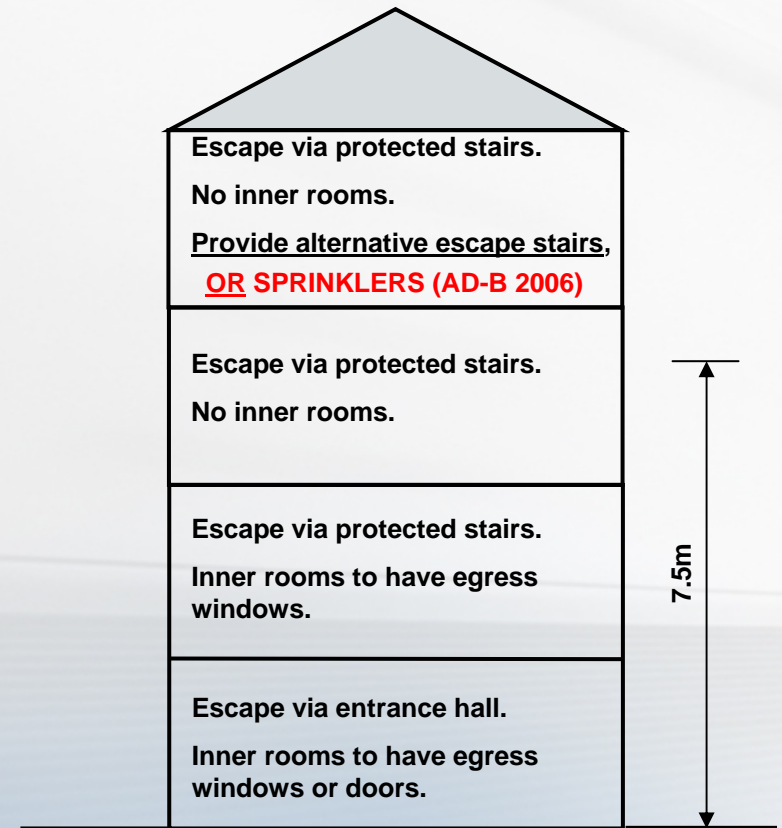


**Two Storey House
(no floor > 4.5m)**

Houses - 3 & 4 Storey



Three Storey House
(one floor > 4.5m)

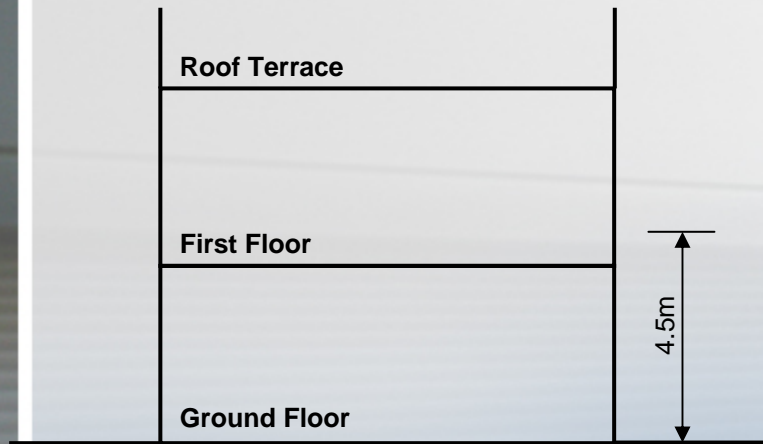


Four Storey House
(one floor > 7.5m)

Need to consider:

(a) Is it a 'Habitable Room'?

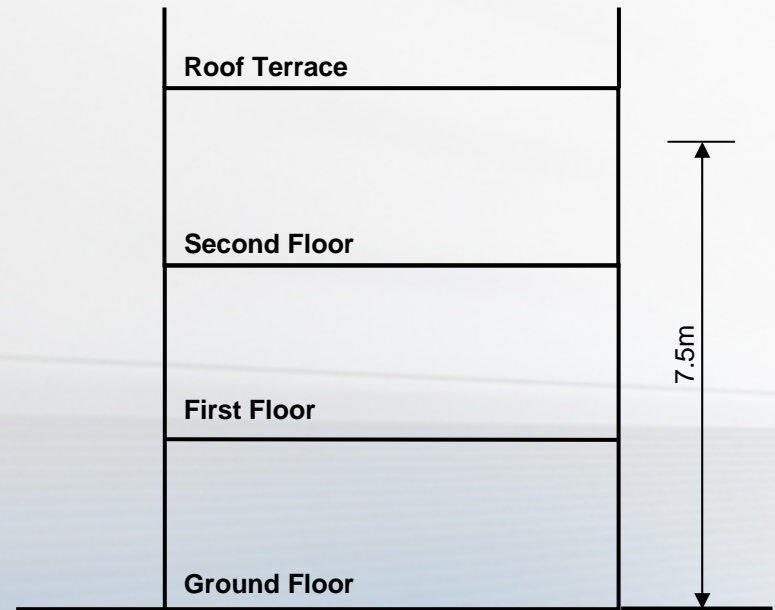
(b) Is it a 'Storey'?



Two Storey + Roof Terrace
(one floor > 4.5m ?)

2 Storey House + Roof Terrace:
May require protected stairs

3 Storey House + Roof Terrace:
may require an alternative escape route



Three Storey + Roof Terrace
(one floor > 7.5m ?)

Houses – Large Houses



- No specific guidance in TGD-B
- BS 5839-6: 2004 recommends a Grade A or B Fire Detection and Alarm System
- Storey greater than 200m²

Houses – Open Plan Living



Houses – Open Plan Living



TGD-B (1997):

An open-plan type arrangement, where the stairway rises directly from the ground floor accommodation is less preferable than that described at (ii) above and is only acceptable where the following conditions are met:

- the stairway discharges to within 4.5 m of a door at the ground storey leading directly to the open air;
- the stairway does not discharge into kitchen accommodation;
- the automatic fire detection and alarm system complies with the requirements for an LD2 system in accordance with 1.5.5;
- all habitable rooms at the upper storey are provided with windows for escape or rescue in accordance with 1.5.6; and
- meets the general provisions for dwelling houses, outlined in 1.5.8.

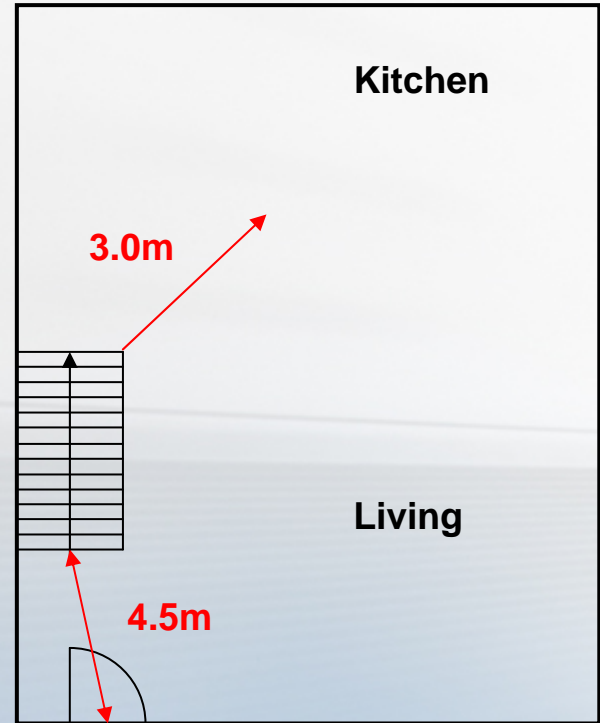
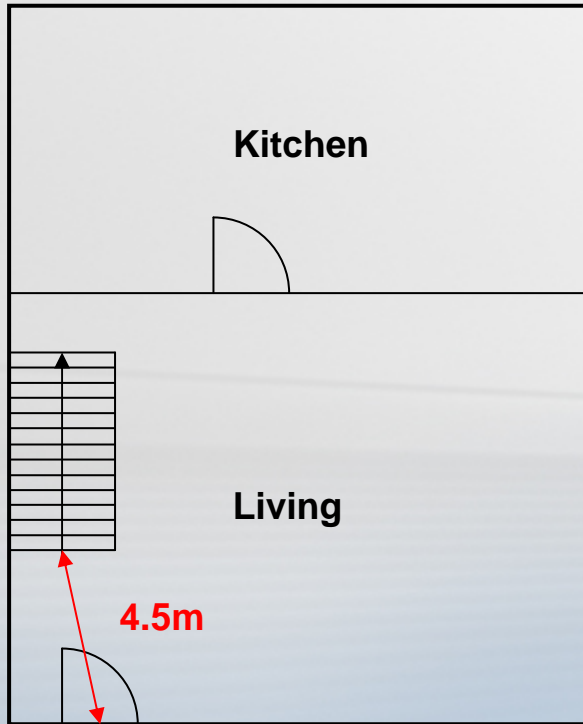
TGD-B (2006):

An open-plan arrangement, where the stairway rises directly from the ground storey accommodation is less preferable than the arrangement at (ii) above and is only acceptable where:

- the stairway discharges to within 4.5 m of a door at the ground storey leading directly to the open air;
- the stairway does not discharge into a kitchen and either:
 - any ground storey kitchen is enclosed in storey height construction which need not be fire resisting or;
 - where the stairway passes within 3 m of the kitchen, the stairway should be enclosed in storey-height construction which need not be fire-resisting;
- a fire detection and alarm system is provided, in accordance with 1.5.5;
- all habitable rooms at the upper storey are provided with windows for escape or rescue in accordance with 1.5.6; and
- the design meets the general provisions for dwelling houses, outlined in 1.5.8.

- Section 1.5.2 of TGD-B (2006)
- Amended wording:
 - Stairs to discharge within 4.5m of exit door
 - Stairs must not discharge to kitchen
 - Kitchen to be enclosed or remote (3m away)

Houses – Open Plan Living



- Comes into effect in UK in April 2007
- Self closers no longer required in dwellings
- Windows locks permitted to egress windows
- Sloping floor permitted as alternative to 100mm step to garage
- Limited inner-inner rooms permitted
- Use of residential sprinkler systems recognised

- Fire is generally in an Apartment
- High degree of compartmentation
- Simultaneous evacuation unlikely
- No reliance on external rescue

Apartments – Maisonette Units

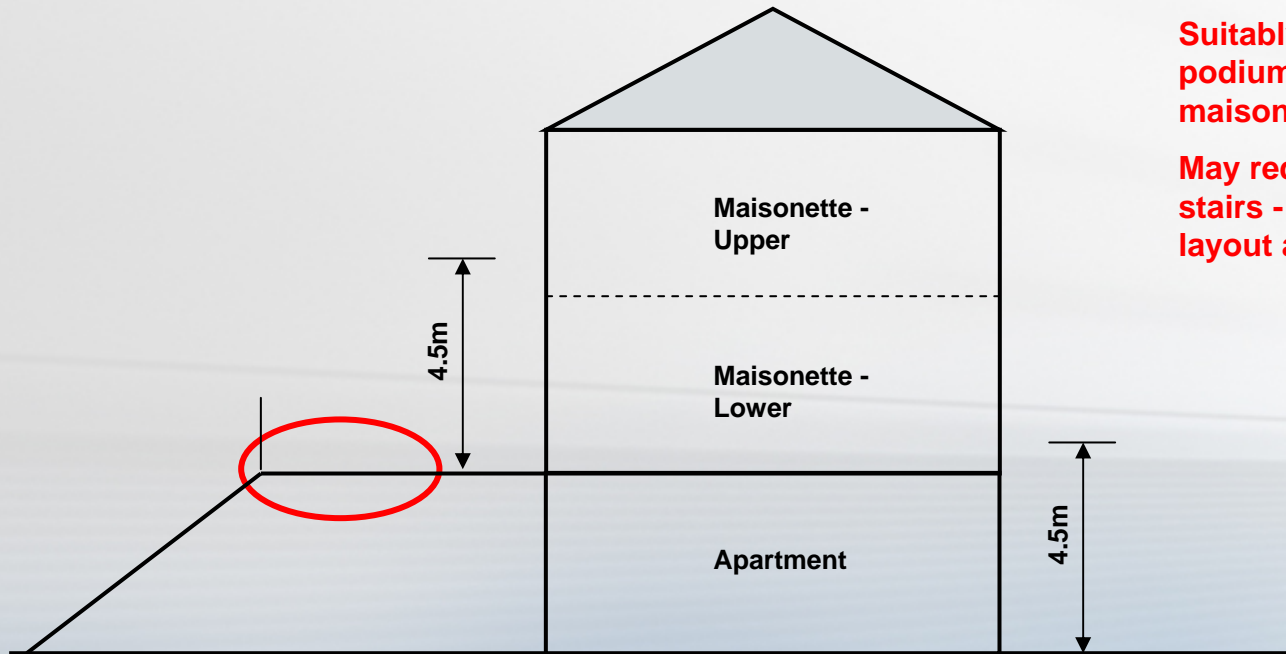


- Typically with independent external entrances
- Similar in design to houses

- Guidance in BS 5588-1:1990
- For independent entrance refers to guidance on houses
- For common entrance alternative exit is required from storeys above 4.5m from ground or access level

- Access Level defined in BS 5588-1 as
 - “A level used for normal access to the building that either incorporates, or leads directly to, a place of safety”
- Height above ground or access level dictates the measures to be taken
- Consideration needs to be given to:
 - capacity for self rescue
 - place of safety
 - staging area for fire service
- Suitably designed podium may be considered as access level (BS 5588-1)

Apartments – Maisonette Units

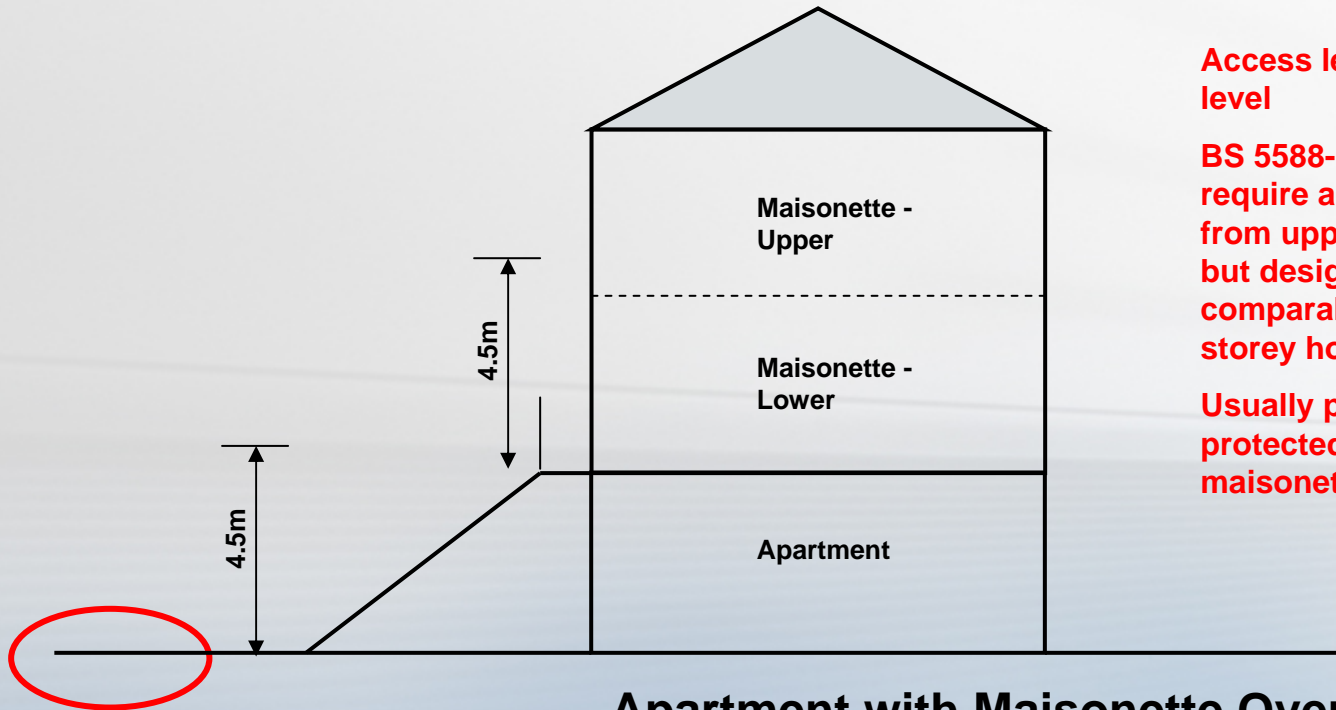


Suitably designed podium access to maisonette

May require protected stairs - depending on layout at upper level

Apartment with Maisonette Over (Example 1)

Apartments – Maisonette Units

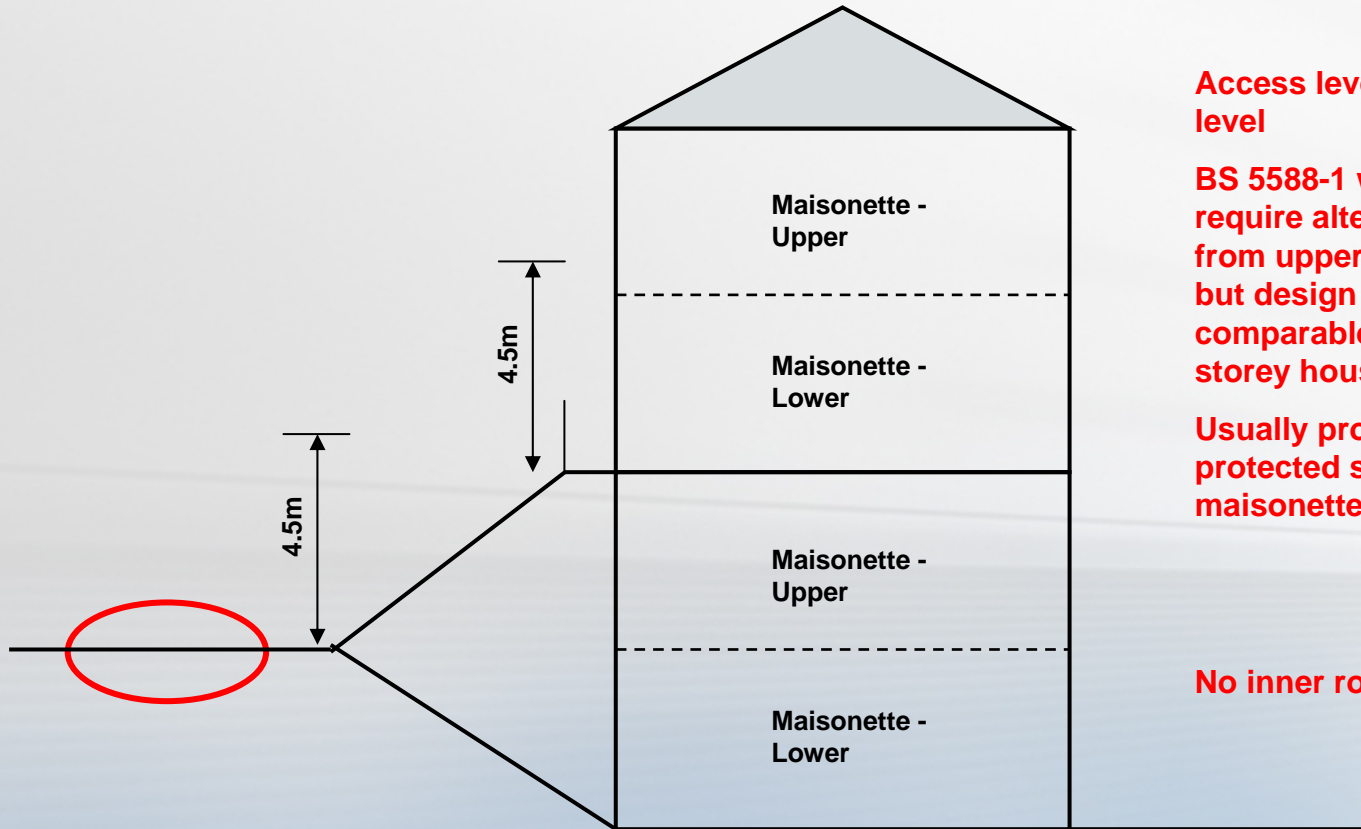


**Apartment with Maisonette Over
(Example 2)**

Access level is ground level

BS 5588-1 would require alternative exit from uppermost level but design is comparable to a 3 storey house

Usually proposed with protected stairs to maisonette



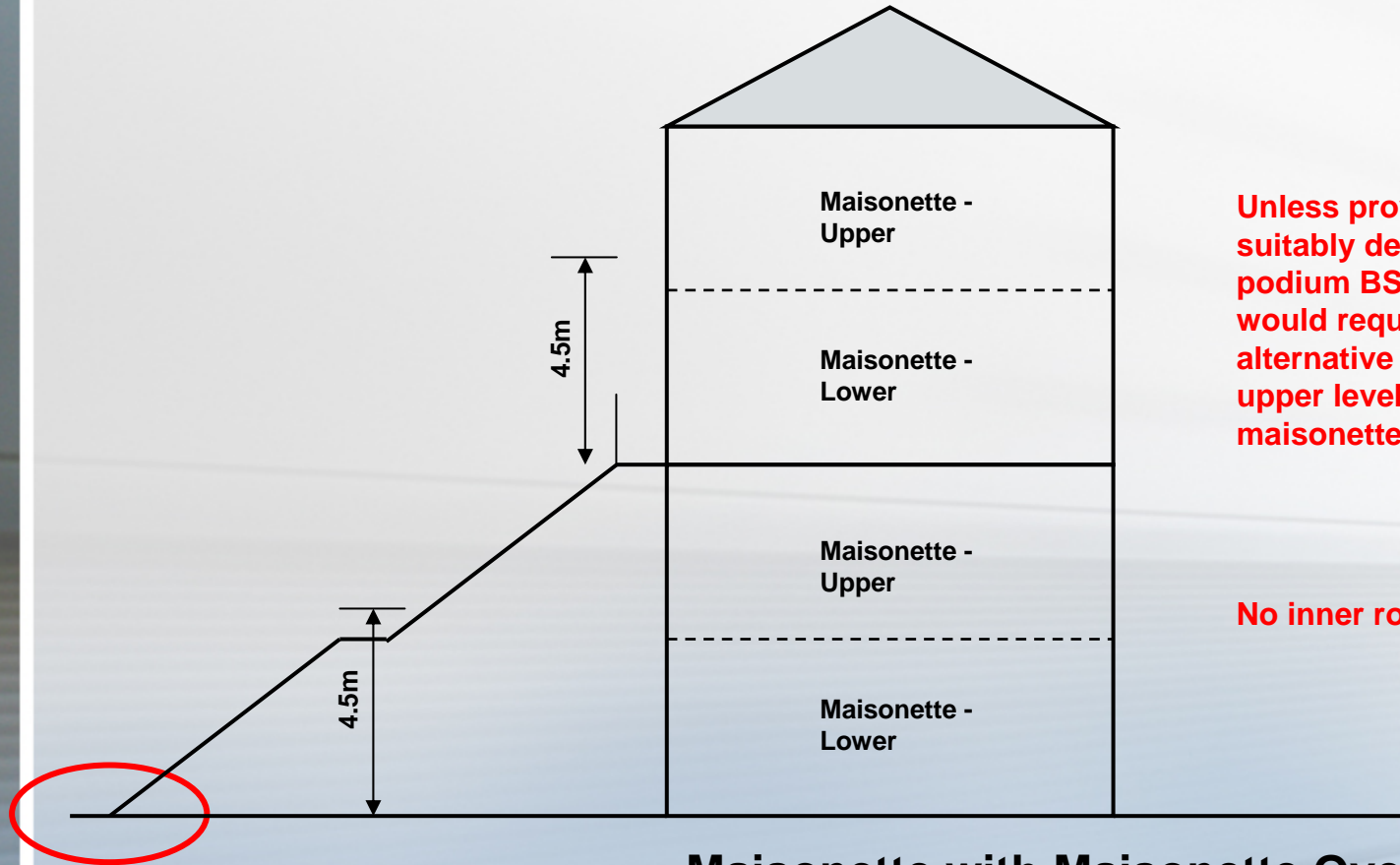
Access level is ground level

BS 5588-1 would require alternative exit from uppermost level but design is comparable to a 3 storey house

Usually proposed with protected stairs to maisonette

No inner rooms.

**Maisonette with Maisonette Over
(Example 3)**



Unless provided with a suitably designed podium BS 5588-1 would require alternative exit from upper level of topmost maisonette

No inner rooms.

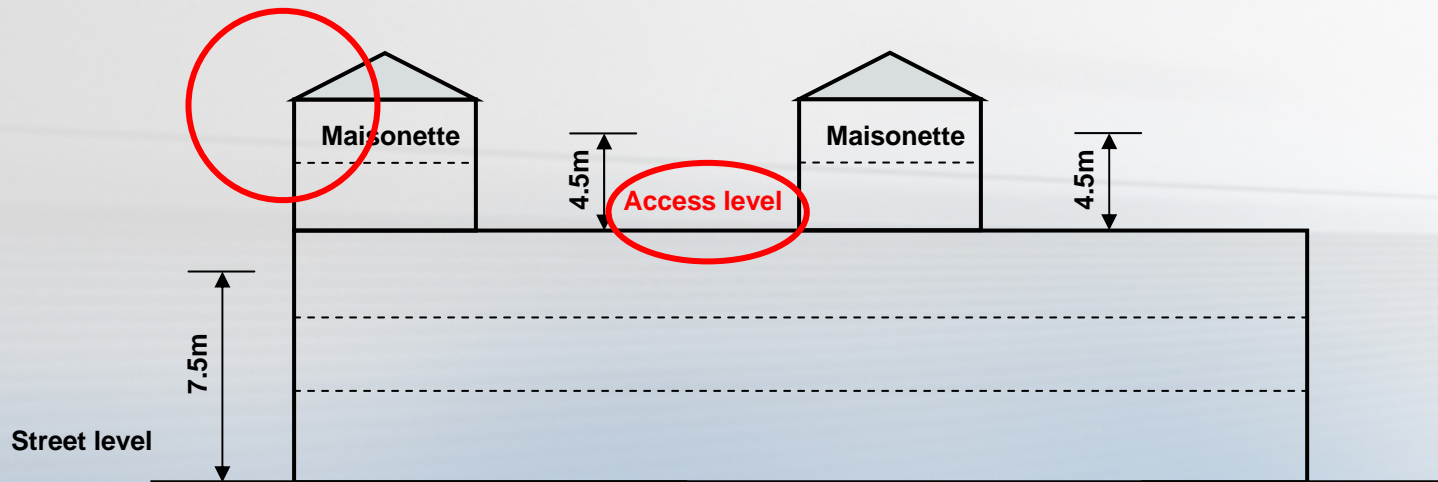
**Maisonette with Maisonette Over
(Example 4)**

Apartments – Access Level

Needs careful consideration of
Access and Facilities for the
Fire Service

May require a
protected stairs

No inner rooms



Podium / Access Deck with Maisonettes on Same

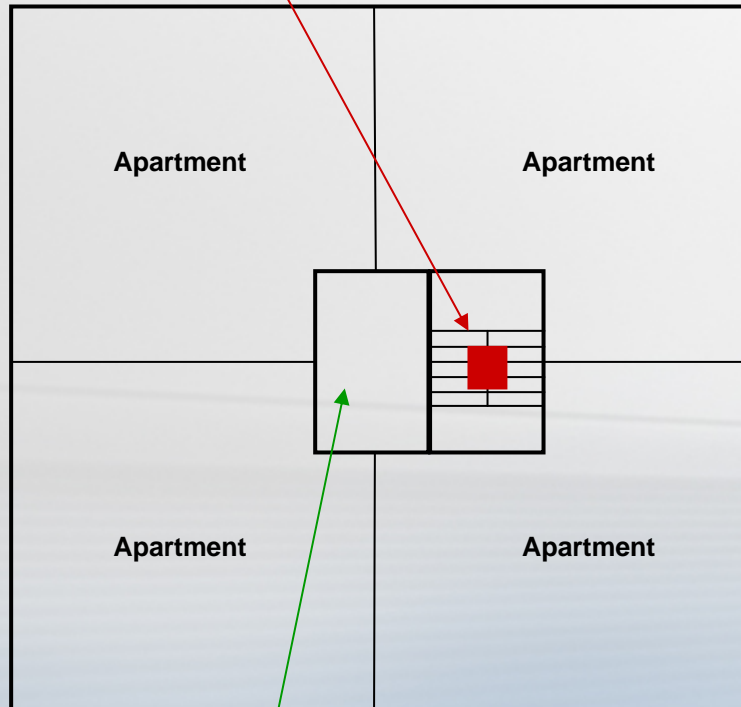
➤ Issues include:-

- Car parking / storage / refuse
- Ventilation of basement
- Possibility of mechanical ventilation
- Possibility of sprinklers
- Continuation of lift and stairs down to basement level
- Vented lobbies to lifts and stairs

- Height dictates fire resistance and ventilation of common areas
- < 11m
- 11 to 20m
- > 20m

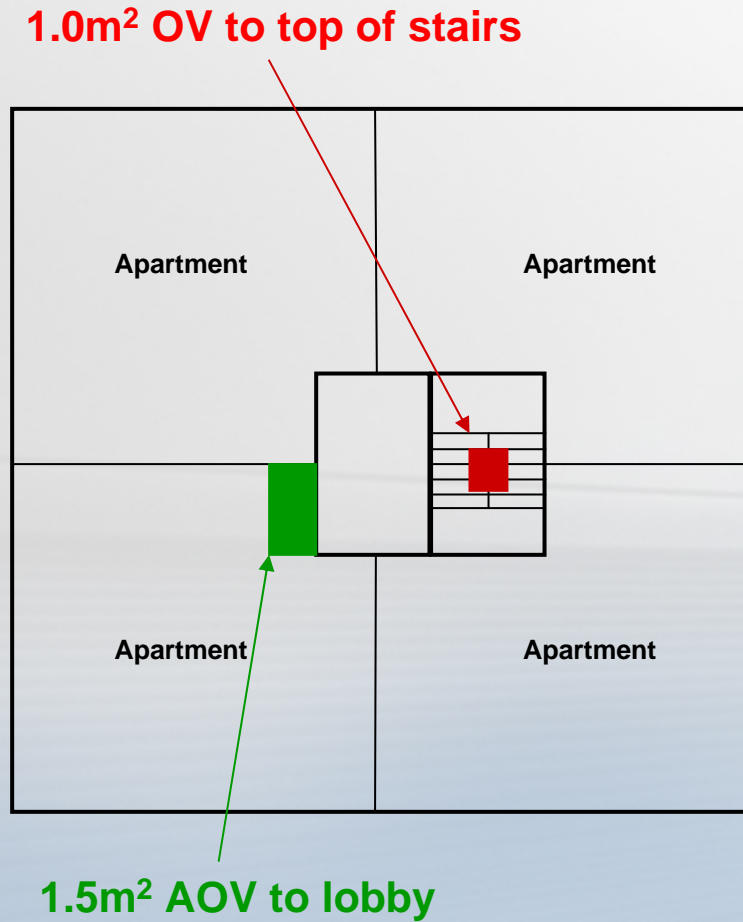
Apartments (<11m)

1.0m² OV to top of stairs



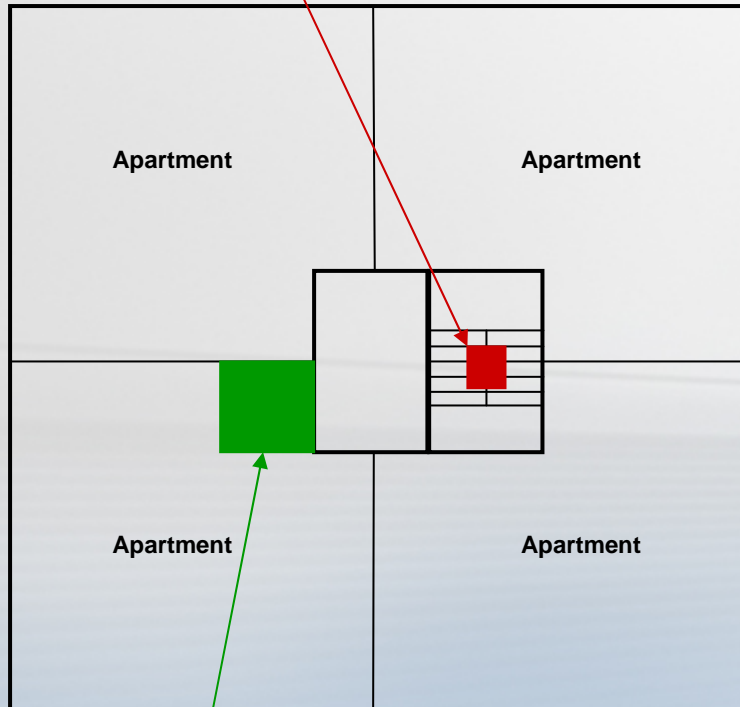
**No ventilation to lobby
(unless travel distance >4.5m)**

Apartments (11 to 20m)



Apartments (> 20m)

1.5m² OV to top of stairs

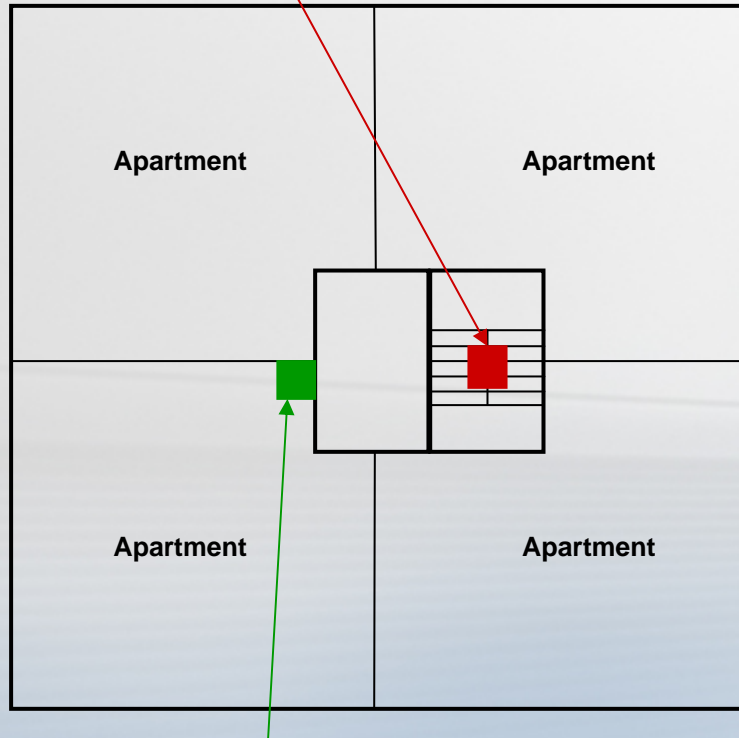


Fire Fighting Shaft Required

3.0m² Shaft with 1.5m² AOVs to lobby

Apartments – High Rise – Alternative Design

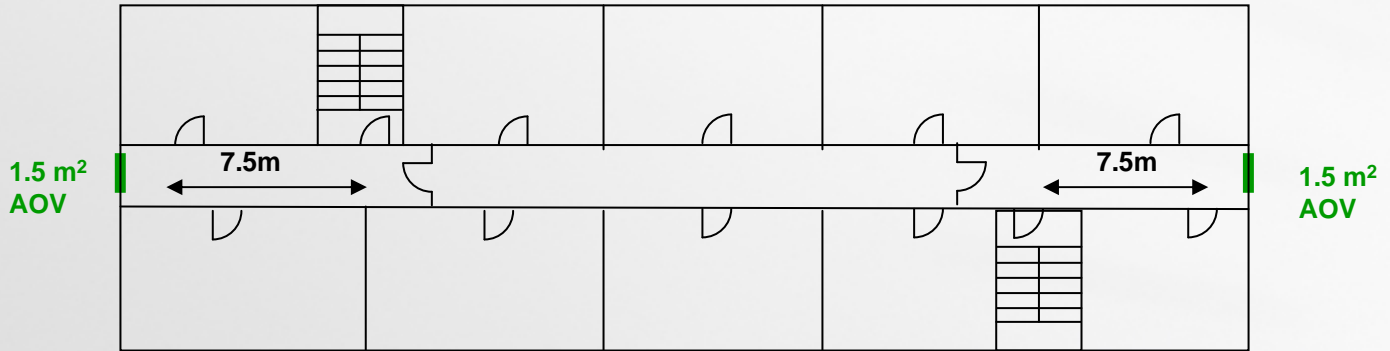
1.0m² OV to top of stairs



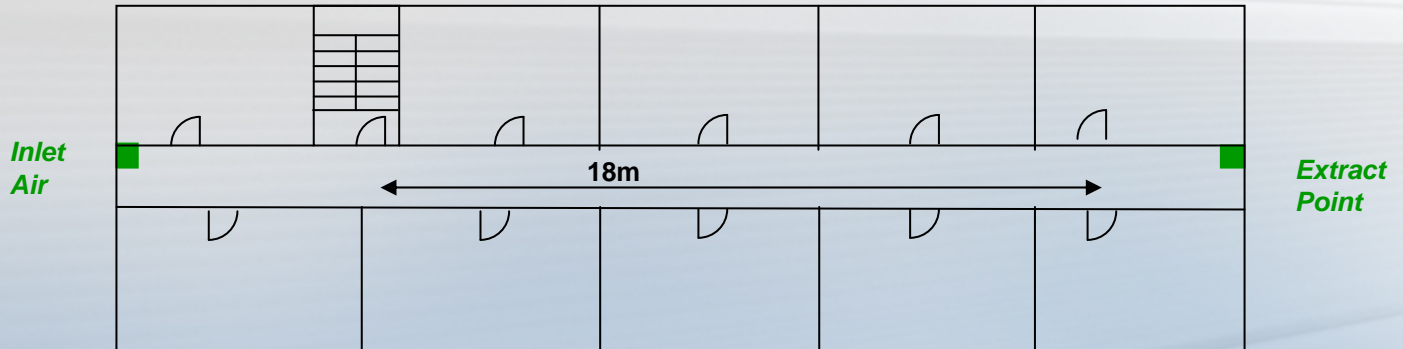
2.4m² (80% saving per floor)

Proprietary mechanical vent shaft 0.6m²

Apartments – Extended Travel Distances



Code Compliant Design



Extended Corridor with Mechanical Extract

➤ Techniques:-

- Traditional Masonry
- Timber Frame (Masonry outer leaf)
- Closed Wall Timber Frame
- Loadbearing Metal Frame
- Modular Prefabricated Pods
- Ducted Ventilation

➤ Issues:-

- Fire Spread via Opes / Service Penetrations
- Cavity Barriers
- Fire Protection of Steel Frames
- Structural Support of Pods
- Services in Compartment Walls / Floors
- TGD-B(2006) Section 3.2.5.7















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