

## Section 2 - Provisions for Fire Resisting Construction

### Subsection C3 – Fire Compartmentation

#### Clause C3.1

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Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.

#### Clause C3.2

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A fire compartment should be enclosed by fire barriers. Protection of all openings, joints and penetrations located in a fire barrier should have an FRR not less than that of the fire barrier.

### Subsection C4 - Fire Compartment Limitations and Fire Resistance Ratings

#### Clause C4.1

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Every element of construction within each fire compartment and every fire barrier of each fire compartment should have an FRR of not less than that as specified in Table C1.

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

<b>Use Classification</b>	<b>Compartment Area/ Volume</b>	<b>Fire Resistance Rating (minutes)</b>
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m <sup>2</sup>	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m <sup>2</sup>	60
4b. Mercantile Facilities	Not exceeding 2,500m <sup>2</sup>	60
	Exceeding 2,500m <sup>2</sup> but not exceeding 10,500m <sup>2</sup>	120
5. Assembly:		
5a & 5d. PPE & Other assembly premises	Not exceeding 2,500m <sup>2</sup>	60
	Exceeding 2,500m <sup>2</sup> but not exceeding 10,500m <sup>2</sup>	120
5b. Educational establishments	Not exceeding 2,500m <sup>2</sup>	60
	Exceeding 2,500m <sup>2</sup> but not exceeding 10,500m <sup>2</sup>	120
5c. Transport facilities	Not exceeding 10,500m <sup>2</sup>	120
6. Industrial:		
6a. Industrial workplaces	Not exceeding 10,500m <sup>2</sup>	120
6b. Bulk storage, Warehouses	Not exceeding 28,000m <sup>3</sup> and 10,500m <sup>2</sup>	120
6c. Storage, manufacturing of hazardous/dangerous goods premises	Not exceeding 7,000m <sup>3</sup>	120
7. Carparks	Not exceeding 10,500m <sup>2</sup>	60

Notes:

1. A fire compartment area/volume in excess of that given above will be dealt with on individual merits giving full consideration to enhance means of escape, means of access for firefighting and rescue, fire service installations and fire resisting construction so as to achieve an equivalent level of fire safety.
2. Different Use Classifications should be separated in accordance with Subsection C7.
3. Special hazards should be separated in accordance with Subsection C13.
4. For any use not covered by Table C1, the FRR required will be determined by the Building Authority having regard to the fire load, hazard level and other relevant fire safety provisions of the building.
5. For Use Classification 1 – Residential, each flat should be separated from adjoining flats by fire barriers.
6. For Use Classification 2 – Hotel, each guestroom should be separated from the adjoining guestrooms and other Use Classifications by fire barriers.

Clause C4.2

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The FRR required for the elements of construction, components and fire barriers should satisfy one or more criteria of stability, integrity or insulation, related to various methods of exposure as specified in Table C2 when tested in accordance with Part E.

Clause C4.3

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Where a single-storey building does not exceed 7,000m<sup>3</sup> in volume and 7.5m in height, any steelwork construction may be unprotected, provided that the building is separated from any adjoining building or the site boundary by a clear unobstructed open space not less than 6m in width.

**Commentary**

No FRR is required for elements of construction of single-storey covered walkways on podium or ground floor if they comply with Subsection C9 and Clause C12.4 and are constructed of non-combustible materials complying with Part E.

Table C2: Fire Resistance Rating Criteria for Elements of Construction, Fire Barriers and Other Components

Elements of construction or other components		Criteria to be satisfied			Method of Exposure
		Stability	Integrity	Insulation	
1	Structural frame, beam or column	Y	N	N	Exposed faces only
2	Floor including fire compartment floor	Y	Y	Y	Each side separately
3	Roof forming part of an exit route or performing the function of the floor	Y	Y	Y	From underside
4	Loadbearing wall not being a fire barrier	Y	N	N	Each side separately
5	External wall	Y*	Y	Y	Each side separately
6	Loadbearing wall being a fire barrier	Y	Y	Y	Each side separately
7	Non-loadbearing wall being a fire barrier	N	Y	Y	Each side separately
8	Protected shaft, lobby and corridor	Y*	Y	Y	Each side separately
9	Fire shutter, fire stop, fire dampers, sealing system	N	Y	N (unless specified)	Each side separately
10	Smoke outlet shaft	Y	Y	Y	From outside
11	Enclosure around services other than Item 14	N	Y	Y	From outside
12	Door (including frame and fixing)	N	Y	N (unless specified)	Each side separately (except lift doors – from landing side only)
13	Fixed light ( including frame, glazing & fixing)	N	Y	Y	Each side separately
14	Enclosure around services in required staircase/protected lobby	N	Y	Y	Each side separately

Notes:

1. Y = required; N = not applicable; Y\* = required for load bearing elements only.
2. Lintels, posts or jambs of an opening in a fire barrier should be regarded as an integral part of that wall.
3. Subject to Subsection C5 and Clause C9.7, curtain wall glazing does not require to have an FRR.
4. FRR requirements for different Use Classification are listed in Table C1.
5. Any restriction of the cross-section area of the smoke outlet shaft to 75% or less of its original area should be deemed to constitute failure in stability.
6. When an FRR is specified for a fire barrier which consists of different items in this Table, each of such items should satisfy the criteria as specified in this Table.

## Subsection C5 – Prevention of Fire Spread between Buildings

### Clause C5.1

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Every building should be suitably enclosed by external walls and roof with an FRR to ensure protection against spread of fire to adjoining buildings or site.

### Clause C5.2 Separation between Buildings on the Same Site

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Buildings on the same site are regarded as adjoining buildings if they are less than 1.8m apart. Fire barriers should be provided in compliance with the following requirements:

- (a) Where the angle made between two facades of two adjoining buildings is more than 135° as measured on plan:
  - (i) any part of any such building within 900mm of any such adjoining building should be enclosed by imperforate external walls having an FRR of not less than that of the internal elements of construction; and
  - (ii) notwithstanding (a)(i) above, unprotected openings may be made in such external walls of the building provided they are not less than 900mm from such unprotected opening in such adjoining building.
- (b) Where the angle made between two facades of two adjoining buildings is at 135° or less as measured on plan:
  - (i) any part of any such building within 1.8m of any such adjoining building should be enclosed by imperforate external walls having an FRR of not less than that of the internal elements of construction;
  - (ii) openings are permitted within the fire barriers, provided they are at a distance of at least 900mm from the adjoining building and protected by a fixed light having an FRR of not less than that of the storey complying with Table C2; and
  - (iii) notwithstanding (b)(i) & (b)(ii) above, unprotected openings may be made in such external walls of the building provided they are not less than 1.8m from the unprotected opening in such adjoining building.

- (c) Any part of a roof within 1.8m of the adjoining building should be imperforate and having an FRR of not less than that of the internal elements of construction of the storey below. Openings are permitted within the fire barriers, provided they are at a distance of at least 900mm from the adjoining building and protected by a fixed light having an FRR of not less than that of the storey complying with Table C2.

See Diagram C1 for illustration.

### Clause C5.3 Separation between Buildings not on the Same Site

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Fire barriers should be provided to buildings of adjoining sites in the following manner:

- (a) If any part of any building is within a distance of not more than 900mm from the site boundary of the adjoining site, the external walls and roofs of that part should have an FRR of not less than that of the internal elements of construction; and
- (b) The external walls and the roof should be imperforate. Openings are permitted, provided they are at a distance of at least 450mm from the common site boundary of the neighbouring site and are protected by fixed light having an FRR of not less than that of the storey and comply with Table C2.

See Diagram C1 for illustration.

### Subsection C6 – Protection of Flats in Use Classification 1 and 2

#### Clause C6.1

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In Use Classification 1 and domestic part of Use Classification 2, where flats or guestrooms are connected to a common internal corridor:

- (a) the common internal corridor should be provided with fire barriers having an FRR that complies with Table C1;
- (b) doors of each flat or guestroom leading to the common internal corridor should have an FRR of not less than that of the fire barrier of the common internal corridor; and
- (c) a smoke seal should be installed to every fire rated door of a flat or guestroom leading to the common internal corridor.

#### **Commentary**

Smoke seal is very effective in preventing the spread of smoke through a fire rated door. A tight-fitting and latched fire rated door does not prevent smoke spread. Smoke seals should be provided to the top and sides of the fire rated door.

## Subsection C7 - Separation between Use Classifications

### Clause C7.1

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Where parts of any building:

- (a) are for different Use Classifications, including the sub-class in Table A1 in Part A; and/or
- (b) are used for different occupancies,

they should be separated by fire barriers having the longer FRRs in respect of such Use Classification as stipulated in Table C1.

### Clause C7.2

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Ancillary small offices, caretakers' quarters and small storage areas or loading and unloading areas in an industrial building, pantries in an office building and snack bar in Use Classification 5a do not require a separation by fire barriers.

### Clause C7.3

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Provided that the fire compartment area limitations in Table C1 are complied with, separation by fire barriers are not required between different occupancies for the following uses:

- (a) Use Classification 4a; or
- (b) Retail shops in Use Classification 4b.

### Clause C7.4

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Except for shopping arcade in Use Classification 4b, every common internal corridor serving rooms or flats in different occupancies should be separated from such occupancies by fire barriers having an FRR of not less than that of the Use Classification of that floor. Where these FRRs differ, the higher FRR value should be adopted. Any fixed lights installed within the corridor should have an FRR of not less than that of the wall.

#### **Commentary**

For shopping arcade, retail shops are not required to be separated from the common arcade or mall area by fire barriers taking into account that the shops are under a common management and a common fire alarm system actuated by a sprinkler alarm or by break glass points is installed.

## Clause C7.5

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For a balcony approach:

- (a) Subject to (b), where part of the exit route is deadend, the deadend balcony approach should be separated from the occupancies it served by fire barriers having an FRR of not less than that of the Use Classification of such occupancies. This includes any doors and fixed lights installed in such separating walls;
- (b) for Use Classification 1, any window within a deadend balcony approach should be fixed and have an FRR of not less than -/30/30.

## Subsection C8 - Openings through Fire Barriers and Vertical Shafts

### Clause C8.1

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Openings should not be formed at fire barriers forming part of a fire compartment as described in Clause C3.1 unless such openings are protected by fire rated doors or fire shutters having an FRR of not less than that of such fire barriers. If the total width of the openings is more than 25% of the length of the compartment walls concerned, the fire rated doors or fire shutters should have an FRR with regard to the criterion of insulation of not less than that of the fire barrier. Such FRR with regard to the criterion of insulation can be reduced to not less than 30 minutes if sprinkler heads are provided on each side of the fire rated doors or fire shutters. The sprinkler heads should be a part of the fire service installations of the building and should comply with the Code of Practice for Minimum Fire Service Installations and Equipment.

### Clause C8.2

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Every opening for passage of air-conditioning ducts, ventilation ducts, electrical trunkings, conduits, pipes, cables and the like through a fire barrier should be protected with fire dampers or other suitable form of fire stop to maintain the required FRR of that fire barrier.

### Clause C8.3

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Where a vertical shaft linking different floors is formed by fire barriers, the openings within the vertical shaft for passage of air-conditioning ducts, ventilation ducts, electrical trunkings, conduits, pipes, cables and the like should be fire sealed. FRR to the floor enclosed by the vertical shaft is not required. Doors and hatches, etc provided to the vertical shaft should have an FRR of not less than that of the vertical shaft and be self-closing.

#### **Commentary**

Vertical shafts are normally unoccupied spaces and contain electrical, plumbing or mechanical services.



#### Clause C8.4

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Subject to Clause C8.2, building services including the associated ducts, trunkings, conduits, pipes, cables and the like are not required to be enclosed by fire barriers if they are installed within the same fire compartment.

#### Clause C8.5

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Any fire sealing system should comply with the following requirements:

- (a) The sealing system should comply with the requirements in Part E;
- (b) The performance of the sealing system should not be affected by moisture or dampness;
- (c) The life of the sealing system should not be shorter than that of the duct, pipe or wire; and
- (d) The sealing should be firmly fixed.

#### Clause C8.6

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Where water-borne metallic pipes pass through fire barriers, gaps between the pipes and the fire barriers should be properly filled by fire rated material having an FRR of not less than that of the fire barrier that it penetrates.

#### Clause C8.7

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Fire shutters should be constructed, installed and assembled to the satisfaction of the Building Authority and the operation of the fire shutters should be designed, installed, tested and maintained to the satisfaction of the Director of Fire Services. Fire dampers should be designed, installed, tested and maintained to the satisfaction of the Director of Fire Services or the Building Authority, as appropriate.

#### **Commentary**

Fire dampers that are directly associated with the ducting and trunking under the Building (Ventilating Systems) Regulations are within the ambit of the Director of Fire Services. They include blade type fire dampers manufactured and installed in accordance with the standards and requirements stipulated by the Director of Fire Services.

## Subsection C9 – Protection of Required Staircases and Lifts

### Clause C9.1

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All liftwells should comply with the following requirements:

- (a) all liftwells, except for openings for doors and ventilation or openings between the liftwell and the machine or pulley room, should be separated from the rest of the building by fire barriers having an FRR of not less than 120/120/120;
- (b) penetrations in a liftwell wall around frames or reveals of lift landing doors, floor indicator panels and lift call buttons should be properly sealed to maintain the FRR of the wall and comply with Part E;
- (c) a door provided at a lift landing to give access to the car of a lift and any other door to the liftwell wall should have an FRR of not less than that of the fire barriers therein with regard to integrity, or not less than -/120/-; and
- (d) where a lift connects basement with storeys above the ground storey, the lift doors at the basement should be protected by a smoke seal lobby complying with Part E.

#### **Commentary**

The FRR required for the lift car landing doors is for the purpose of resisting a fire from the occupied side of the floor but not from the lift car side.

### Clause C9.2

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Provided that the lift machine or pulley room is completely separated by fire barriers from the rest of the building (except for the opening for lift car cable/rope), fire resisting construction is not required for the lift car including landing doors and the liftwell, if any, of a bullet lift, panorama lift and the like serving a single fire compartment.

### Clause C9.3

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All protected exits and protected lobbies should comply with the following requirements:

- (a) They should be separated from the rest of the building by fire barriers having an FRR of not less than that of the Use Classification of that fire compartment to which they connect;
- (b) Any doorway giving access to the protected exits should be provided with a fire rated door having an FRR, with regard to the criteria of integrity and insulation, of not less than that of the fire barriers therein;
- (c) The fire rated doors at the doorway giving access to a protected lobby should have an FRR that complies with Clause C16.5 with regard to the criteria of integrity and insulation; and
- (d) All required staircases and their protected lobbies should not accommodate any services other than emergency services such as fire hydrants, sprinkler systems, emergency lights, exit signs, closed-circuit television and direct intercom link unless such services are enclosed by fire barriers having an FRR of not less than that of the walls separating the protected exit from the rest of the building. Any access openings in such enclosures should be provided with a fire rated door having an FRR, with regard to the criteria of integrity and insulation, of not less than that of the fire barriers therein.

### Clause C9.4

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Each element of construction of a required staircase including the landings and supports enclosed within the walls having the required FRR need not have an FRR but must be non-combustible.

### Clause C9.5

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Where the ground storey of a building provided with only one required staircase is used for any occupancy other than domestic or office, the required staircase from ground to first floor level should be separated from the rest of the building by a fire barrier having the longer of the FRRs specified in Table C1 and the wall enclosing the required staircase should, at the main entrance, be returned for a distance of not less than 450mm along the frontage of the ground storey.

### Clause C9.6

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Subject to Subsection C5, Clause C9.7 and C9.8, an external wall of a required staircase and its protected lobby may be unprotected and openings may be made in the external wall.

### Clause C9.7

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Where any external wall of a required staircase and its protected lobby opposing, either directly or indirectly, and within 6 m of:

- (a) the opposite side of a street;
- (b) a common boundary with an adjoining site;
- (c) any other external wall having an FRR of less than that required for the wall separating the required staircase or protected lobby concerned from the rest of the building, or other opening not protected by fixed light with an FRR of that required for the wall of the required staircase or protected lobby concerned of the same building; or
- (d) any other building on the same site,

that part of the external wall should have an FRR of not less than that required for the wall separating such required staircase or protected lobby from the remainder of the building. It should also be imperforate, unless protected by fixed light which should not occupy more than 25% of the area of the external wall of the storey in which it is located and having an FRR of not less than that of the wall or, in the case of the discharge point at ground storey or roof level, a fire rated door having an FRR of not less than that of the wall. See Diagram C2 for illustration.

#### **Commentary**

The distance of 6m should be measured in a straight line between the features listed in (a) to (d) of the clause and the side of the subject window of a required staircase or protected lobby, nearest to such features. Any screen on such side of the window having the required FRR of not less than that of the required staircase or protected lobby could be regarded as solid screen wall in measuring the required minimum 6m distance. See Example (b) in Diagram C2 for illustration.

### Clause C9.8

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Where the external wall coming under Clause C9.6 continues in the same plane with other external walls of the same building and both such walls have an FRR of less than that required for the wall separating the required staircase or protected lobby concerned from the rest of the building, the remaining fire resisting walls of the required staircase or protected lobby should, at the junction with the external wall, be extended for a distance of not less than 450 mm at any angle, except that at the final discharge point at ground storey, the extension should not project beyond the external wall. See Diagram C3 for illustration.

#### **Commentary**

The separation distances specified in Diagram C3 are to prevent fire spread or to prevent thermal injuries to escaping occupants and are not intended to prevent smoke spread.

## Subsection C10 - Protection of Openings between Floors

### Clause C10.1

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For sprinkler protected building, at any internal unprotected opening in floors within a fire compartment, such as those for escalators, circulation staircases or walkways, the following should be provided:

- (a) a barrier of not less than 450mm measured vertically downwards from the underside of the floor should surround the opening. The barrier should have an FRR of not less than -/30/- and be non-combustible complying with the requirements in Part E. If false ceilings are hung in the vicinity of the opening, the barrier should extend not less than 450mm below the false ceiling. See Diagrams C4 and C5 for illustration; or
- (b) a smoke curtain activated by a smoke detection system subject to the approval from the Building Authority and the Director of Fire Services.

#### **Commentary**

The 450mm downstand at the edge of a void is for the purpose of ensuring the formation of a hot smoke layer to activate sprinkler protection. The 450mm downstand will, in the very early stages of a fire, provide a barrier to the expanding hot layer. The barrier is not intended to prevent smoke from spreading between floors as fire develops.

The smoke curtain mentioned in Clause C10.1(b) above should:

- (a) be deployed upon receipt of a fire alarm /smoke detection alarm signal or in the event of main power failure;
- (b) not be less than 450mm measured vertically downwards from the underside of the floor or below the false ceiling if false ceilings are hung in the vicinity of the opening; and
- (c) be tested to BS EN12101-1 for 600°C for at least 30 minutes and BS EN 1634-3.

### Clause C10.2

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A curtain wall or other similar construction, which protects the building against the elements and which extends beyond one storey in height, should be constructed entirely of non-combustible materials (except for window sealants and gaskets). Any void formed between the curtain wall and the perimeter of the building onto which the curtain wall is fixed should be sealed to form an effective smoke and fire barrier to prevent smoke and fire spread between floors. The smoke and fire barrier should have:

- (a) an FRR of not less than that of the floors; and
- (b) D-stability duration of not less than the FRR of the floors and the maximum leakage is not more than  $25\text{m}^3/\text{h}/\text{m}^2$  at 25Pa at ambient temperature when tested in accordance with BS EN 12101-1.

### Clause C10.3

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An atrium in a sprinkler protected building should comply with the following requirements:

- (a) the atrium should be separated from all other spaces by fire barriers having an FRR of not less than that of those spaces. The fire barrier can be formed by fire rated walls, fire shutters, fire curtains or fire rated glazings;
- (b) the volume of an atrium should not exceed 28,000m<sup>3</sup>;
- (c) the maximum height from lowest connected floor to the underside of the lowest structural member of the ceiling of the upper-most connected floor should not exceed 15m. See examples in Diagram C6;
- (d) a sprinkler system designed and installed to the satisfaction of the Director of Fire Services must provide coverage to the base of the atrium;
- (e) the atrium cannot have more than 3 floors interconnected; and
- (f) other fire separation requirements on special designs to be determined by the Building Authority.

#### **Commentary**

An atrium is formed when floors are linked through openings between floors, there is a risk of smoke spread that could affect adversely the life safety of occupants, especially on the upper floors of the atrium. The fire separation of the atrium from the surrounding areas can be achieved by fire barriers, fire rated glazing or automated fire shutters / curtains.

## Subsection C11 – Protection against External Fire Spread

### Clause C11.1

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Subject to Subsection C5, the external wall of a building at any floor should be separated from the external wall at the floor next below by:

- (a) a spandrel that is a vertical element of 900mm, with an FRR of not less than that of the intervening storey; or
- (b) a horizontal projection of 500mm, with an FRR of not less than that of the intervening storey.

This clause does not apply to a single family house or a sprinkler protected building.

See Diagram C7 for illustration.

#### **Commentary**

A 900mm spandrel or 500mm horizontal projection is effective in slowing flame spread only and may not prevent fire spread. A sprinkler system installed in compliance with the requirements of the Director of Fire Services is the most effective form of fire control to prevent vertical fire spread.

#### Clause C11.2

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For Use Classification 1, openings of not more than 110mm in diameter are allowed at the fire rated spandrels of the kitchen and bathroom for the penetration of plumbing and drainage pipes.

#### Subsection C12 – Protection of Roofs

##### Clause C12.1

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All roofs, together with the members forming the roof structure, should be constructed of non-combustible materials complying with Part E.

##### Clause C12.2

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The roof of every building with only one required staircase, forming part of a protected exit in which the level of the highest floor is more than 13m above ground level should have an FRR of not less than that of the storey below.

##### Clause C12.3

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The main roof or any other part of the roof, which is used or intended to be used as a refuge floor or part of a refuge floor, should have an FRR of not less than that of the storey below.

##### Clause C12.4

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Where a protected exit leads to a temporary place of safety, which is an open area located at an upper floor instead of leading directly to a street or to an ultimate place of safety, such as podium level, the exit route at the temporary place of safety should comply with Subsection C9. In particular, the floor of the temporary place of safety should have an FRR of not less than that of the storey below.

## Subsection C13 - Protection of Areas of Special Hazard

### Clause C13.1

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Areas of a building accommodating a special hazard should be separated from the rest of the building by fire barriers having an FRR of not less than -/120/120. If the special hazard area is connected directly to a protected exit, the fire barriers should have an FRR of not less than -/240/240.

#### **Commentary**

For the purpose of this clause, the hazard of occupancy should be the relative danger to the start and spread of fire, the relative danger of smoke or gases generated and the relative danger of explosion or other occurrence which may endanger the lives and safety of occupants. The definition of special hazard is given in Part A. The protection to means of escape should be enhanced where an area of special hazard opens direct to a protected exit.

### Clause C13.2

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A kitchen in a restaurant may be regarded as ancillary accommodation to the restaurant for the purpose of assessing the fire resisting construction requirements. Such a kitchen should comply with the following requirements:

- (a) the kitchen should be enclosed by fire barriers having an FRR of not less than -/60/60 and any opening in the enclosure should be protected by fire rated door(s) having an FRR of not less than -/60/60; and
- (b) protected lobby in compliance with Clause C16.5 should be provided between the kitchen and
  - (i) any exit route from the main building; and/or
  - (ii) the dining area of the restaurant where the kitchen has a usable floor area exceeding 45m<sup>2</sup> and the lobby opens onto an exit route of the dining area; and
- (c) subject to compliance with Clause C16.1, hold-open device for the doors of the kitchen may be installed.

### Clause C13.3

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In any Use Classification 1 provided with a single exit door, a kitchen adjacent to such door should be separated from the rest of the flat by walls having an FRR of not less than -/30/30 and the entrance to the kitchen should be provided with a fire rated door having an FRR of not less than -/30/30.



#### Clause C13.4

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If fire barrier is not provided in accordance with Clause C13.3 (i.e. an open kitchen), the following fire safety provisions should be provided:

- (a) smoke detector(s) fitted with sounder base should be provided inside the subject flat. The alarm signal of the smoke detector(s) should be connected to the local fire services control panel of the building and should not be linked to the Fire Services Communication Centre;
- (b) smoke detector(s) should be provided at the common area outside the subject flat. The alarm signal of the smoke detector(s) should be connected to the local fire services control panel, the common fire alarm system of the building and the Fire Services Communication Centre;
- (c) sprinkler head(s) should be provided to cover the notional open kitchen area. The alarm signal of the system should be connected to the local fire services control panel, the common fire alarm system of the building and the Fire Services Communication Centre;
- (d) a full height wall having an FRR of not less than -/30/30 should be provided adjacent to the flat exit door. The width of the wall should not be less than 600mm; and
- (e) For open kitchen in premises with internal staircase(s), a barrier of not less than 450mm measured vertically downwards from the underside of the floor shall be provided. The barrier should surround the notional open kitchen area and should have an FRR of not less than -/30/- and be non-combustible complying with the requirements in Part E. If false ceilings are hung in the open kitchen, the barrier should extend not less than 450mm below the false ceilings.

#### **Commentary**

The specification and location of the smoke detectors should be considered carefully when they are installed inside the flats to minimize false alarms. Also taking into account the effect of humidity, medium or low sensitivity smoke detectors are recommended to be installed in living areas and placed away from the cooking range(s) and bathroom.

The smoke detectors and sprinklers are fire service installations designed in accordance with the Code of Practice for Minimum Fire Service Installations and Equipment and should be subject to annual inspection and certification by a registered fire service installation contractor.

The full height wall having an FRR of not less than -/30/30 should be erected with a material that is not easily removable (e.g. reinforced concrete construction).

## Subsection C14 – Protection of Basements

### Clause C14.1

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Every basement should be provided with the following:

- (a) fire barriers forming the fire compartment between the ground storey and a basement should have an FRR of not less than -/240/240. This includes all protected exits serving the basement;
- (b) all elements of construction of the basement should have an FRR of not less than 240/240/240;
- (c) fire barriers forming fire compartment walls within basements should have an FRR of not less than -/120/120; and
- (d) where a basement has the same Use Classification as the ground storey and any upper storeys, the basement may be united with the ground and upper storeys, provided that every element of construction and fire barriers in all such storeys should have an FRR of not less than that of the basement as specified in (a), (b) and (c) above.

### Clause C14.2

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Every basement that is enclosed on four sides should be provided with smoke outlets, which should:

- (a) be not more than 30m apart and situated along the street frontages or adjacent to external walls;
- (b) be sited at a high level, be evenly distributed around the perimeter of the building and be so arranged as to create a through draft;
- (c) be provided to every fire compartment as described in Clause C3.1 in the basement;
- (d) have an area in aggregate of not less than 0.5% of the floor area they serve or, in areas used for bulk storage or warehouse, not less than 2.5% of the floor area they serve;
- (e) be not less than 1m in its least dimension;
- (f) be situated as far away as possible from the discharge points of all required staircases and be suitably indicated on the external face of the building;
- (g) be covered by stall-boards or pavement light that can be easily broken by firefighters in an emergency; and
- (h) be maintained unobstructed or covered only with a grill or louvres constructed of metal other than aluminium where they are terminating in the open air in a position inaccessible to a firefighter.

### Clause C14.3

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Where a dynamic smoke extraction system is provided in a basement which is subject to the satisfaction of the Director of Fire Services, smoke outlets should be provided as follows:

- (a) have at least one smoke outlet for every 3,500 m<sup>3</sup> of fire compartment volume, but in no case less than 1 outlet per floor;
- (b) be readily accessible to firefighter in an emergency; and
- (c) comply with the requirements of Clause C14.2, except (d) and (h) thereof unless incompatible with the requirements in (a) and (b).

### Clause C14.4

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Where a smoke outlet shaft serving a basement extends into or through another storey, it should have an FRR or be protected with an enclosure having an FRR not less than that required for the element of construction of the storey served or through which it passes, whichever is the higher. Where a smoke outlet shaft serving a basement adjoins another smoke outlet shaft, they should be similarly separated from each other. An unenclosed smoke outlet shaft should be capable of resisting accidental mechanical damage to the satisfaction of the Director of Fire Services.

## Subsection C15 – Linked Buildings

### Clause C15.1

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A bridge may link two or more buildings and should comply with the following:-

- (a) Where fire barrier is provided at each end of the bridge, the elements of construction of the bridge and such fire barriers should have the longest of the FRR of the storey(s) the bridge links. If the fire barriers are fire shutters, by-pass lobbies clearly indicated by exit signs should be provided. The external walls at the junctions of the bridge and the building(s) should comply with the requirements in Subsection C5.
- (b) Where no fire barrier is provided at each end of the bridge and the bridge is unenclosed, i.e. both sides of the bridge are provided with, throughout its whole length, protective barriers or parapets not higher than 1.2m, it should be constructed of non-combustible materials and the elements of construction should have the longest of the FRR of the storey(s) it links.
- (c) Where no fire barrier is provided at each end of the bridge and the bridge is not unenclosed, it will be regarded as an integral part of the fire compartment it links and should comply with the relevant requirements in this Code with regards to the building(s) it links.

#### **Commentary**

Where fire barriers are not provided at each end of the bridge, the bridge should be an unenclosed bridge constructed of non-combustible materials to prevent spread of fire and allow disperse of smoke. Otherwise, the bridge will be considered as a part of the building(s) it links.

## Clause C15.2

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A tunnel linking two or more buildings should be provided at each end with fire barriers having the longest of the FRR of the storey(s) it links. If fire shutters are used, by-pass lobby clearly indicated by exit signs should be provided. Doors including by-pass lobby should have an FRR of not less than that of the fire barriers. The tunnel should be of non-combustible construction.

### **Commentary**

#### Use of Fire Shutters and By-Pass Lobby

Fire shutters are fire barriers but also prevent means of escape movement. Occupants may not realise the by-pass doors are means of escape and will often not use the by-pass doors provided. Therefore, appropriate exit sign should be provided.

## Subsection C16 – Fire Rated Doors

### Clause C16.1

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All fire rated doors should be self-closing and comply with the requirements in Part E.

### Clause C16.2

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Fire rated doors to a required staircase forming part of a protected exit and its protected lobby should remain closed. Other fire rated doors are allowed to be held open provided that the hold-open device complies with requirements in Clause B13.8.

### Clause C16.3

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Except for fire rated doors with hold-open devices complying with Clause C16.2, all fire rated doors should be provided with a notice on both sides stating in English and Chinese with words and characters, not less than 10mm high, as follows:



#### Clause C16.4

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All fire rated doors should be closely fitted around their edges to impede the passage of smoke or flame. The bottom gap between such doors and the floor should not exceed 10mm.

#### **Commentary**

The bottom gap between the fire rated door and the floor shall be not more than the designed values of such door specified in the fire test report.

#### Clause C16.5

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A protected lobby should comply with the following requirements:

- (a) all fire barriers should be constructed from the soffit of upper storey or from the underside of a false ceiling to the floor. The fire barriers and the false ceiling should have an FRR of not less than that of the Use Classification of that floor; and
- (b) if the FRR of the door facing the occupied side (or in case of Clause C13.2, the kitchen side) is not less than the FRR of the fire barriers of that storey, the second door is not required to have an FRR. Both doors should be provided with smoke seals; or
- (c) if both doors of the protected lobby have the same FRR, the FRR of both doors can have an FRR of not less than half of the fire barriers of that lobby. Both doors should be provided with smoke seals.

## Subsection C17 – Protection for Refuge Floor at Intermediate Floor Level

### Clause C17.1

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The area for refuge on every refuge floor in a building should be separated from the rest of the building, including vertical shafts or ducts passing through such floor, by walls having an FRR of not less than -/120/120 and by floors having an FRR of not less than 120/120/120. Any vertical shafts or ducts passing through a refuge floor should not open directly onto that floor.

#### **Commentary**

One means of complying with the Performance Requirement for tall building is provided in Subsection B18 of Part B, which details information for refuge floors, including aspects of fire resisting construction and should be read in conjunction with this Subsection.

Access through a protected lobby will not be considered as open directly onto the refuge floor.

### Clause C17.2

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Where the side of a refuge floor is required to be open, the open side should not directly or diagonally be within a distance of less than 6 m from:

- (a) the opposite side of a street;
- (b) a boundary of another site;
- (c) any other external wall having an FRR of less than 120/120/120; or
- (d) any other building on the same site.

If the subject matter in (b), (c) or (d) are on or beyond the same plane of the open side of the refuge floor, this requirement does not apply.

### Commentary

- (a) If a communal sky garden is incorporated in a refuge floor, the following requirements should be observed :
- (i) in Subsection B18 and C17, except those special provisions mentioned below, should be complied with. In assessing the net area for refuge and the minimum dimension of the area for refuge, no account should be taken of the space occupied by any planters, equipment and furniture in the refuge floor;
  - (ii) all garden furniture and equipment in the refuge floor should be firmly fixed;
  - (iii) all furniture, equipment and rubbish bins should be of non-combustible materials and so sited that they will not obstruct the exit routes and lift openings. Rubbish bins, where provided, should be fitted with self-closing lids; and
  - (iv) the garden should not be used for activities involving the use of naked fire e.g. barbecuing. A notice to this effect should be posted at prominent locations at the garden.
- (b) Where a communal sky garden is incorporated in a refuge floor, a relaxation on the restriction to provide lift door openings onto such floors may be granted subject to the following:
- (i) the lift landing doors should open onto a protected lobby with the doors and walls having an FRR of not less than -/120/120; and
  - (ii) the lift operation is arranged in such a manner that the landing doors at the refuge floor, other than those for fireman's lifts, will be automatically locked when the fire alarm is on.
- (c) While live plants are unlikely to pose undue fire risk<sup>1</sup>, the use of artificial plants/soil should be avoided where possible. The authorized person should advise the management to include in the fire safety management plan ensuring that any artificial plants and soil substrate materials are non-combustible and do not emit toxic gases in case of fire.
- (d) The Building Authority may impose additional requirements depending on the special circumstances of individual cases. Authorized persons proposing communal sky gardens in refuge floors with special design are advised to conduct a fire engineering assessment. The Fire Services Department also welcomes any enquiries prior to formal submission of plans.

<sup>1</sup>Live plants that are likely to be highly flammable (such as those secreting resinous sap or having volatile waxes or oils in their leaves, twigs and stems) should be used with caution.