

PAM CPD

**"Uniform Building by-laws 1984 (amendment 2021):
important revisions to Fire Safety provisions"**

Ar Chong Lee Siong

9 Sept 2023

Highlighted amendments to Parts VII and VIII of the Uniform Building By-Laws 1984 (amendment 2021)

1. Clause 136A : Fire shutters
2. Clause 137 : Compartment floors
3. Clause 140 : Fire appliance access
4. Clause 144 : Cladding on external wall
5. Clause 163 : Fire doors
6. Clause 174A : Final exit
7. Clause 194 : Single stair
8. Clause 197A : Fire fighting shafts
9. Clause 197B : Fire fighting access lobbies
10. Clause 224A : Hospitals
11. Clause 226A : Hose reel systems
12. Clause 249 : Smoke control
13. Clause 252A : Atriums
14. 5th Schedule : Purpose groups, dimensions of buildings and compartments
15. 7th Schedule : Travel distance, occupant load, capacity of exit
16. 10th Schedule : alarm and extinguishment system
17. 11th Schedule : staircase landing width or depth


CONCEPTS OF FIRE SAFETY

1 EVACUATION


2 PASSIVE CONTAINMENT

3 ACTIVE INTERVENTION

**4 ACCESS FOR FIRE FIGHTING
AND RESCUE**



Specific prescriptions
with reference to
Purpose Group and
occupancy, type, size
and height of
building
**UBBL Schedules
5,6,7,8,9,10**



Prescriptions with
reference to building
Height and Volume, for
ALL building types.

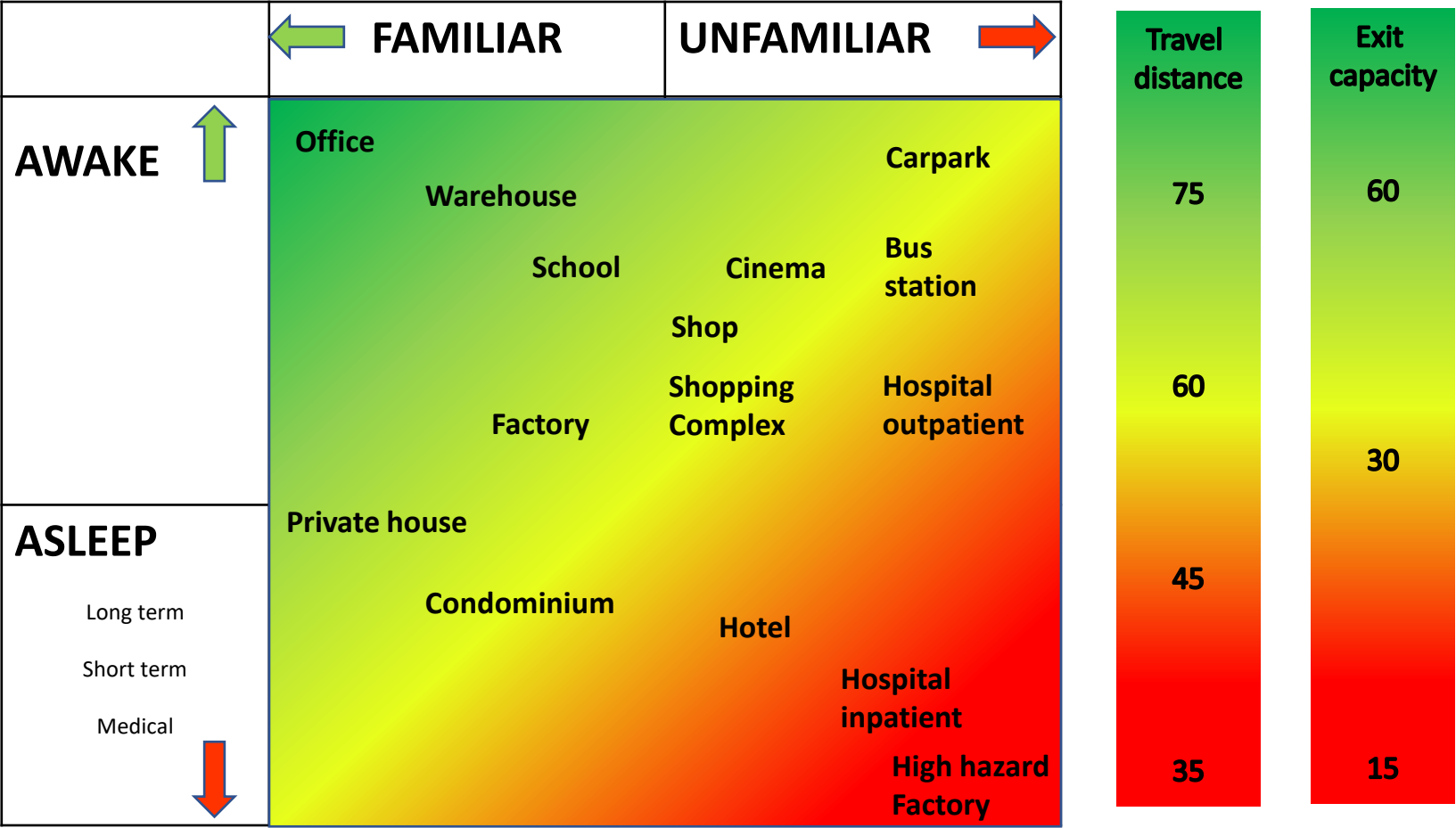
Number of purpose groups			Descriptive Title	Purposes for which building or compartments is intended to be used
I	..	..	Small residential	Private dwelling house detached or semi-detached or terraced.
II	..	..	Institutional	Hospital, school, college, library, nursing home or other similar establishment used for education or as living accommodation for, or for treatment, care or maintenance of, persons suffering from disabilities due to illness or old age or other physical or mental disability or under the age of 5 years, where such persons sleep in the premises.
III	..	..	Other residential	Accommodation for residential purpose other than any premises comprised in groups I and II, including a hotel, hostel, dormitory, apartment, flat, old folks' home, orphanage or service apartment.
IV	..	..	Office	Office, or premises used for office purposes, meaning thereby the purposes of administration, clerical work (including writing, book-keeping, sorting papers, filing, typing, duplicating, machine-calculating, drawing and the editorial preparation of matter for publication), handling money and telephone and telegraph operating.
V	..	..	Shop	Shop, or shop premises, shopping complex, food court, wet market or dry market,

			premises used for the carrying on there of retail trade or business (including the sale to members of the public of food or drink for immediate consumption, retail sales by auction, the business of lending books or periodicals for the purpose of gain, and the business of a barber or hairdresser) and premises to which members of the public are invited to resort for the purpose of delivering their goods for repair or other treatment or of themselves carrying out repairs to or other treatment of goods.
VI	..	..	<p>Factory</p> <p>Factory means all premises as defined in section 2 of the Factories and Machinery Act 1967, but excluding those buildings classified under purpose group VIII—Storage and general.</p>
VII	..	..	<p>Place of assembly</p> <p>Place, whether public or private, used for the attendance of persons for or in connection with their social, recreational, educational, business or other activities, and not comprised within group I to VI, including a convention centre, museum, art gallery, cinema, theatre, auditorium, place of worship, or transportation passenger terminal.</p>
VIII	..	..	<p>Storage and general</p> <p>Place for storage, deposit or parking of goods and materials (including vehicles), and other premises not comprised in groups I to VII.</p>

[Amendment 2012]

[Amendment 2021]

MS 1183:2015 : Occupancy characteristics

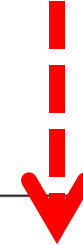


Travel distance

- **UBBL 165**
- **7th Schedule**
- **Dead end**
 - initial travel distance before a point where an alternative path becomes available
- **Direct distance**
 - Stipulates that travel distance must be measured along the actual path of travel
- **Open plan**
 - Where an actual path of travel cannot be determined, the direct distance can be measured as a straight line direct to the exit. Permitted travel distance is then reduced to 2/3.

UBBL 2021 7th Schedule

SEVENTH SCHEDULE					
MAXIMUM TRAVEL DISTANCES					
[By-law 165(4), 166(2), 167(1) , 170(b), 174(1), 174A(1a)]					
Purpose Group		Limit when alternative exits are available			
		One-way travel	Two-way travel		Corridors
		(1)	(2)	(3)	(4)
		*Dead-End Limit (metre)	Unsprinklered (metre)	Sprinklered (metre)	*Dead-End Limit (metre)
I.	Small residential	NR	NR	NR	NR



UBBL 2021 7th Schedule



Purpose group	dead-end	unsprinklered	sprinklered	corridor dead-end
II. Institutional				
Hospitals, nursing <u>homes, etc.</u>	15	30	45	15
School	15	45	75 60	15
Open plan	NR	30	45	
Flexible plan	NR	45	60	
III. Other residential				
Hotels	15	30	45	15
Apartments, flats and service apartments	20	30	75 60	20
Dormitories	15	45	75 60	15
IV. Office	15	45	75 60	15
V. Shop	15	45	60	15
VI. Factory				
General and special purpose	15	30	60	15
High hazard	0	22	35	0

UBBL 2021 7th Schedule



Purpose group		dead-end	unsprinklered	sprinklered	corridor dead-end
	Open structures	NR	NR	NR	NR
VII.	Place of assembly	15	45	60	15
VIII.	Storage and general				
	Low and ordinary hazard	15	30	60	15
	High hazard	10	20	35	10
	Parking garages	15	45+	60 x	15
	Aircraft <u>hangars</u> (ground floor)	15	30 +	45 +	15
	Aircraft <u>hangars</u> (mezzanine floor)	15	20	20	15
		NR---No requirements or not applicable. x Limits distance of travel on floors below in the street in sprinklered garage to 45 metres. * The dead-end limit shall be the distance to a storey exit or to a point where alternative means of escape is available provided that the total travel distance shall not exceed the limits under (2).			

Exit Route components

- Exit door
- Exit discharge
- Protected corridor
- Protected staircase
- Balcony approach
- Single staircase

Exit door, exit discharge

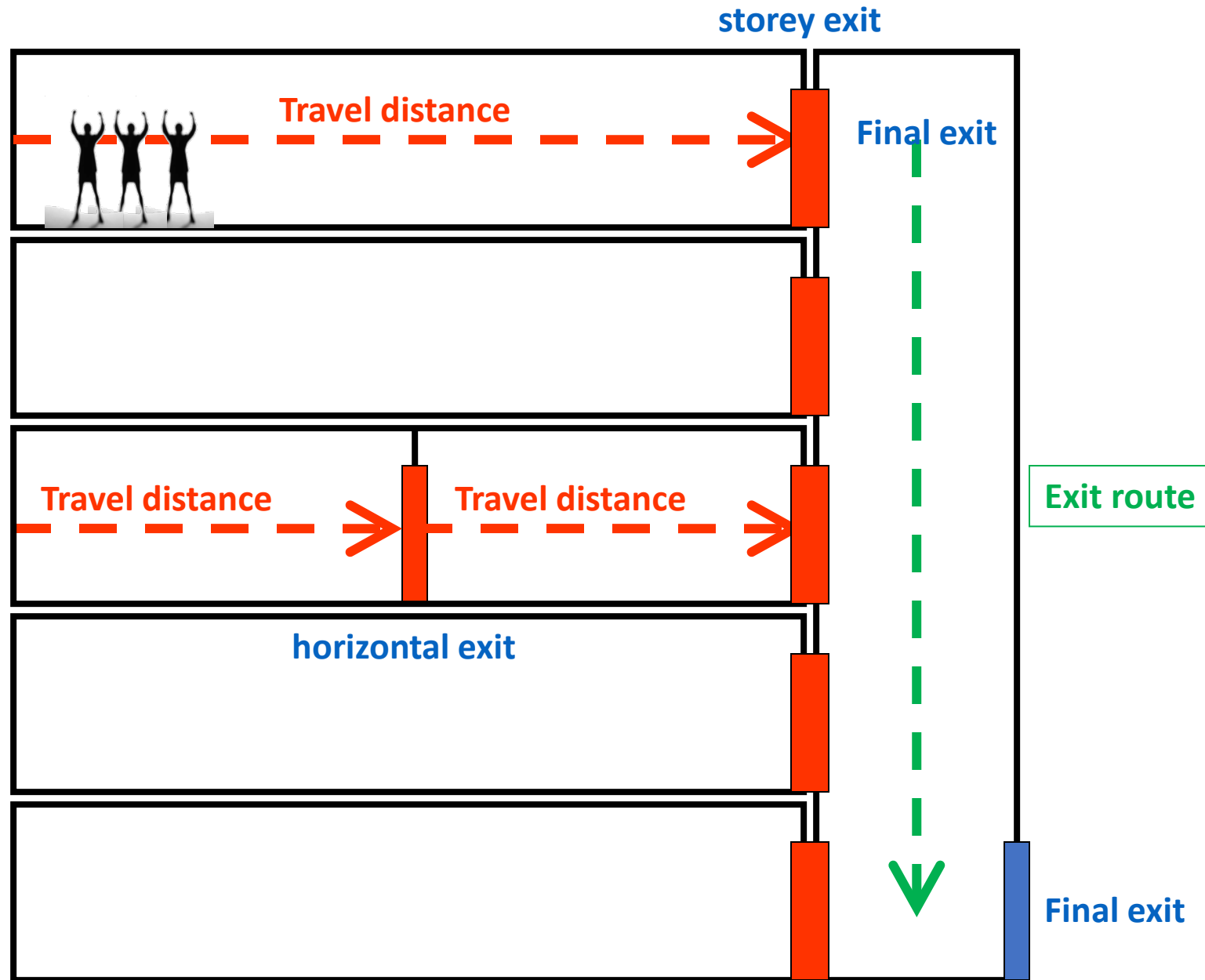
- **UBBL 173**
 - **UBBL 186**
 - **UBBL 193**
 - **UBBL 133 - interpretations**
-
- 'Door' refers to the physical door installed at an exit, and all its functional components e.g. locksets, latches, hinges and closers
 - 'discharge' refers to the 'doorway' or threshold of an exit

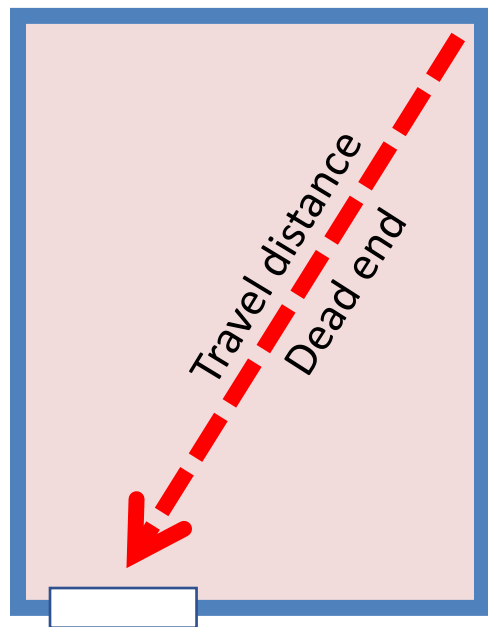
Exit door, exit discharge

- Not all fire rated doors are exit doors
- Not all exit doors need to be fire doors
- Not all doors need to be exit doors
- Not all doors can be exit doors
- **To qualify as an Exit Door:**
- Exit doors must always be able to be opened (without undue effort) at all times
- Exit discharge must always allow the passage of people at all times
- 'Exit' in this context means storey exit, horizontal exit or final exit

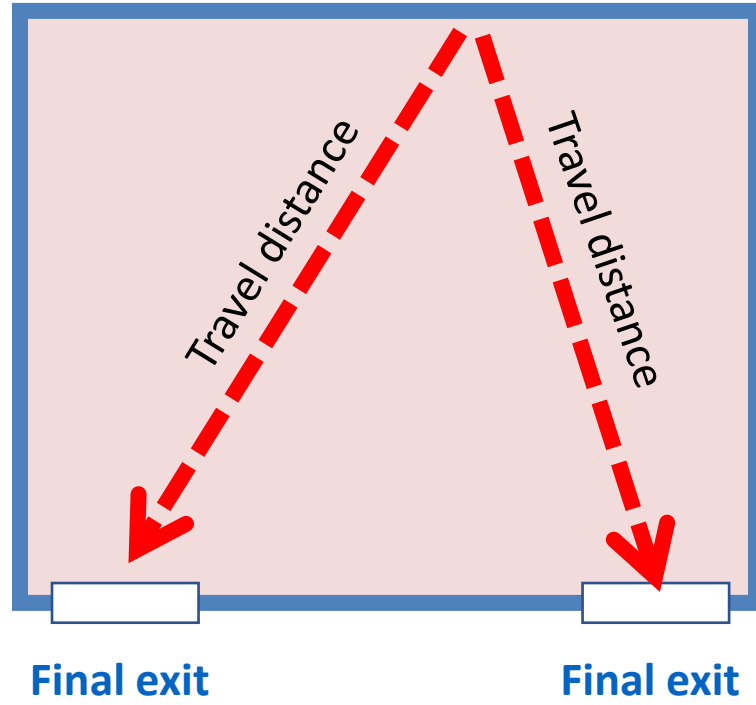
Protected corridor, protected staircase

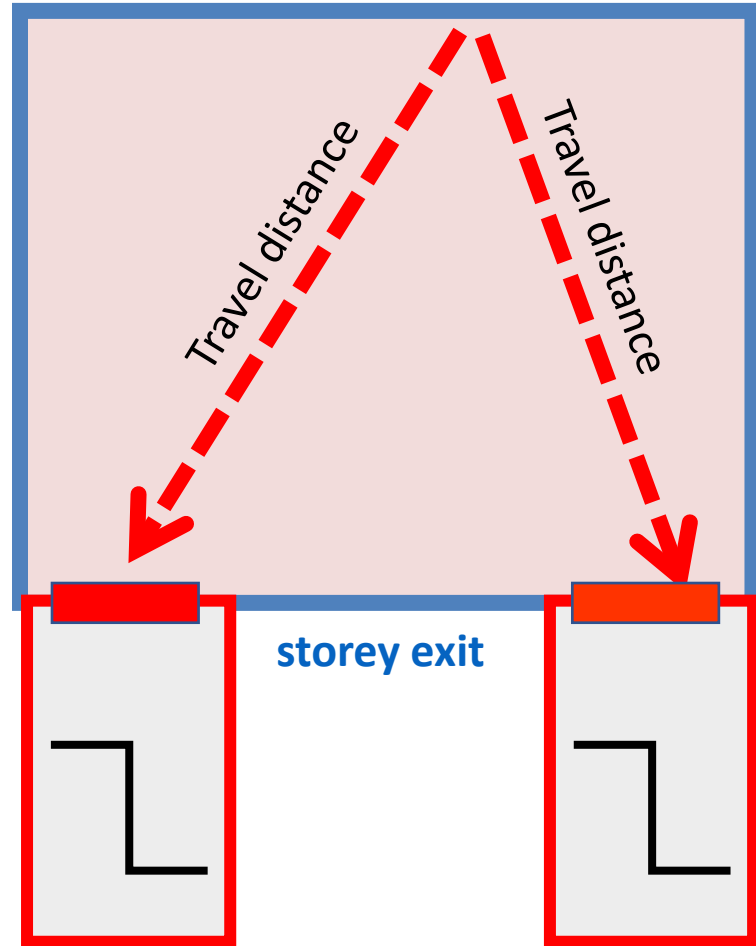
- **UBBL 133-interpretations**
- **UBBL 157, 189, 190, 191**
- While not expressed, it is inferred from the UBBL that all components that form the Exit Route shall be of protected construction.
- Using the same inference, 'protected' shall mean 'enclosed', 'separated' or 'isolated' from untenable exposure to Fire or Smoke



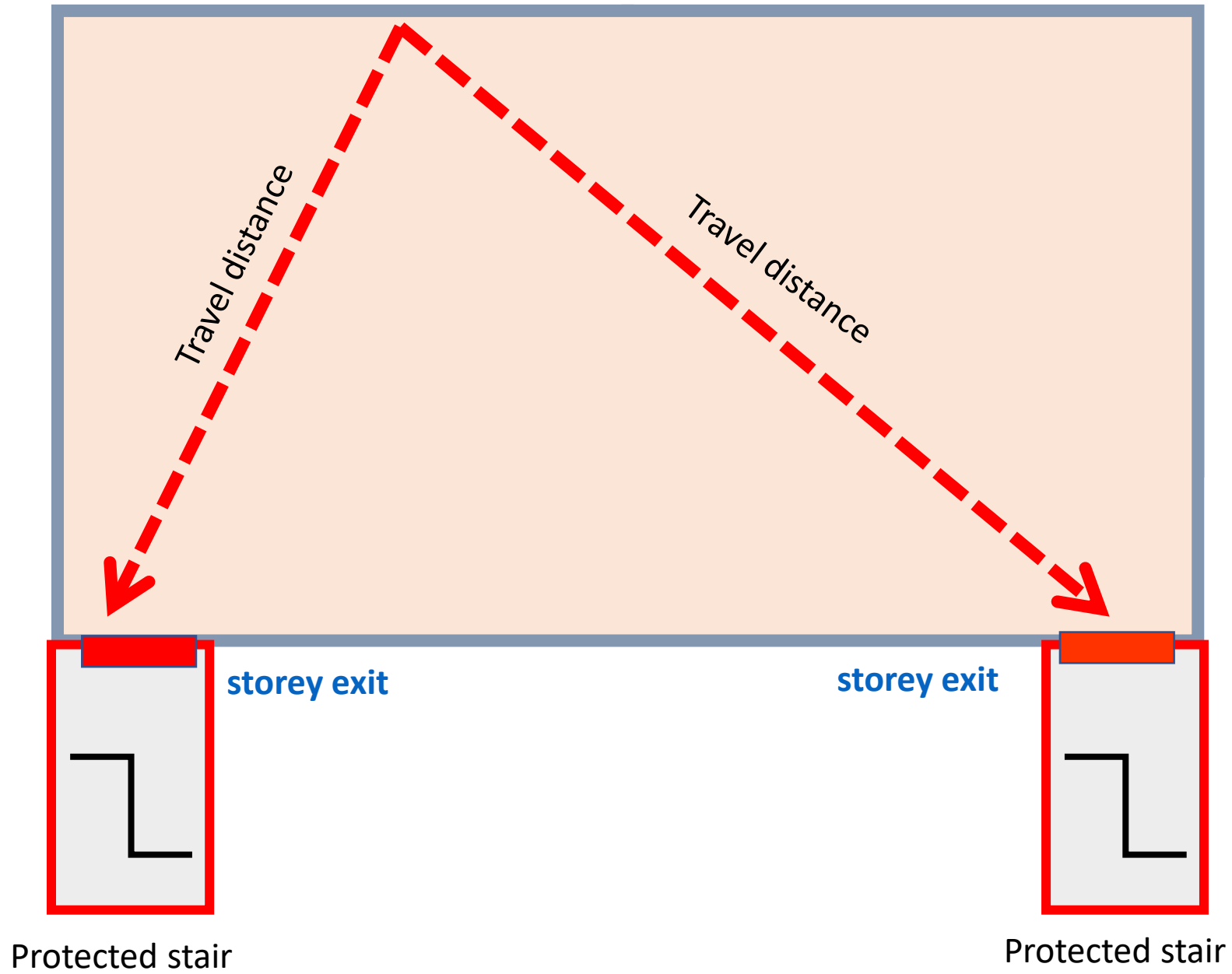


Final exit

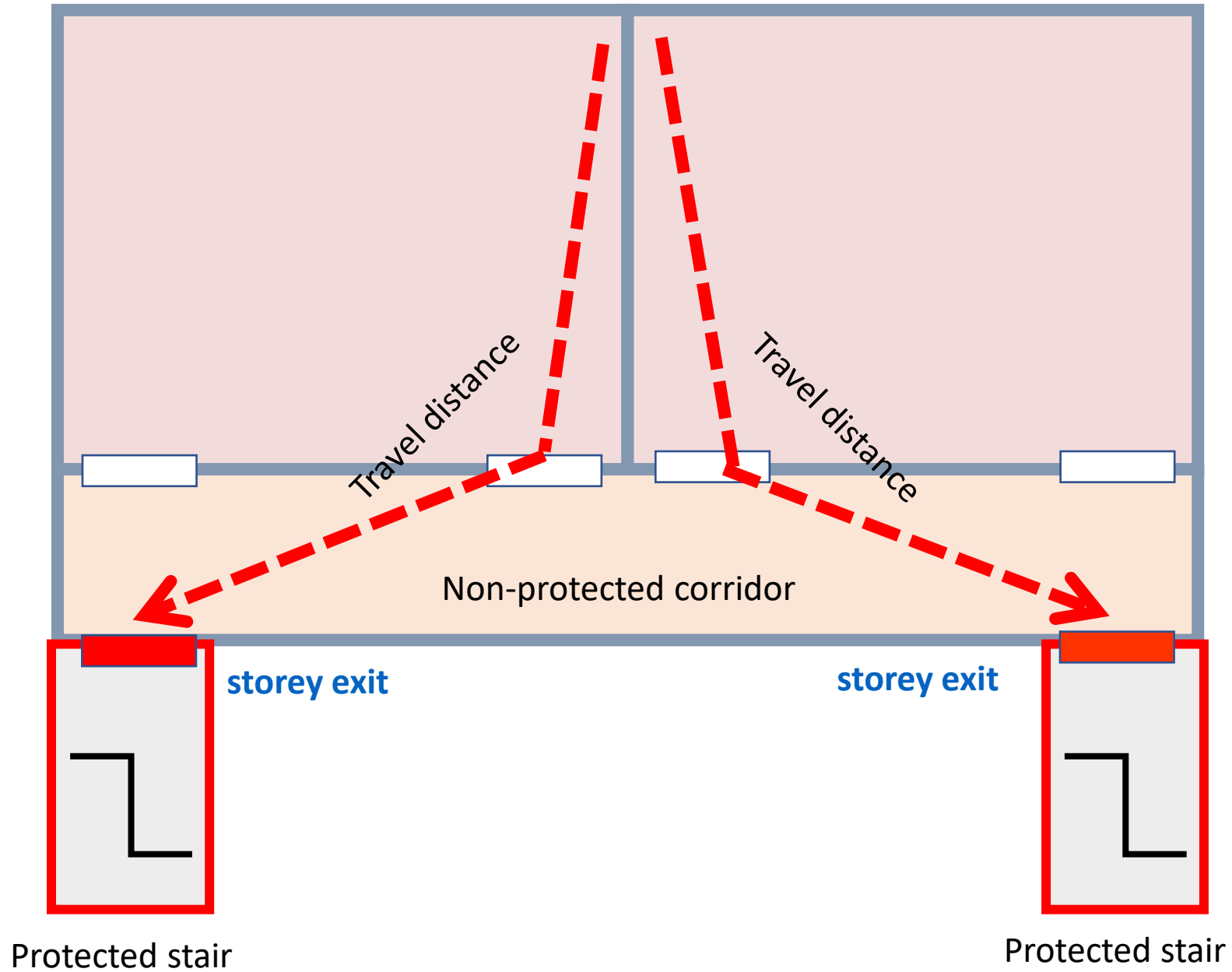




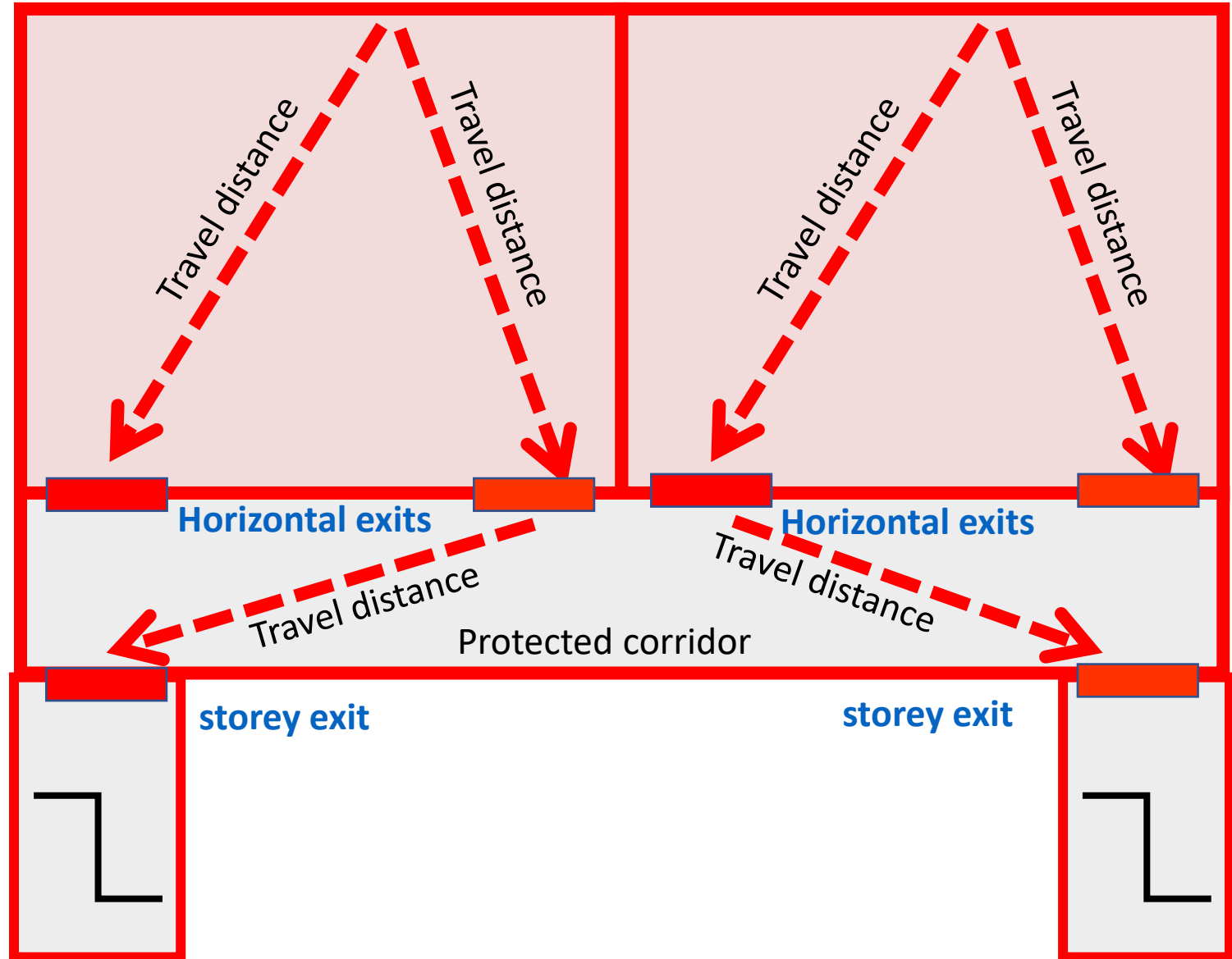
Protected stairs



Non fire rated partitions

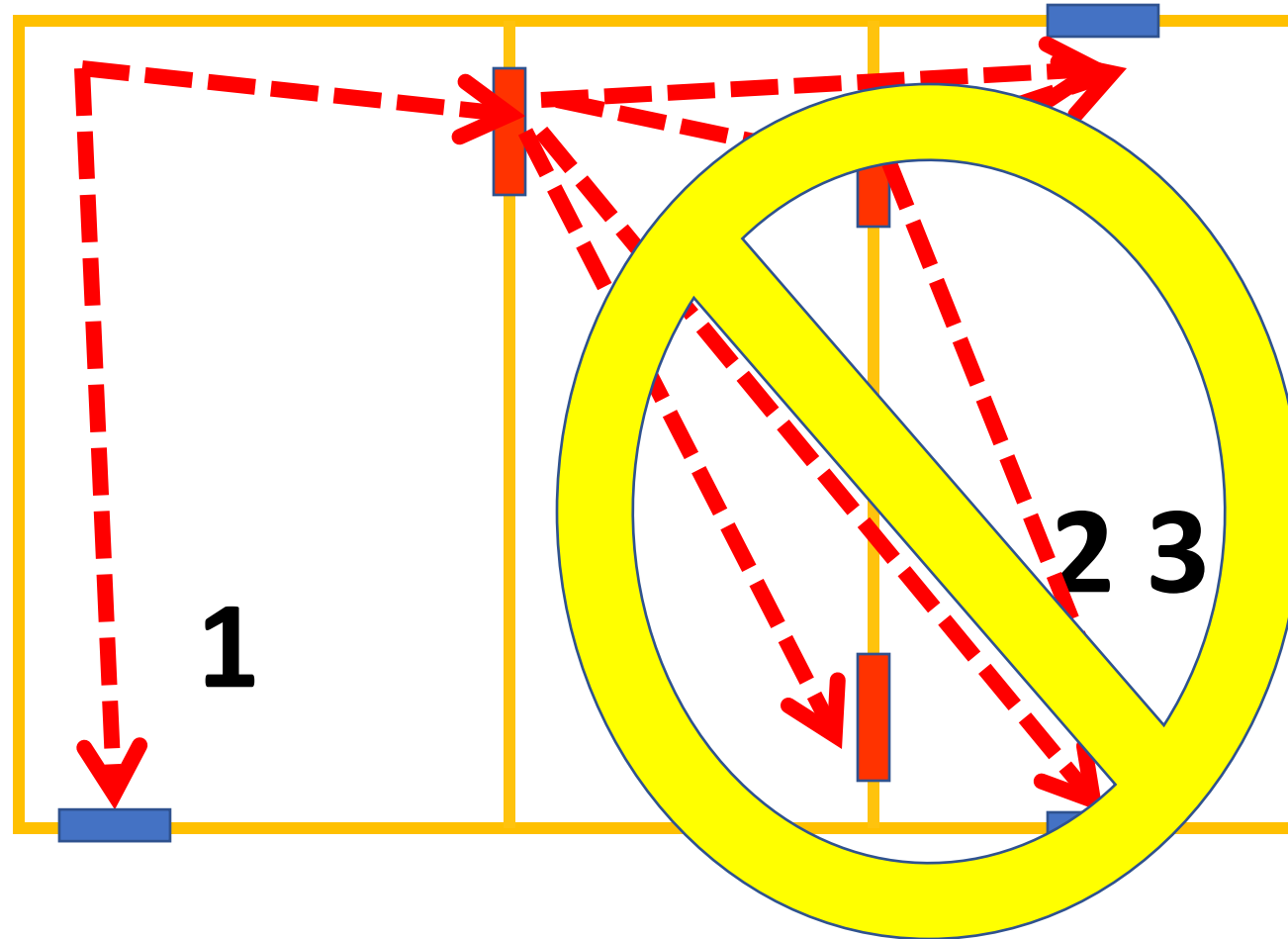


Fired rated compartment walls

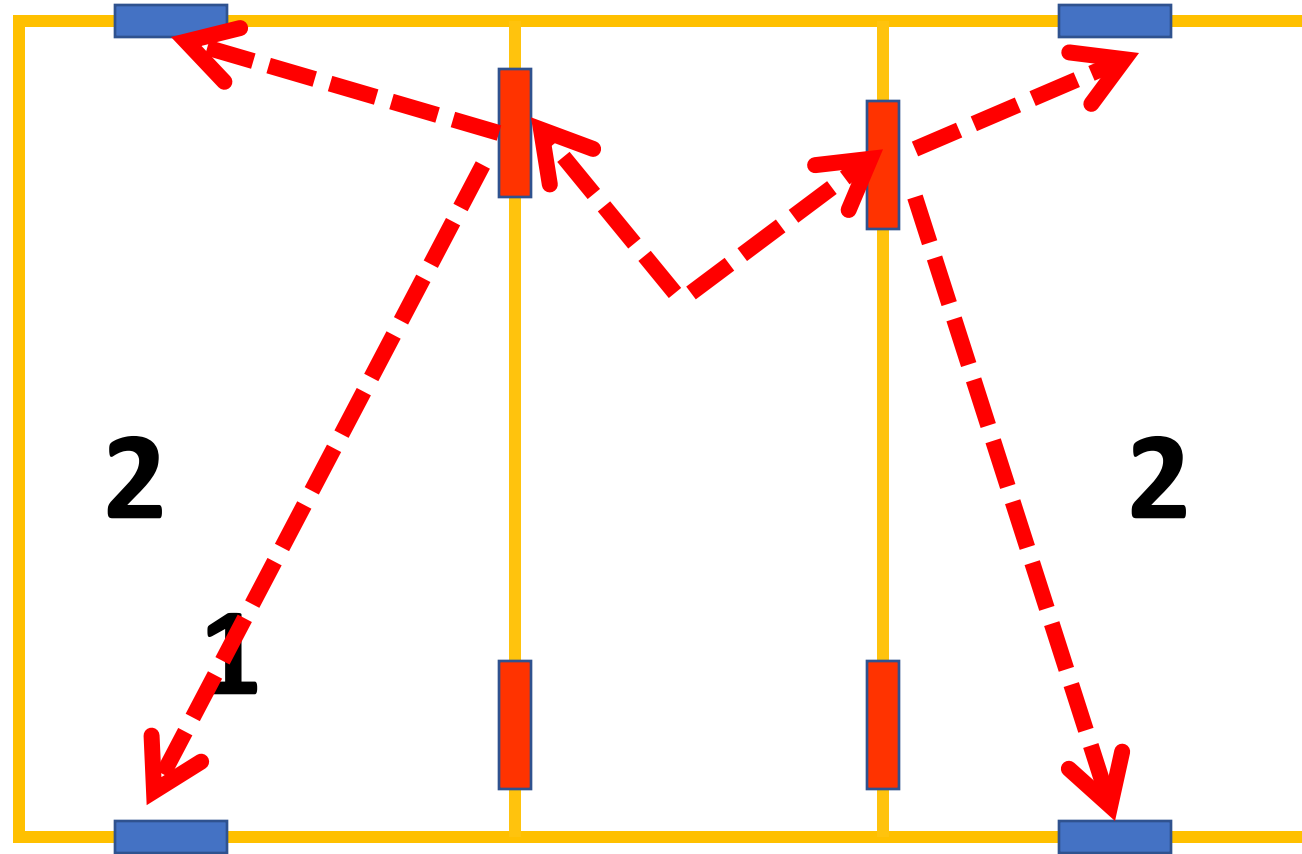


Protected stair

Protected stair

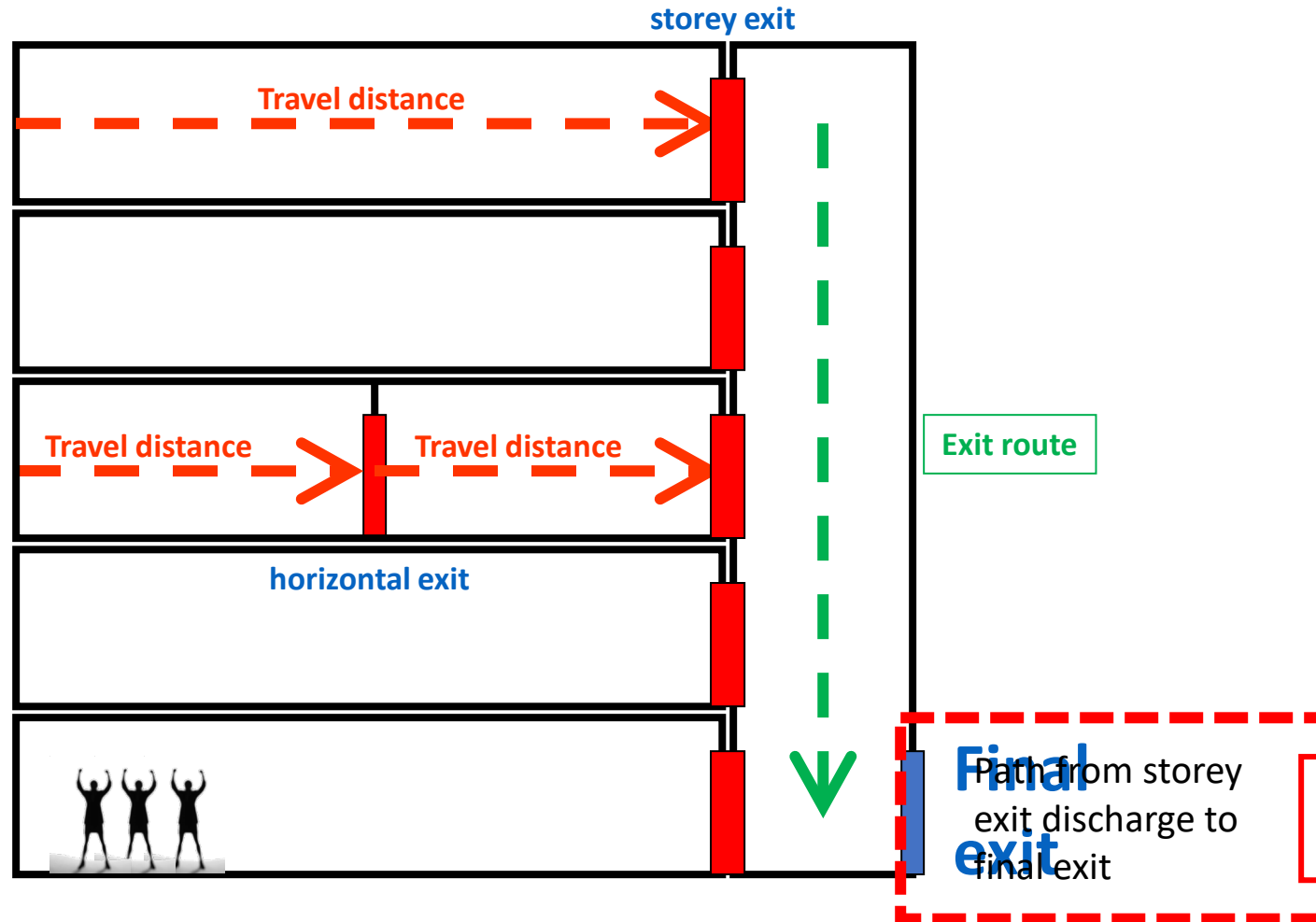


Horizontal exits



Horizontal exits

UBBL 2021 clause 174A

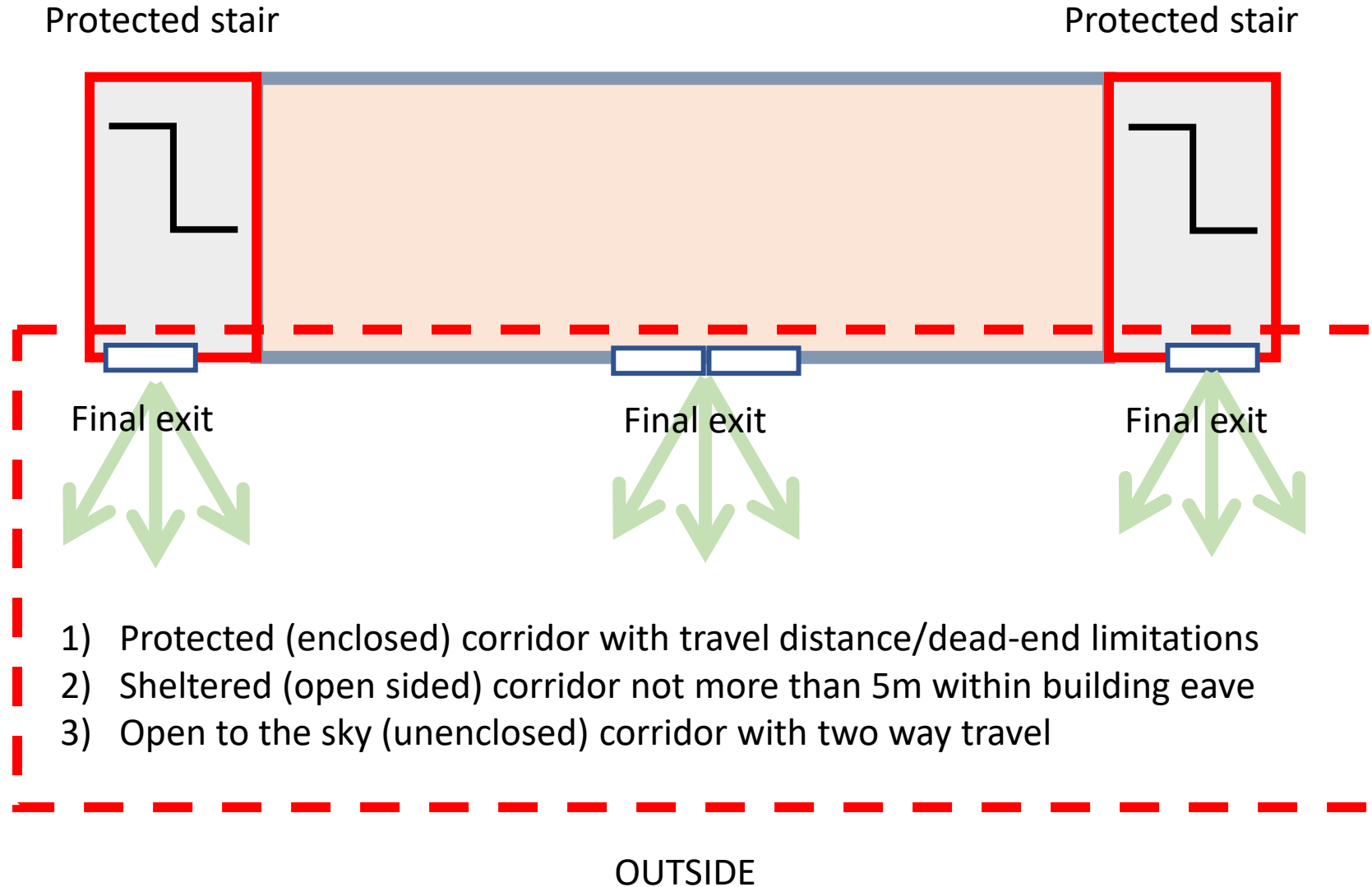


174A Final Exit

(2) In a sprinkler protected building, a maximum of 50 percent of the total number of exit staircase can be may discharged directly to the ground level covered circulation space provided that if all of the following are complied with:

- (a) the discharge point of the exit staircase into the ground level circulation space shall be within sight of and with direct access to a place of safety outside the building;
- (b) the maximum distance between the discharge point of an exit staircase to a place of safety outside the building shall not exceed 10 metres;
- (c) where there are commercial activities e.g. such as shops, kiosks or carts located along one side or both sides of the designated escape passageway leading to a the place of safety outside the building, a minimum separation distance of 10 metres shall be maintained between the commercial activities and the designated escape passageway. The circulation space shall also be installed with an engineered smoke control system, and alternatively, the commercial activities shall be fire compartmented with walls and doors of a minimum 1 hour fire resistance period; and
- (d) the clear width of the an exit doors leading to a the place of safety outside the building shall be adequate to receive the occupant load of the discharge floor and the total number of people persons discharging from the internal exit staircases.

UBBL 2021 clause 174A



174A (1) (d) an external route leading to a final exit which may comprise an open sided external corridor with no commercial activity and is not more than 5 metres from the building eave line

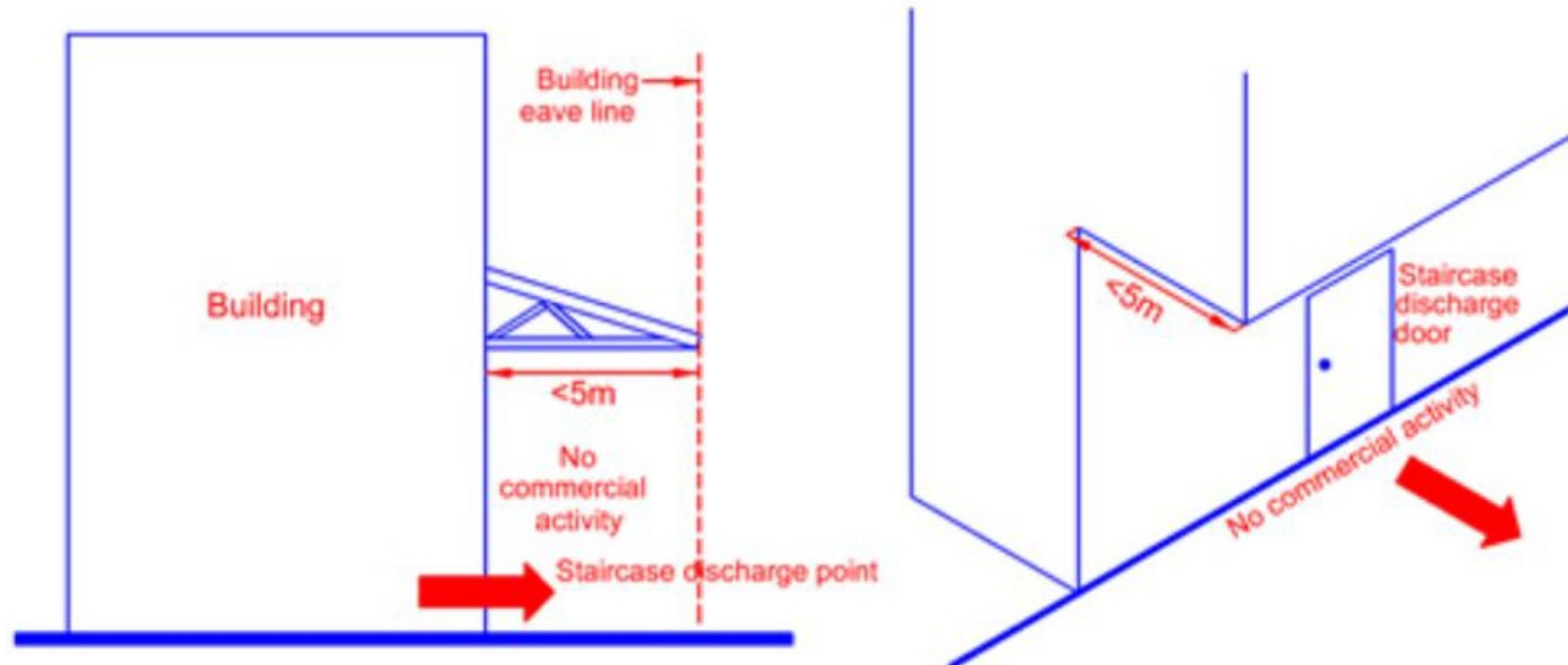
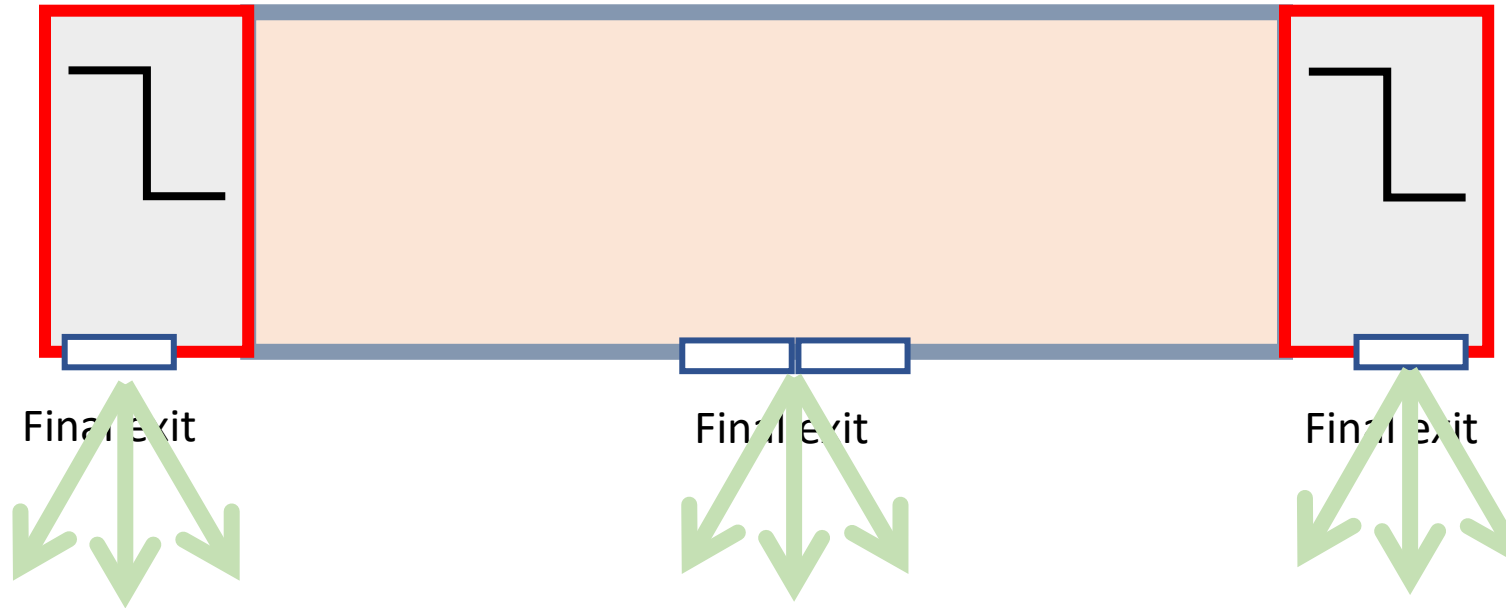


Figure extracted from
Singapore Civil Defence Force (SCDF)
Code of Practice for Fire Precaution in Buildings

UBBL 2021 clause 174A (2) sprinklered building

Protected stair

Protected stair

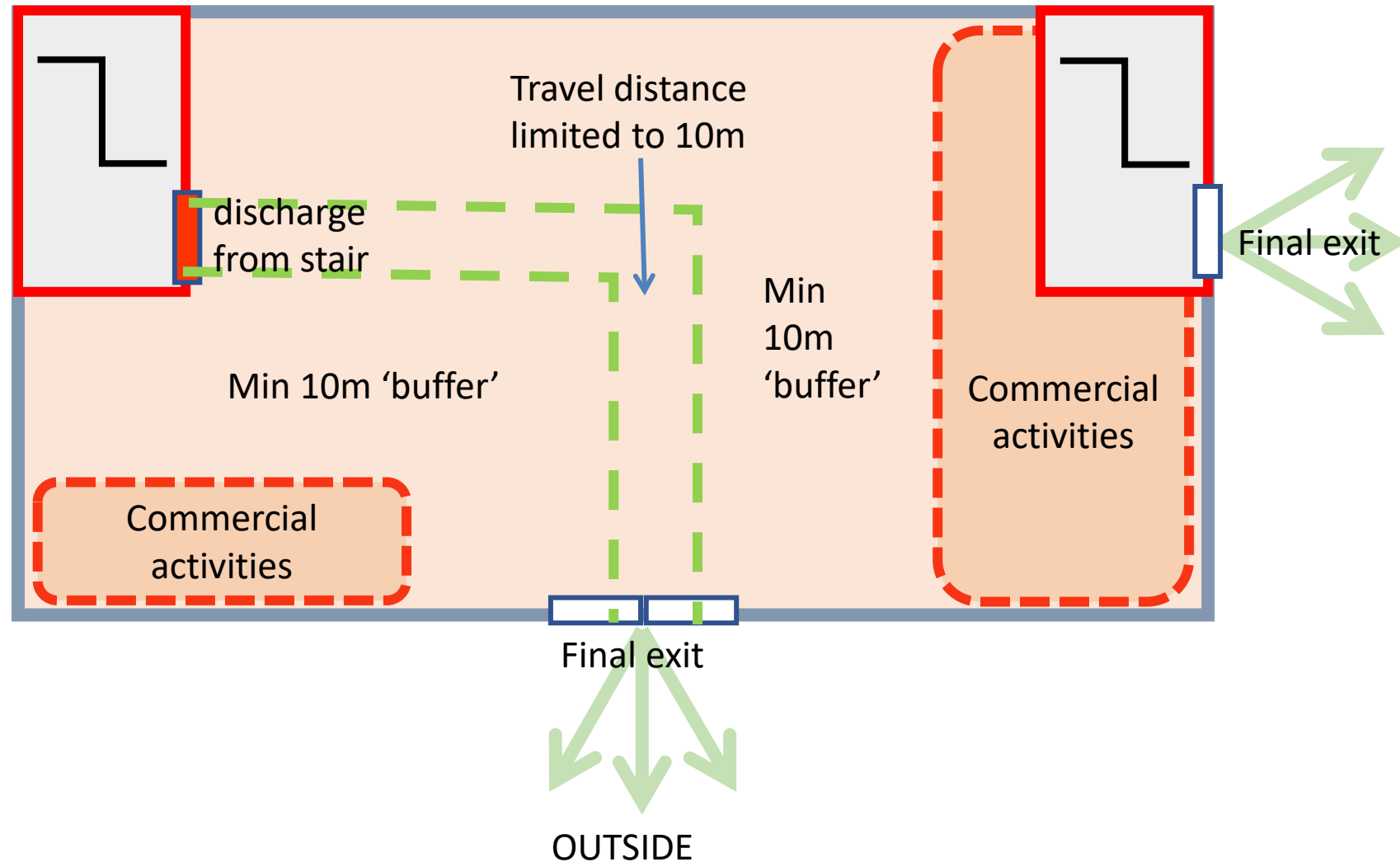


OUTSIDE

UBBL 2021 clause 174A (2) sprinklered building

Protected stair

Protected stair



224A. Hospitals **Area of refuge**

Every hospital shall comply with the following additional requirements:

- (1) A patient accommodation area containing a beds shall not be located in the basement storeys.
- (2) The minimum clear width of an exit door opening shall be not be less than 1.2 metres.
- (3) Every upper storey used for the accommodation of patients shall be provided with at least two areas of refuge, and the size of the areas of refuge shall be sized adequately to accommodate the number of beds for at least 50 percent of the total beds patients from the floor concerned-
 - (a) for an area of refuge not adjacent to the patient ward, the routes leading to the area of refuge shall be through:-
 - (i) an external corridor; or
 - (ii) a protected lobby separated from the adjoining areas of the building by a wall and door of at least one hour fire resistance period, and the protected lobby shall have a minimum size of 4 metres (length) by 2 metres (width) and shall be ventilated;

- (3) Every upper storey used for the accommodation of patients shall be provided with at least two areas of refuge, and the size of the areas of refuge shall be sized adequately to accommodate the number of beds for at least 50 percent of the total beds patients from the floor concerned-
- (a) for an area of refuge not adjacent to the patient ward, the routes leading to the area of refuge shall be through:-
 - (i) an external corridor; or
 - (ii) a protected lobby separated from the adjoining areas of the building by a wall and door of at least one hour fire resistance period, and the protected lobby shall have a minimum size of 4 metres (length) by 2 metres (width) and shall be ventilated;
 - (b) for an area of refuge immediately adjacent to a patient ward, the routes leading to the area of refuge need may not be through an external corridor provided that both the area of refuge and the adjacent patient ward are:
 - (i) fire compartmented from each other by a wall and door of at least one hour fire resistance period;
 - (ii) provided with an engineered smoke control and the design smoke layer height shall be at least 2.5 metres above the finished floor; and
 - (iii) provided with a minimum of two remotely located exit access between them.

(4) The provision of fire escape bed lifts shall be as follows:

- a) at least two fire escape bed lifts shall be provided for premises with more than one storey;
- b) It fire escape bed lifts shall be located remotely from each other and sited adjacent to a protected staircase;
- c) each area of refuge shall also be served by at least one fire escape bed lift;
- d) fire lifts can may double-up as a fire escape bed lifts provided that there is are more than one fire lift and at least one shall remain as a dedicated fire lift, and where the fire lift doubles up as fire escape bed lifts, its dimensions shall be as specified in subparagraph 224A (4)(c)(f)
- e) the fire escape bed lift shall be contained within a fire fighting shaft;
- f) the entry into the fire escape bed lift and the exit staircase shall be through a common protected lobby, and the fire escape bed lift shall have a minimum clear platform size of 2.7 metres (depth) by 1.8 metres (width).
- g) A the signage shall be displayed outside the fire escape bed lift stating “FIRE ESCAPE BED LIFT”.
- h) The escape exit route for the fire escape bed lift at the designated floor shall be protected from other occupancy areas by one hour fire resistance separation and shall discharge directly into a safe area;
- i) A fire escape bed lift that opens directly into an external corridor and which is sited adjacent to a protected staircase does not require a protected lobby, provided that there is no unprotected opening within 3 metres horizontally from the fire escape bed lift door opening, and the fire escape bed lift provided in this situation may be treated as a common bed lift that can may serve multiple compartments located on the same floor;

- j) a fire escape bed lift shall be provided with the following features:
 - (i) a secondary power supply from an emergency generating plant; and
 - (ii) a switch labelled as “Fire Escape Bed Lift”, situated next to the lift landing door at the final exit storey.

(5) A patient accommodation ward with access through an internal corridor shall comply with the following requirements:

- (a) each ward shall be separated from the internal corridor by a wall having at least one hour fire resistance period;
 - (b) doors opening into an internal corridor shall have at least half hour fire resistance period and be fitted with an automatic self-closing device;
 - (c) an internal corridor shall be naturally ventilated with fixed openings in an external wall, such ventilation openings being not less than 15 percent of the floor area of the internal corridor;
 - (d) the ventilation opening in the external walls shall not be less than 3.5 square metres, at least 1.75 square metres on each side and shall be unobstructed by a parapet walls or balustrade levels upwards and be positioned on opposite sides of the internal corridor such that it provides effective cross ventilation throughout the entire space of the corridor;
- with

- shall
- (e) the ventilation openings in the external walls shall not be more than 12 metres from any part of the internal corridor;
 - (f) an internal corridor may be provided with mechanical ventilation and pressurisation in lieu of natural ventilation; and
 - (g) other non-patient accommodation areas or spaces which open into or form part of the internal corridor, and or which can may jeopardise the means of escape provision, be compartmentalised by one hour fire-rated enclosures and half hour fire doors.

(6) External access to a patient accommodation ward shall be through external corridor.

(7) For a smoke lobby to the escape staircase:

- (a) An entry into an escape the exit staircase from any part of a building of more than four storeys above the ground level shall comply with the requirements of the smoke lobby under by-law 196; and
- (b) Where a the smoke lobby is provided to an escape the exit staircase to serve a patient accommodation floor, or any area where a patients may need to be is evacuated on a beds or stretchers, the smoke lobby shall have a minimum clear space (unobstructed by door swing) of 6 square metres which is unobstructed by a door swing.

(8) For the staircase landing width/ or depth.

- (a) Escape an exit staircases that serve a patient accommodation floor to be used by a patients in an emergency fire situation shall be designed to allow the evacuation of the patients on a beds or stretchers.
- (b) The width of stairs a staircase, and staircase landing width and depth shall comply with the Eleventh Schedule.

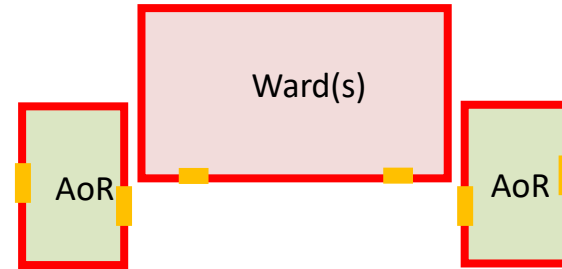
(9) Other outpatient clinics.

For an outpatient clinics without a ward that do does not fall under the above categories, the fire safety requirements under this by-law 224A are not applicable.

224A

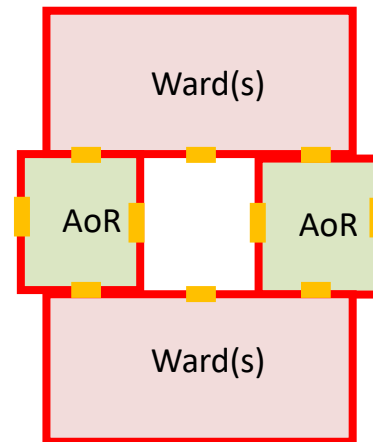
HOSPITAL: AREAS OF REFUGE

Example 1



1) At least 2 Areas of Refuge (AoR)
remote from each other

Example 2

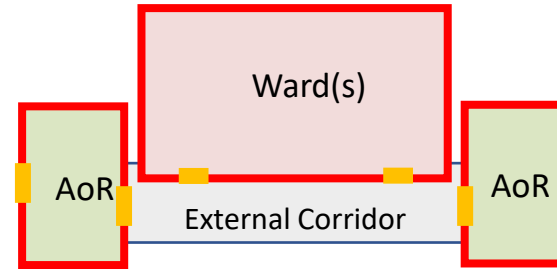


224A

HOSPITAL: AREAS OF REFUGE

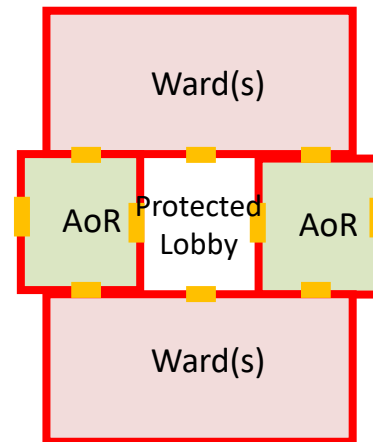
HOSPITAL: AREAS OF REFUGE

Example 1



- 1) At least 2 Areas of Refuge (AoR) remote from each other
- 2) Ward access to AoR via
 - a) External corridor or
 - b) Protected lobby or
 - c) Adjacent (horizontal access)

Example 2

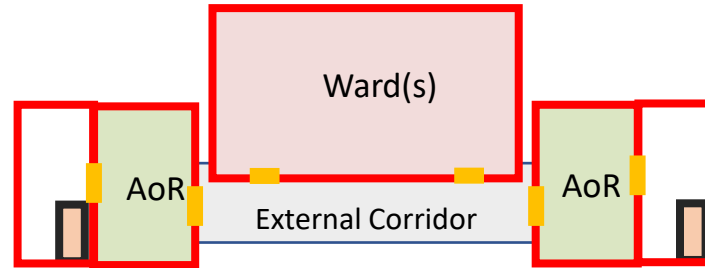


224A

HOSPITAL: AREAS OF REFUGE

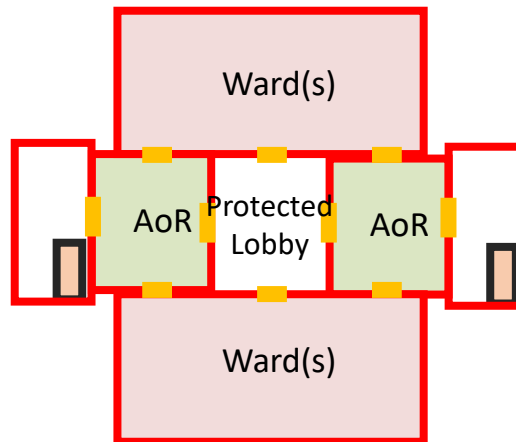
HOSPITAL: AREAS OF REFUGE

Example 1



- 1) At least 2 Areas of Refuge (AoR) remote from each other
- 2) Ward access to AoR via
 - a) External corridor or
 - b) Protected lobby or
 - c) Adjacent (horizontal access)
- 3) Each AoR to be served by at least one Fire Escape Bed Lift (FEBL)

Example 2

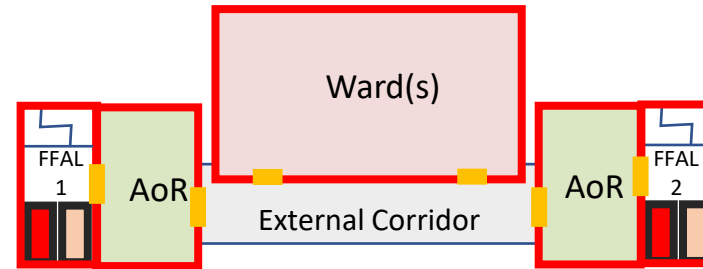


224A

HOSPITAL: AREAS OF REFUGE

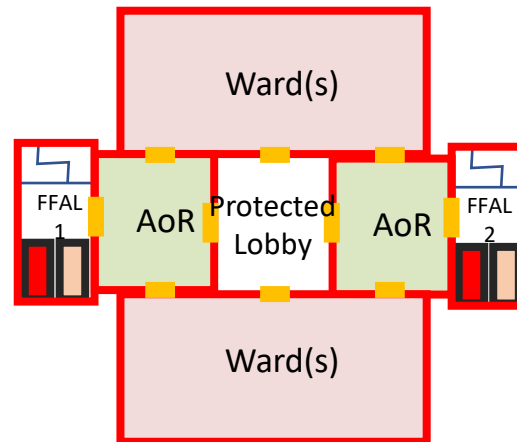
HOSPITAL: AREAS OF REFUGE

Example 1



- 1) At least 2 Areas of Refuge (AoR) remote from each other
- 2) Ward access to AoR via
 - a) External corridor or
 - b) Protected lobby or
 - c) Adjacent (horizontal access)
- 3) Each AoR to be served by at least one Fire Escape Bed Lift (FEBL)

Example 2

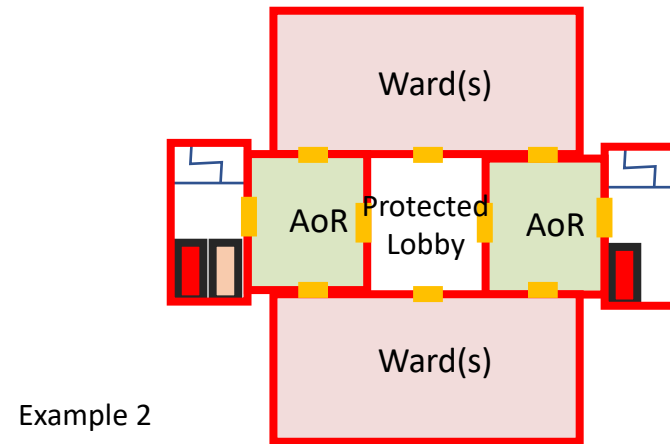
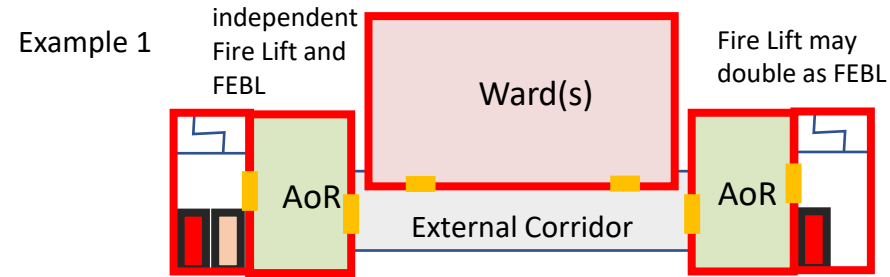


- 4) Every FEBL to be within Fire Fighting Shaft and adjacent to protected stair

224A

HOSPITAL: AREAS OF REFUGE

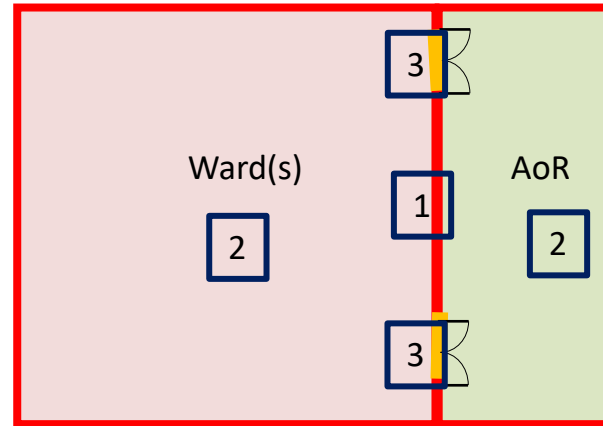
HOSPITAL: AREAS OF REFUGE



- 1) At least 2 Areas of Refuge (AoR) remote from each other
- 2) Ward access to AoR via
 - a) External corridor or
 - b) Protected lobby or
 - c) Adjacent (horizontal access)
- 3) Each AoR to be served by at least one Fire Escape Bed Lift (FEBL)
- 4) Every FEBL to be within Fire Fighting Shaft and adjacent to protected stair
- 5) Fire Lift can double as FEBL but at least one must be a dedicated Fire Lift

224A HOSPITAL: AREAS OF REFUGE

Direct access (horizontal exit) to Area of Refuge immediately adjacent to Ward:



- 1

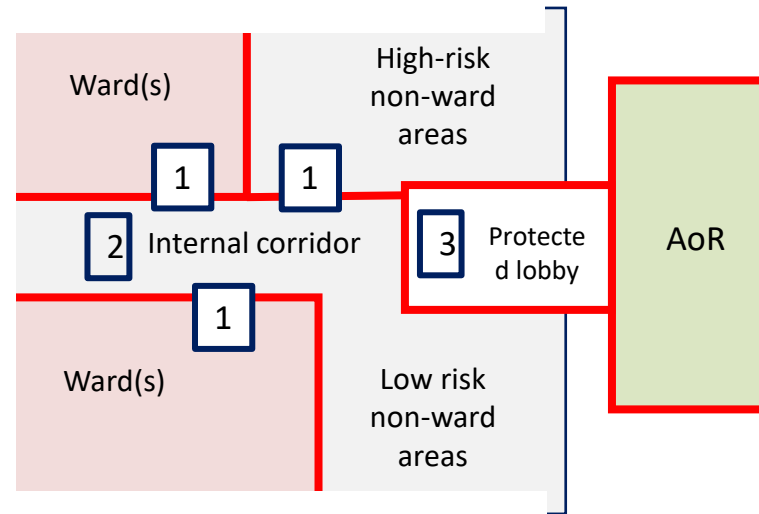
 Fire separation minimum 1hr FRP between Ward and AoR
- 2

 Engineered smoke control minimum 2.5m smoke layer height in **both** Ward and AoR
- 3

 Minimum 2 exit access located as far apart as is practical

224A HOSPITAL: AREAS OF REFUGE

Wards with access through internal corridors:



1. Wards and high-risk non-ward areas to be fire separated from internal corridor minimum 1hr FRP wall and 1/2hr FRP doors
2. Internal corridor to be naturally or mechanically ventilated
3. Protected Lobby (minimum 4m L x 2m W) before Area of Refuge

224A

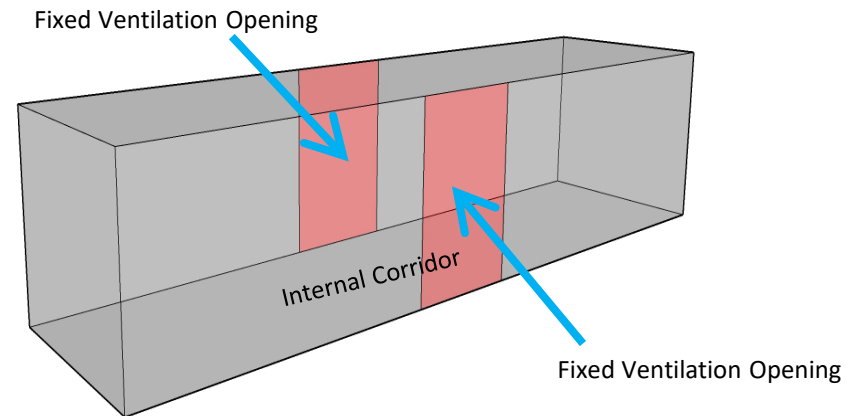
HOSPITAL: AREAS OF REFUGE

224A

Natural Ventilation to Internal Corridor

Fixed ventilation openings (open to external space)

- 1) **Each** fixed ventilation opening to be **minimum 3.5m²**
- 2) Openings must be positioned on opposing sides to induce **cross ventilation**
- 3) **Total** areas of all fixed ventilation openings must **not be less than 15%** of the floor area of the Internal Corridor



224A HOSPITAL: AREAS OF REFUGE

224A Natural Ventilation to Internal Corridor

Where fixed ventilation openings are protected by balustrades or parapets, **minimum unobstructed area** shall not be less than 1.75m²

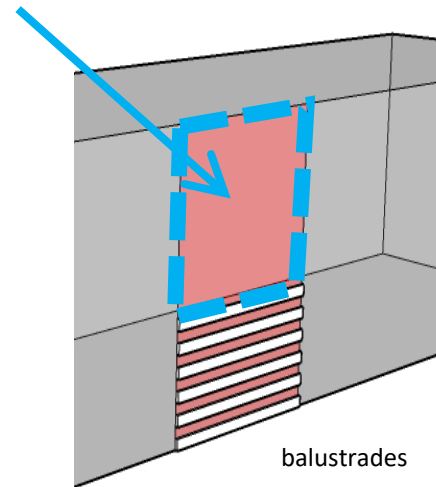
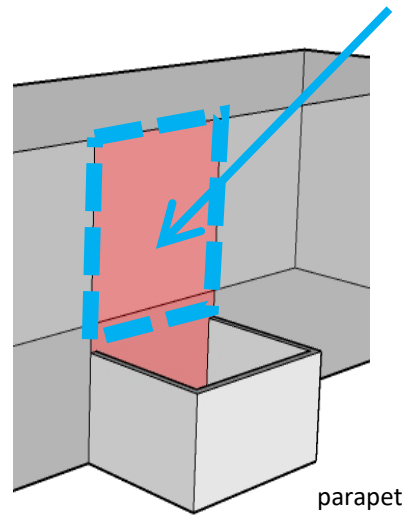


Diagram 3.9.15

Natural Ventilation to Internal Corridors 2

224A

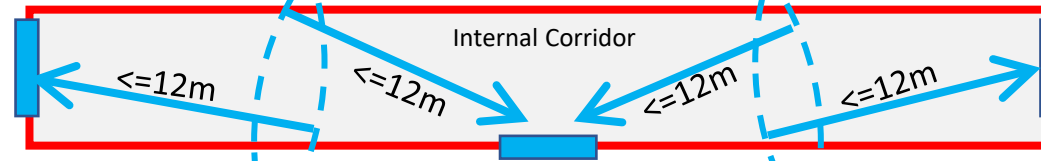
HOSPITAL: AREAS OF REFUGE

224A

Natural Ventilation to Internal Corridor



Every part of the internal corridor shall be **within 12m** from a Fixed Ventilation Opening



224A

HOSPITAL: AREAS OF REFUGE

"ELEVENTH SCHEDULE"

STAIRCASE LANDING WIDTH OR DEPTH

[By-law 224A(8)(b)]

B Staircases width	A Minimum landing width	C Minimum landing depth	
(m)	(m)	(m)	
1.2	2.8	1.9	Allows bed evacuation or stretcher evacuation; and no pedestrian passing
1.2	2.8	1.9	Allows bed evacuation or stretcher evacuation; and restricts ambulant passing
1.5	3.2	1.55	
1.75	3.6	1.35*	Allows bed evacuation, stretcher evacuation or ambulant passing
2	4	1.25*	

Note:

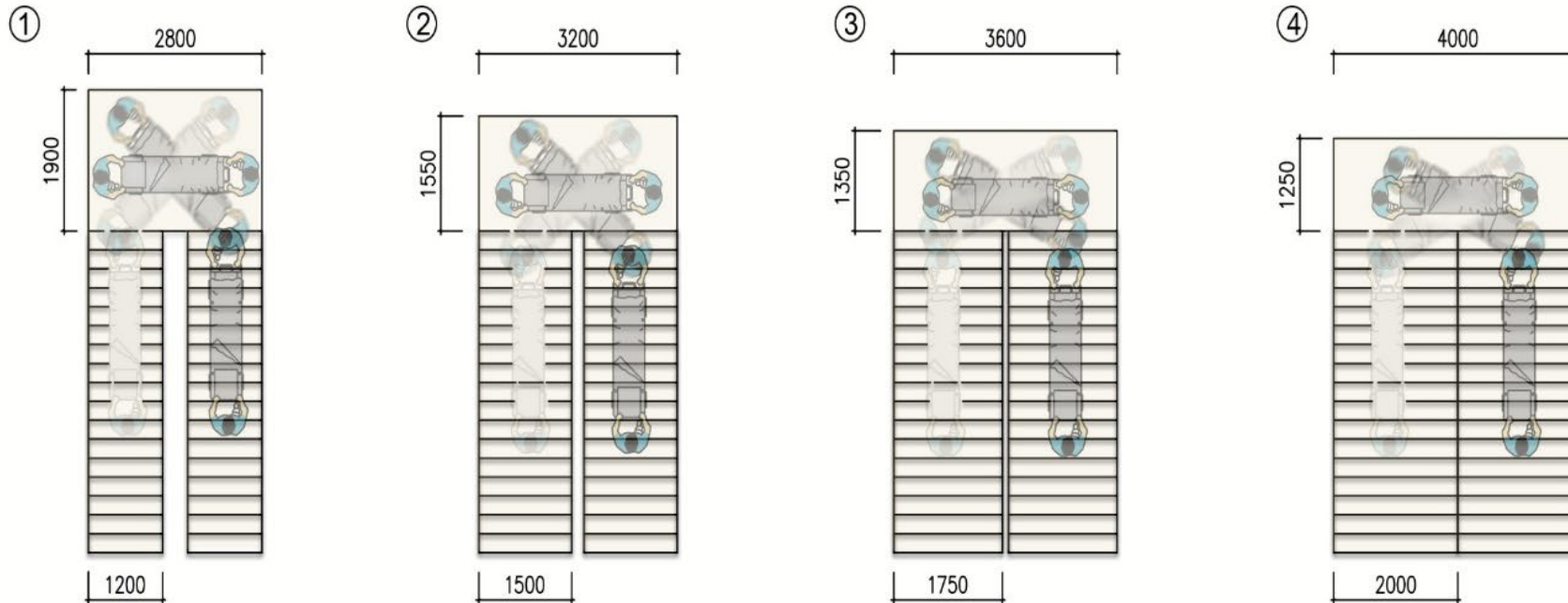
* = *Clear landing depth, instead of the clear stairs width, shall be taken for the purpose of calculating the exit capacity of a staircase.”.

224A HOSPITAL: AREAS OF REFUGE

11th Schedule:

Minimum dimensions of **stair landings** relative to designed stair width

- To allow stretchers with patients to be carried in a horizontal position at all times during evacuation.
- Stair width, landing width and landing depth shall not be less than the required exit capacity width of the stair



UBBL 2021 5th Schedule

VII		Storage and general	Place of storage, deposit or parking of goods and materials (including vehicles), and other premises not comprised in groups I to VII
-----	--	---------------------	---

DIMENSIONS OF BUILDINGS AND COMPARTMENTS

(By-law 136)

Purpose group (1)		Height of buildings (in m) (2)	Limit of dimensions	
			Floor are of storey in building or compartment (in m ²) (3)	Cubic capacity of building or compartment (in m ³) (4)
Part 1 --- Building other than single storey buildings				
II	{Institutional}	Any height	2,000	No limit
	Note: Hospital (patient accommodation ward)	Any height	750	No limit
III	{Other residential}	Not exceeding 28 m	3,000	8,500
III	{Other residential}	Exceeding 28 m	2,000	5,500
V	{Shop}	Any height	2,000	7,000
VI	{Factory}	Not exceeding 28 m	No limit	28,000
VI	{Factory}	Exceeding 28 m	2,000	5,500
VIII	{Storage and general}	Not exceeding 28 m	No limit	21,000
VIII	{Storage and general}	Exceeding 28 m	1,000	No limit

UBBL 2021 5th Schedule

<i>Part 2 -- Single storey buildings</i>				
II	(Institutional)	Any height	3,000	No limit
	Note 1: (patient accommodation ward)	Any height	750	No limit
III	(Other residential)	Any height	3,000	No limit

NOTE: Purpose Groups I, IV, and VII are excluded as there are no limits applicable under by-law 138.

Note 1: For single storey premises not protected by sprinkler, each patient accommodation ward shall be constructed as a compartment having at least 1-hr fire resistance period and at least ½-hr fire resistance period door for protection of door openings. It shall be provided with both an automatic fire alarm system.

Single stair

- **UBBL 194**
- Special provision for the common 'shop-house' design
- Usage limited to shop (ground floor only), residential or office.
- Uppermost floor level limited to 12m

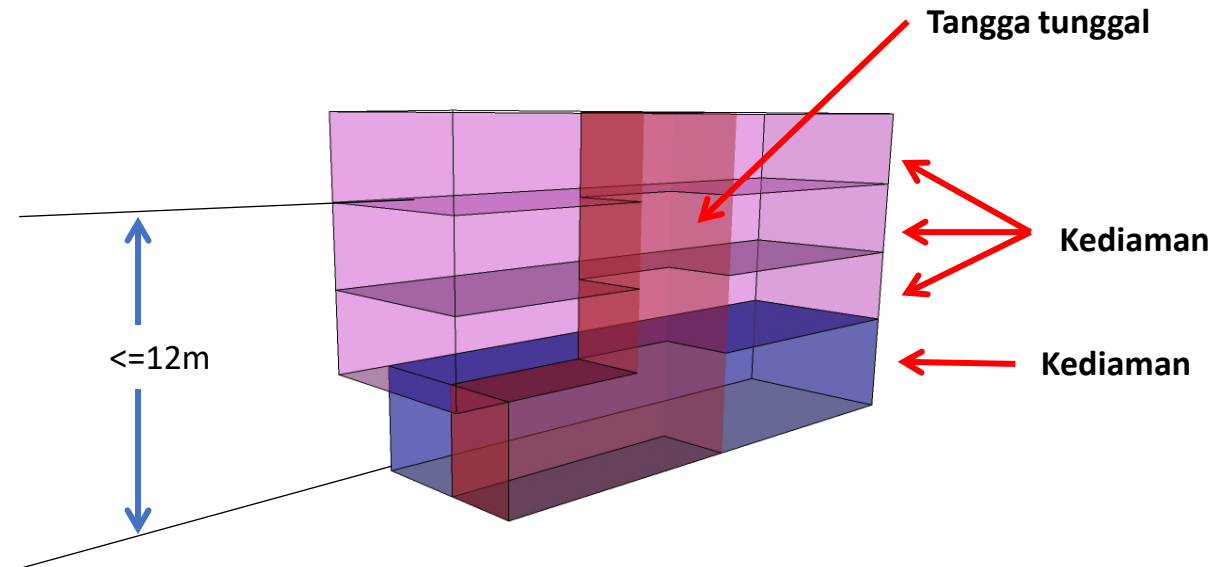
UBBL 2021 : amended provision for:

194. Buildings with single staircase.

A single staircase may be permitted in the following premises:

- (a) any dwellings at a height of 12 metres measured from the fire appliance access level to the highest and lowest occupied floor; and
- (a) any shophouses or dwellings building not exceeding two (2) storeys and the first storey not exceeding 6 metres from the ground level.

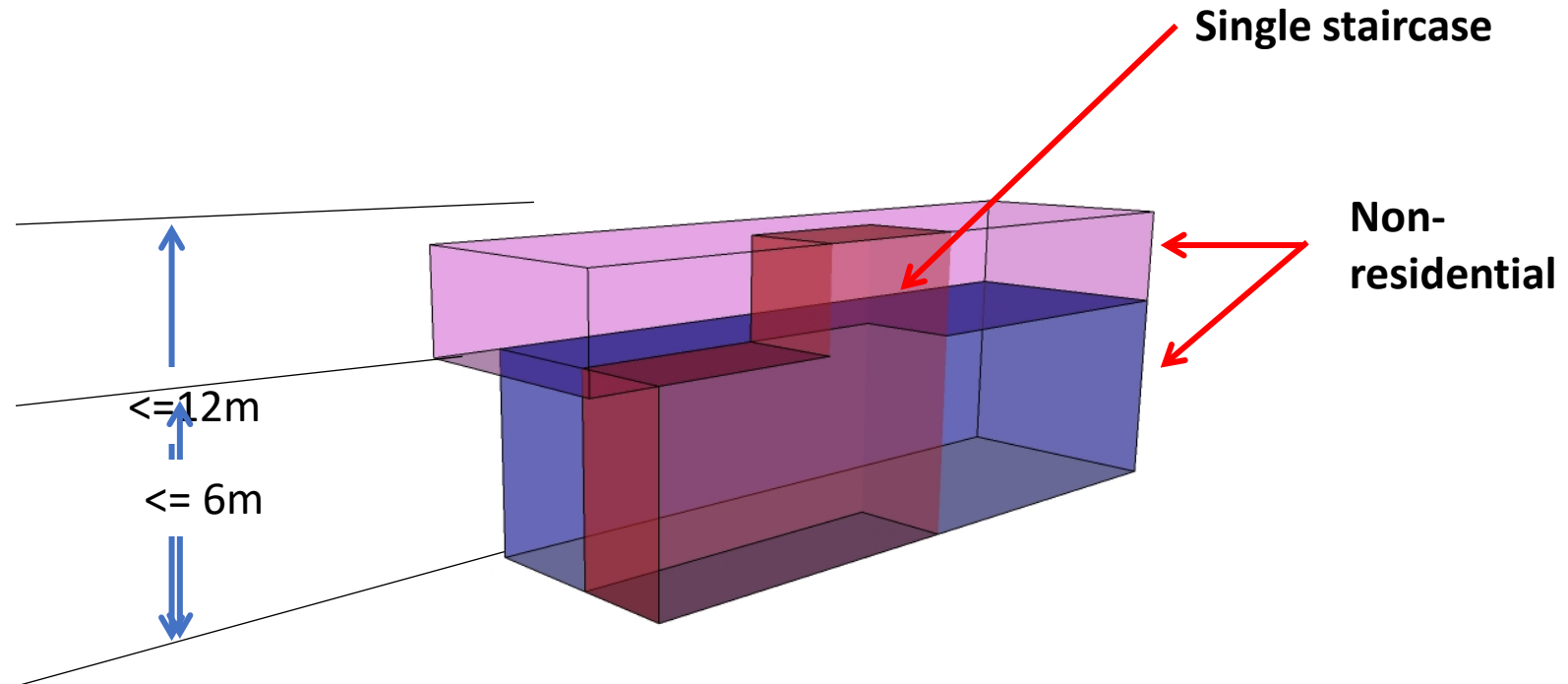
Clause 194 (a) : Single stair application for residential buildings



1) Residential buildings only

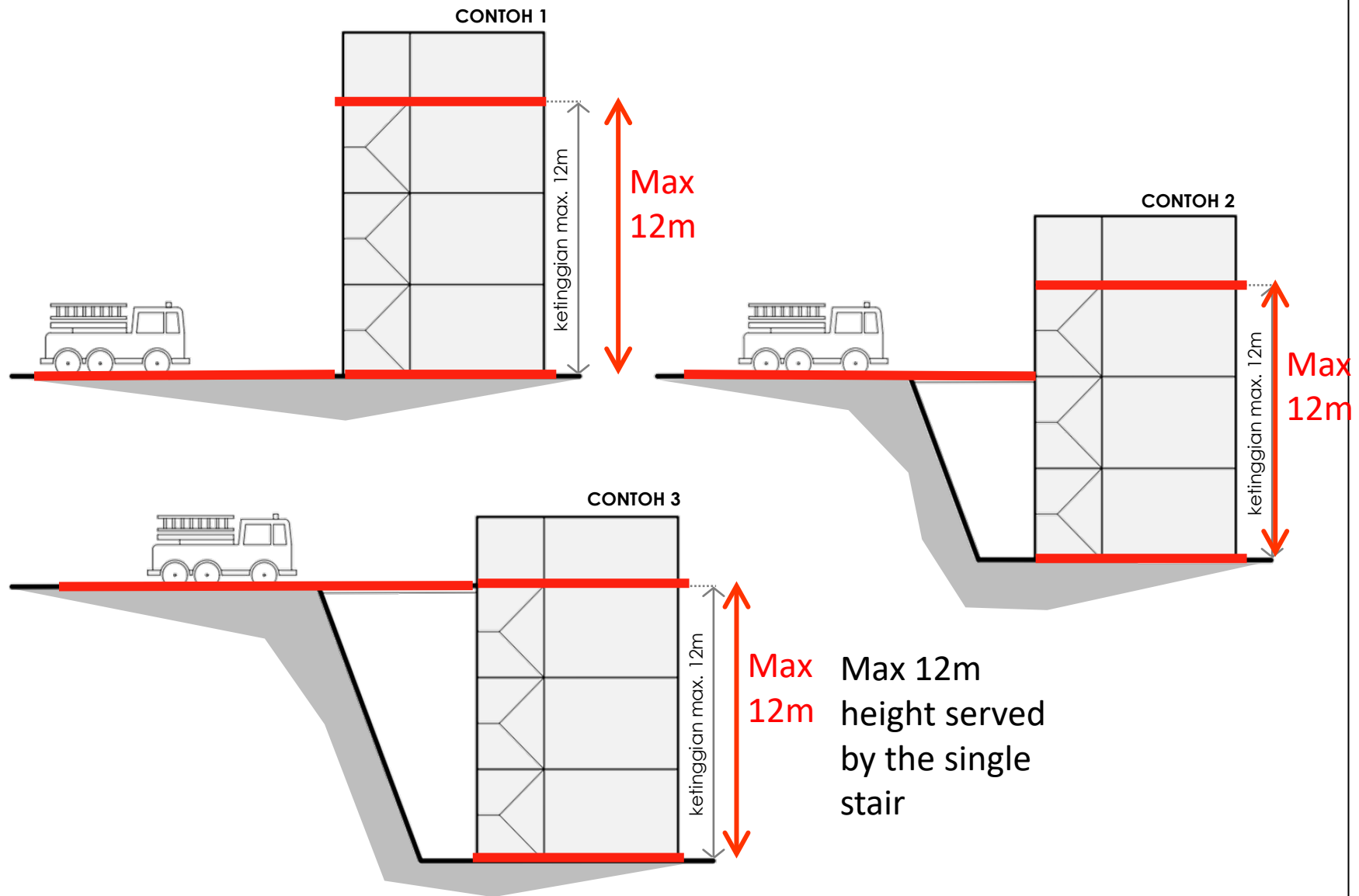
2) The level of highest floor and lowest floor not to exceed 12m measured from the level of Fire Appliance Access

Clause 194 (b) : single staircase application for non-residential buildings

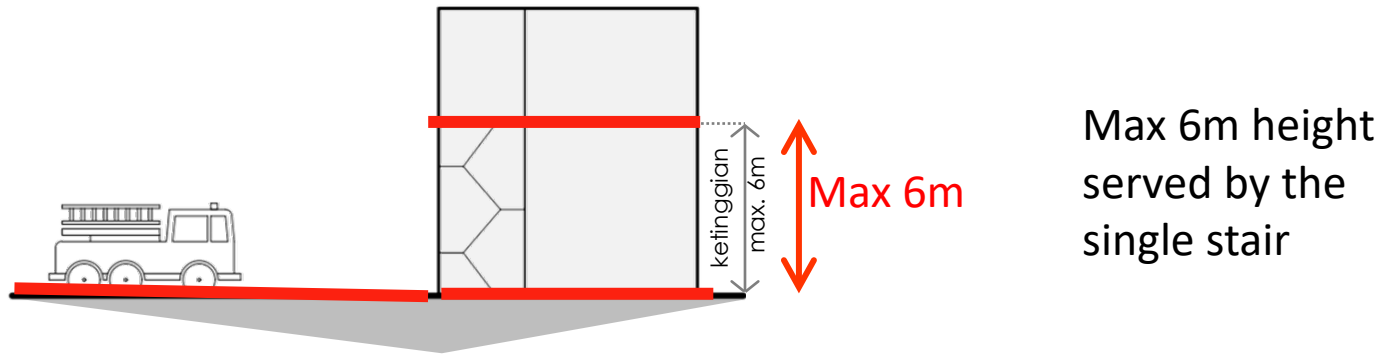


- 1) Any occupancy
- 2) No more than 2 storeys
- 3) Height of first floor no more than 6m above ground level

Travel distance/dead-end limits, exit capacity, storey exit and final exit and compartment limits shall apply



Clause 194 (a) : Single stair application for residential buildings



Clause 194 (b) : single staircase application for non-residential buildings

Capacity of exits

- **UBBL 7th Schedule**
- **UBBL 175, 176, 178**
- Occupant load
- Exit width
- Application of horizontal exit

UBBL 2021 7th Schedule

CALCULATION OF AN OCCUPANT LOAD AND CAPACITY OF AN EXIT

[By-law 168(2), 170(c), 171 (3), 174(2), 175, 176, 177, 181]

<i>Purpose group</i>	<i>Occupant load square metre per</i>	<i>CAPACITY EXIT</i> <i>No. of persons per unit --- Exit width (1) and (1A)</i>				
		<i>Door outside</i>	<i>Horizontal exit</i>	<i>Ramp main exit</i>	<i>Ramp second exit</i>	<i>Stairs</i>
VII. Place of assembly	1.5 net	100	100	100	75	75
Area of concentrated use without fixed seating ...	0.7 net					
Standing space ...	0.3 net					
VIII. Storage and General	20 gross	100	100	100	60	60
Car park ...	30 gross	100	100	100	60	60
Warehouse ...						

UBBL cl 144

Cladding on external walls



Built 1974



new façade cladding 2016



June 2017

Grenfell Tower, London



completed 2011



Torre Dei Moro, Milan

August 2021



0.33

2.20 Flashover

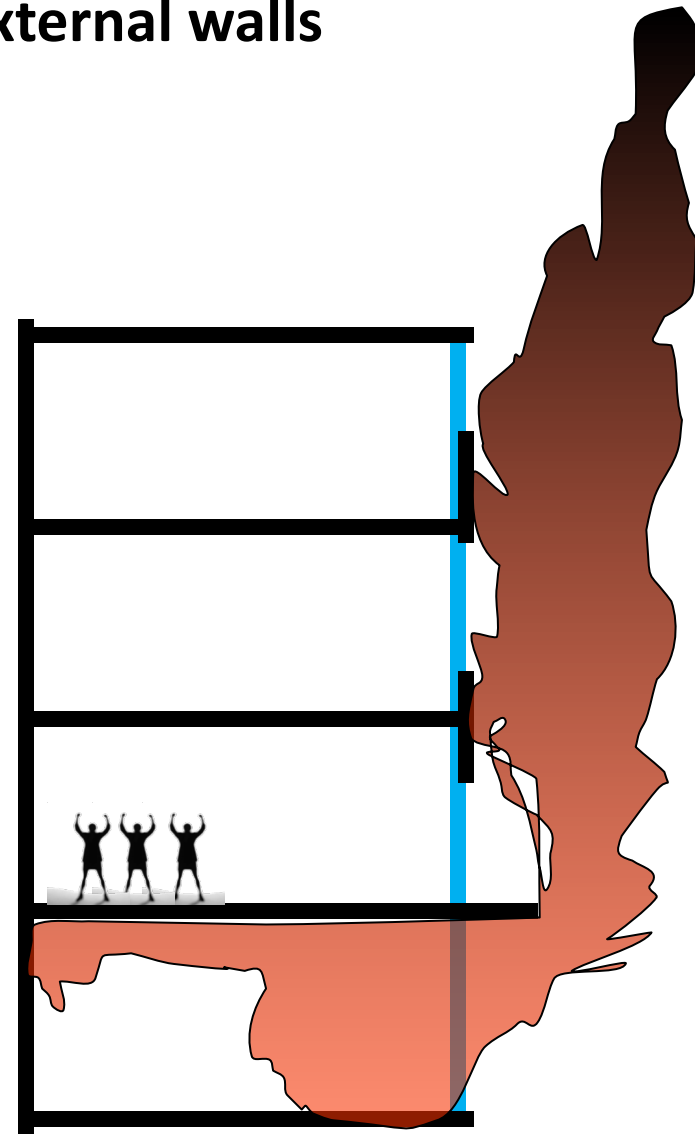
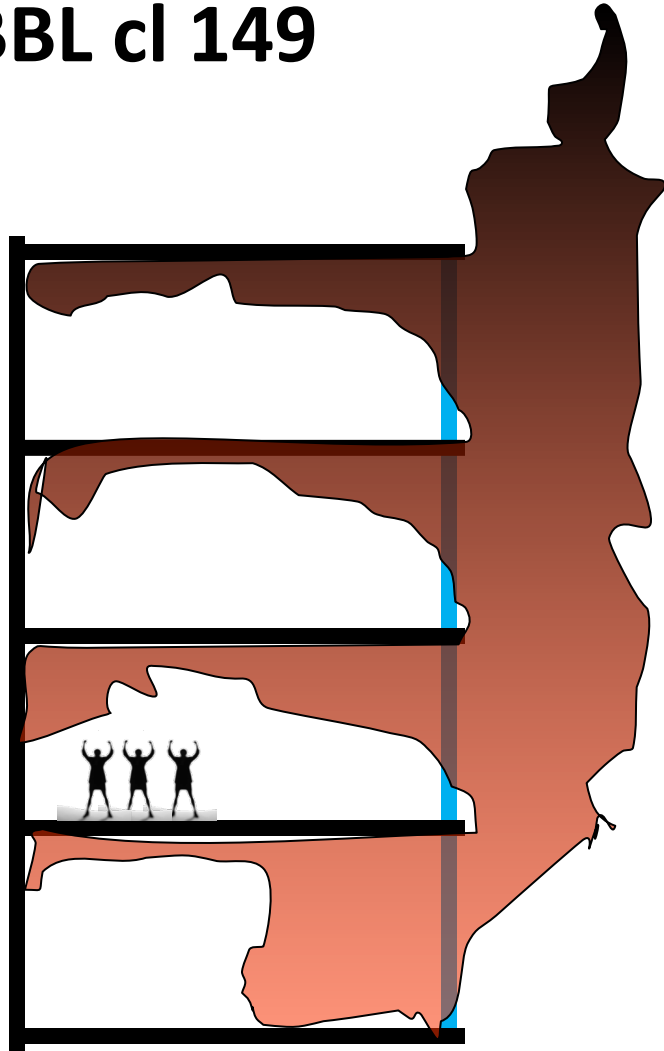
3.46

5.20 Flameout

An apartment fire in Benidorm, Spain

Horizontal and vertical barriers of external walls

UBBL cl 149



900mm vertical or
750mm horizontal barrier

External wall cladding system



KETUA PENGARAH
Director General
IBU PEJABAT
JABATAN BOMBA DAN PENYELAMAT MALAYSIA
Fire And Rescue Department of Malaysia
Lebuhr Wawasan, Presint 7



Telefon : 603-8892 7600
Facsimile : 603-88927977/8
Laman Web : www.bomba.gov.my
E-mail : bkkjbpm.bomba@1govuc.gov.my

Ruj. Tuan :
Ruj. Kami : JBPM.IP.BKK.100-1/7/2 Jld. 2 (6)
Tarikh : 20 Ogos 2021

SEPERTI SENARAI EDARAN

YS Dato'/Tuan,

**PERINTAH TETAP KETUA PENGARAH BILANGAN 5 TAHUN 2021:
PEMASANGAN *EXTERNAL CLADDING SYSTEM* PADA DINDING
LUAR BANGUNAN**

Saya dengan hormatnya merujuk kepada perkara di atas.

2. Dimaklumkan bahawa, bersama-sama ini disertakan Perintah Tetap Ketua Pengarah Bilangan 4 Tahun 2021 yang bertajuk **Perintah Tetap Ketua Pengarah Bilangan 5 Tahun 2021: Pemasangan *External Cladding System* Pada Dinding Luar Bangunan.**

3. Perintah Tetap Ketua Pengarah (PTKP) ini penting bagi dijadikan garis panduan kepada pegawai-pegawai bomba dan pihak *industry players* tentang kaedah dan tatacara amalan terbaik yang berkaitan dengan penggunaan *external cladding system* pada dinding luar bangunan.

4. Sehubungan dengan itu, semua permohonan untuk mendapat sokongan dari Jabatan ini yang dikemukakan oleh pihak *Prinsipal Submitting Person* (PSP) hendaklah diproses menurut Perintah Tetap Ketua Pengarah (PTKP) ini.

...2/

'CEPAT DAN MESRA'



CLADDING SYSTEM YANG DIPASANG PADA DINDING LUAR BANGUNAN

5. JBPM telah menetapkan bahawa mana-mana *cladding system* yang dipasang hendaklah berasaskan kepada keperluan berikut:

above 18m height
Full scale test
BS 8414

5.1 Bagi bangunan yang melebihi 18 meter tinggi diukur dari aras perkakas bomba hendaklah menggunakan bahan tidak mudah terbakar (*non-combustible materials*) dan telah diuji serta mematuhi *performance criteria* berdasarkan BS 8414.

below 18m height
Material test
Class 0
BS 476 part 6&7

5.2 Bagi bangunan yang ketinggiannya kurang 18 meter, *cladding* yang dipasang hendaklah dari jenis kelas 0 berdasarkan BS 476: Part 6 & 7.

5.3 Penentuan ujian *cladding system* dari bahan kelas 0 dan ujian *performance criteria* (full-scale test) adalah seperti di Lampiran A.

PERAKUAN BAHAN PEPASANGAN KESELAMATAN KEBAKARAN BAGI CLADDING

1984

UBBL 2021

144. Cladding on external wall.

(1) Any cladding on any external walls, if such cladding is situated less than 2 metres from any point on the relevant boundary, shall comply with the requirements for Class O when tested in accordance with BS 476: Part 6: 1968, has an index of performance not exceeding twenty.

above 18m height
Full scale test
BS 8414

(2) Any cladding on any external wall, if such cladding is situated more than 2 metres from any point on the relevant boundary and the building is less than 18 metres in height, the cladding shall have a surface complying with the requirements for Class O when tested in accordance with BS 476: Part 6: 1968, has an index of performance not exceeding twenty.

below 18m height
Material test
Class 0
BS 476 part 6&7

144. Cladding on external wall.

(1) Any cladding on any external wall situated less than 2 metres from any point on the relevant boundary or if the building is more than 18 metres in height, the cladding shall be constructed entirely of non-combustible materials and when tested, shall demonstrate compliance in accordance with BS 8414.

(1) Any cladding on any external wall, if such cladding is situated more than 2 metres from any point on the relevant boundary and the building is less than 18 metres in height, the cladding shall have a surface complying with the requirements for Class O when tested in accordance with BS 476: Part 6: 1968, has an index of performance not exceeding twenty.

144

CLADDING ON EXTERNAL WALL

UBBL 144(1)

- 144. (1) Any cladding on any external wall situated less than 2 metres from any point on the relevant boundary or if the building is more than 18 metres in height, the cladding shall be constructed entirely of non-combustible materials and when tested, shall demonstrate the compliance
- in accordance with BS 8414.

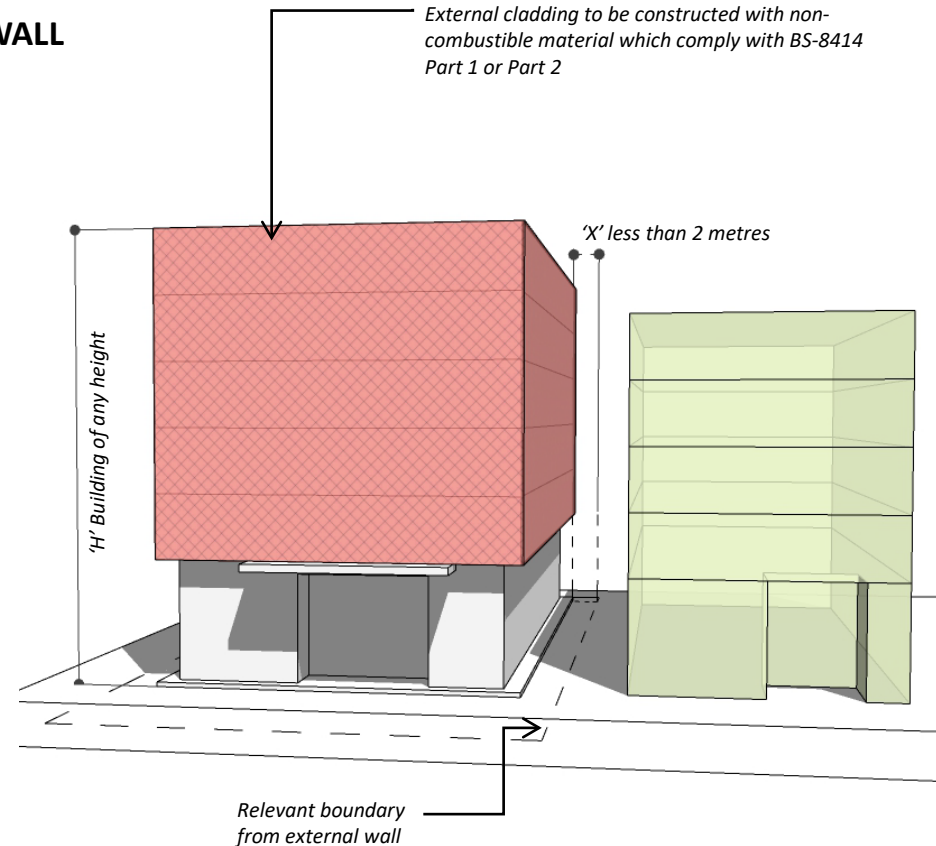


Diagram 4.5.8

Schematic of external cladding of building <18m height

**< 2m from boundary OR
> 18m height, comply with BS8414**

144

CLADDING ON EXTERNAL WALL

UBBL 144(1)

- 144. (1) Any cladding on any external wall situated less than 2 metres from any point on the relevant boundary or if the building is more than 18 metres in height, the cladding shall be constructed entirely of non-combustible materials and when tested, shall demonstrate the compliance
- in accordance with BS 8414.

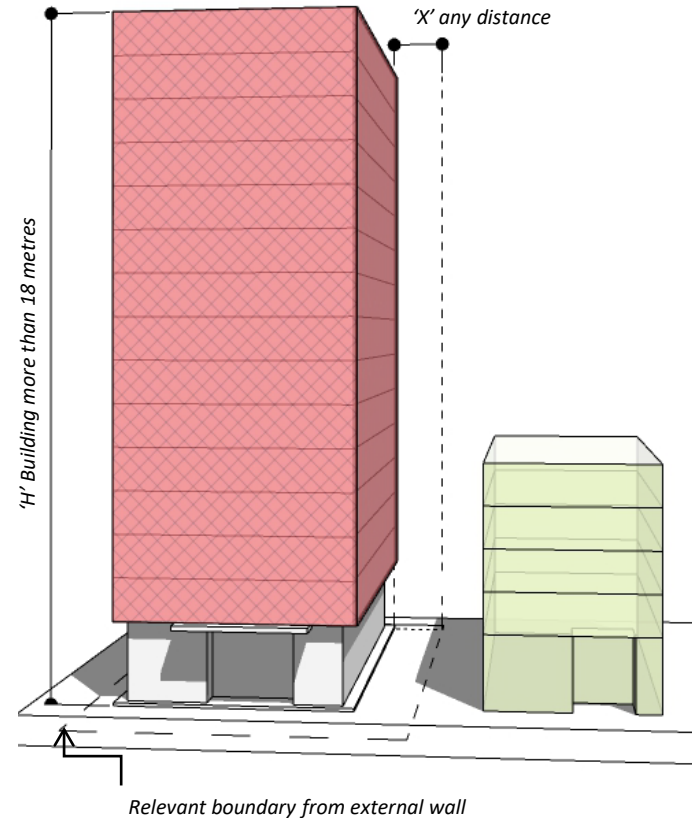


Diagram 4.5.9

Schematic of external wall of building >18m height

**< 2m from boundary OR
> 18m height, comply with BS8414**

CLADDING ON EXTERNAL WALL

UBBL 144(2)

- Any cladding on any external wall, if such a cladding is situated more than 2 metres from any point on the relevant boundary and the building is less than 18 metres in height, the cladding shall have a surface complying with the requirements for Class O when tested and in accordance with by-law 204.

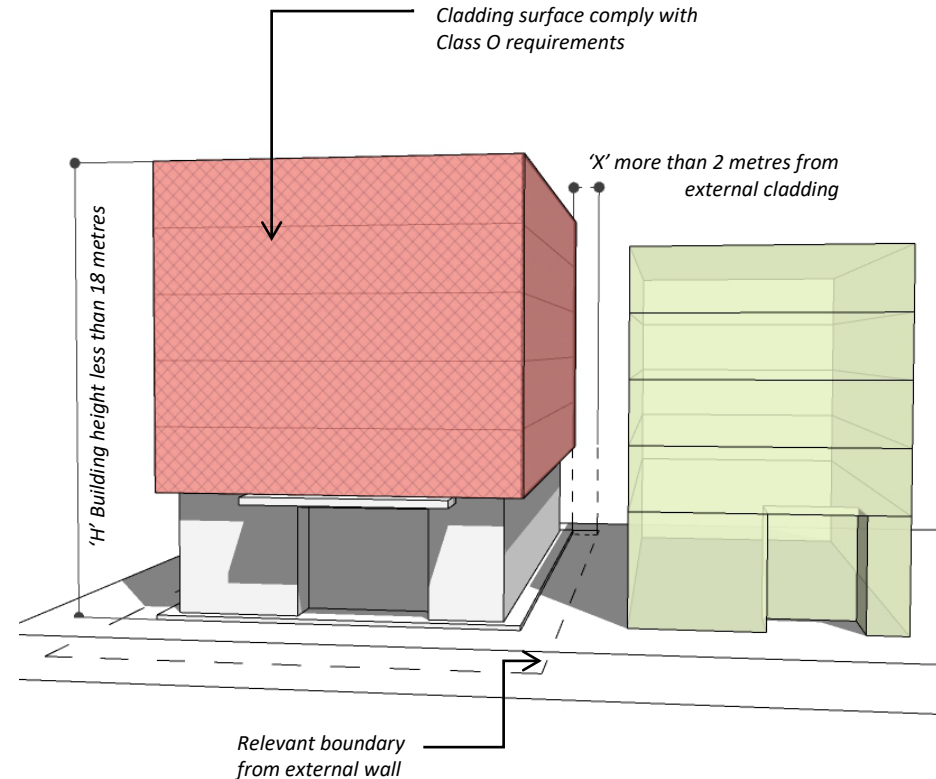


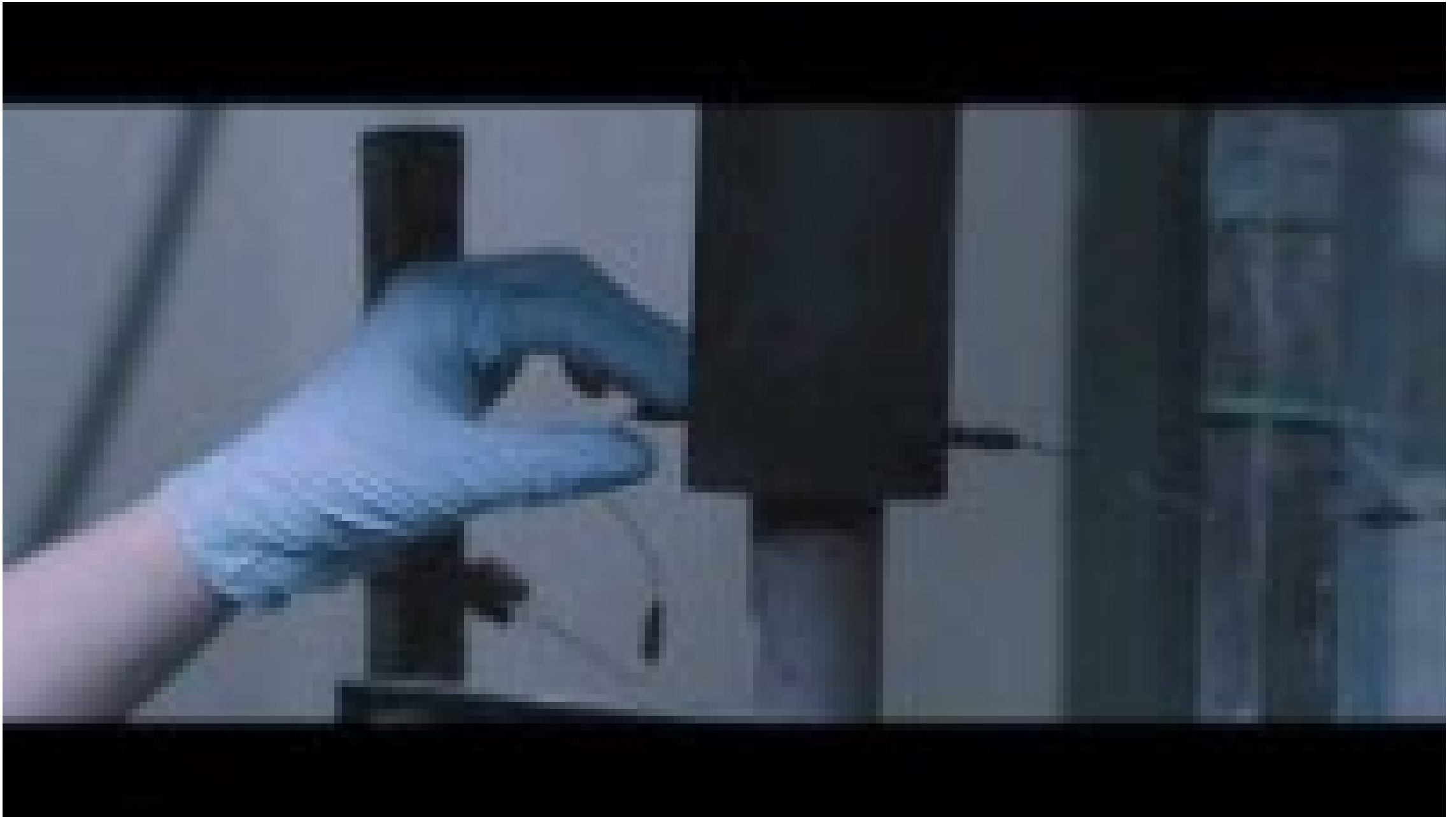
Diagram 4.5.10

Schematic of external cladding of building <18m height

**> 2m from boundary AND
< 18m height, comply with Class O**

Class 0

BS 476 part 6 Fire Propagation Test



BS 476 part 7 Surface Spread of Flame Test



UBBL 204 : Spread of flame classification

Class 1- flame
does not spread
beyond this line
at any point in
the test by 1.5
mins and 10
mins

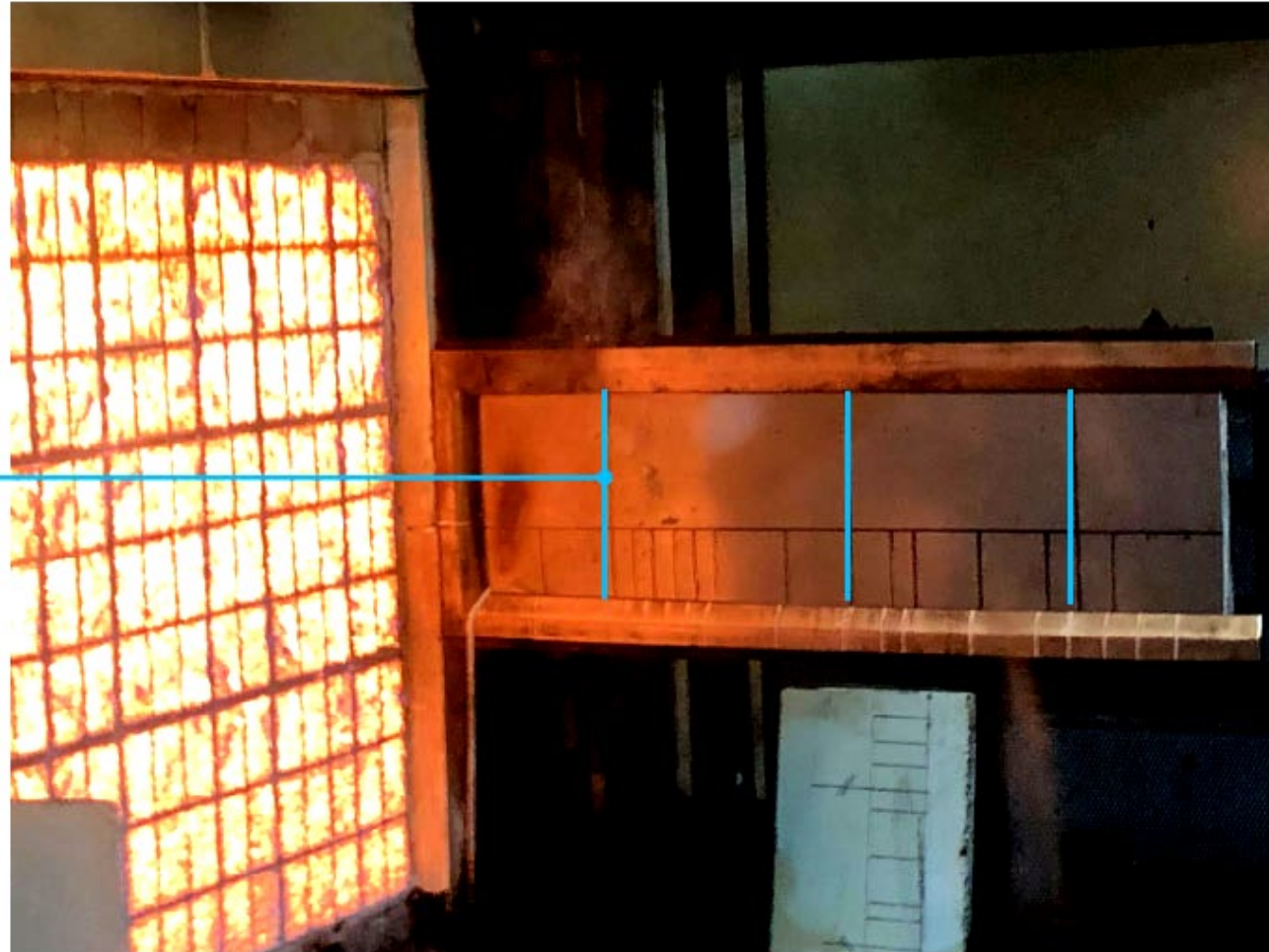


Image source: Arup's slides

UBBL 204 : Spread of flame classification

BS 476-7

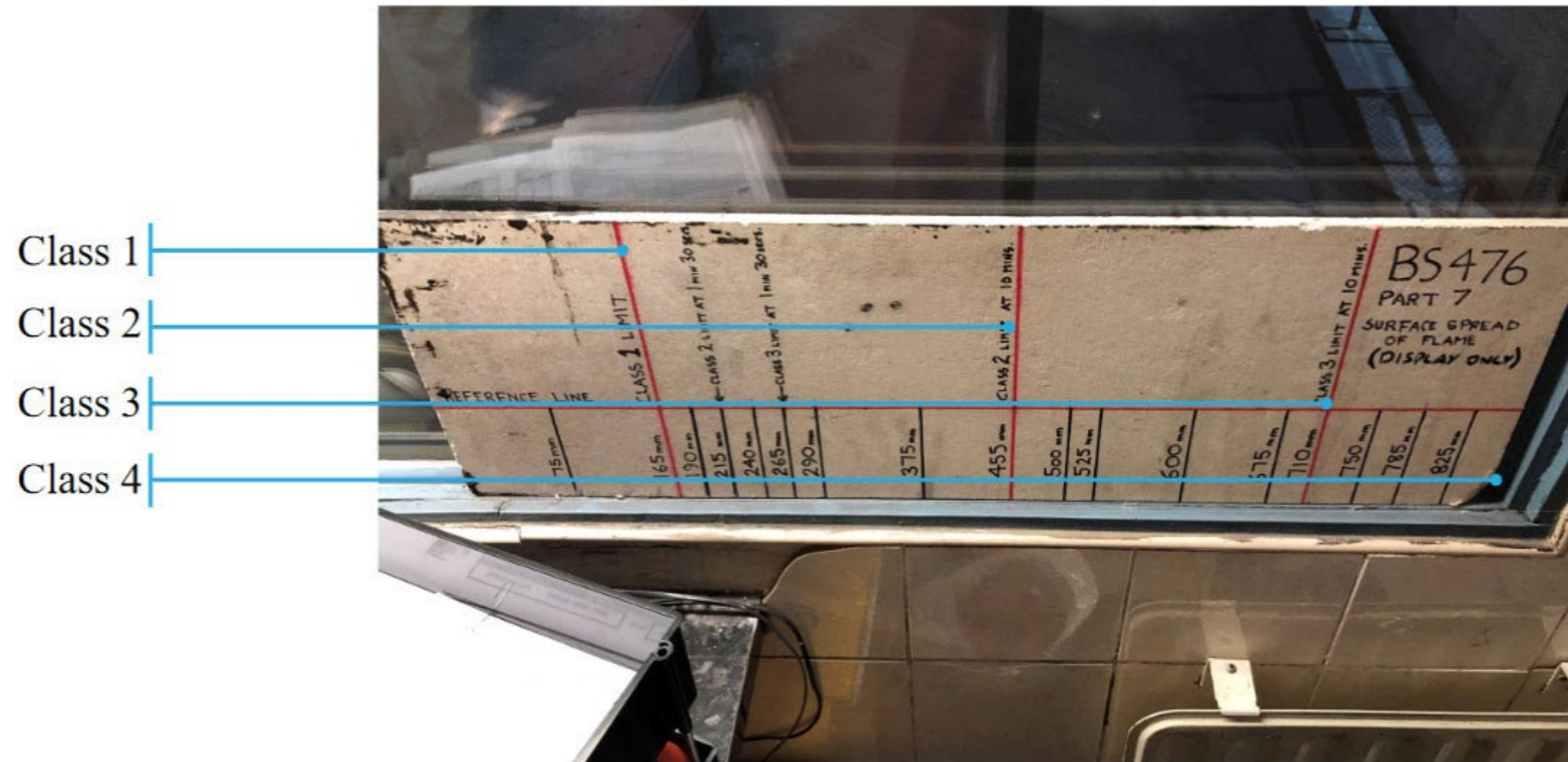


Image source: Arup's slide

UBBL

204. Classification of restriction of flame over surface wall and ceiling

(a) Any reference to a surface being **Class O** shall be construed as a requirement that

(i) The material of which the wall or ceiling is constructed shall be **non-combustible** throughout; **or**

(ii) the surface material, or if it is bonded throughout to a substrate, the surface material in conjunction with the substrate, shall when tested in

accordance with **BS 476: Part 6** and **Part 7** have **an index of performance not exceeding 6**.

(b) Any reference to a surface being of a class other than Class O shall be construed as a requirement that the material of which the wall or ceiling is constructed shall comply with the relevant test criteria as to surface spread of flame specified in relation to that class in BS 476: Part 1: Clause 7.

(c) In relation to a requirement that a surface shall be of a class not lower than a specified class, Class 0 shall be regarded as the highest class followed in descending order by Class 1, Class 2, Class 3 and Class 4.

UBBL 203 : Spread of flame classification

Classification of spread of flame				
Classification	Spread of flame at 1.5 min		Final spread of flame	
	Limit	Limit for one specimen in sample	Limit	Limit for one specimen in sample
	mm	mm	mm	mm
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 45
Class 3	265	265 + 25	710	710 + 75
Class 4	Exceeding the limits for class 3			

Image source: Arup's slide

So, what is “Class 0” ?

Class 0 is not a fire test classification, but is a definition in the UBBL.

For a material to be defined as “Class 0”, it has to:

- 1) achieve a Class 1 fire rating from BS476 Part 7 – Surface spread of flame
and
- 2) achieve an index of i_1 = less than 6 from BS476 Part 6 Fire propagation.

BS 8414

CLADDING ON EXTERNAL WALL

INTRODUCTION OF BS 8414 TEST METHOD

- The uncontrollable fire spread on the facade of high-rise buildings have illustrated the importance of adequately testing external wall systems on a realistic scale.
- The BS 8414 test methods were developed by the Building Research Establishment (BRE). They evaluate whether a cladding system subject to fire breaking out of an opening (such as a window) in an external wall, will result in excessive fire spread up the outside of the building and the potential for fire to re-enter at a higher level.
- This test method is used to evaluate the design of a cladding system installed on the external walls and it is different from BS 476 which only conduct fire test on building materials and structures separately.
- This test is carried out in specialist laboratories such as SIRIM QAS International, and are performed on full-scale systems rather than small-scale samples which are carried out by BS 476 tests.
- It documents the fire propagation response of a complete cladding system as well as the conditions of elements of the cladding system such as cladding sheets, fixings, joints, corner flashing, insulation, fire stop and cavities at the end of the test.
- It does not cover the performance of doors, windows, balconies, or ancillary penetrations installed on the external walls. It also does not cover the exposure to radiant heat from the fire developed on the cladding to adjacent building.

CLADDING ON EXTERNAL WALL

BS 8414 IS A TWO PART STANDARD:

- **1. BS 8414-1:2015+A1_2017**

- This test method is to document the fire performance characteristics of non-loadbearing external cladding systems, rain screen over cladding systems, and external wall insulation systems when fixed to, and supported by, a masonry substrate and exposed to an external fire under controlled conditions.
- The peak fire exposure is intended to be representative of an external fire source or a fully developed (post-flashover) fire in a room venting from an aperture that exposes the cladding to the effects of external flames.
- This part of BS 8414 is solely intended to give an indication of fire spread across or within an external cladding system.

- **2. BS 8414-2:2015+A1_2017**

- This test method is to document the fire performance characteristics of non-loadbearing external cladding systems when fixed to, and supported by, a structural steel frame and exposed to an external fire under controlled conditions.
- The peak fire exposure is intended to be representative of an external fire source or a fully developed (post-flashover) fire in a room venting from an aperture that exposes the cladding to the effects of external flames.
- This part of BS 8414 is solely intended to give an indication of fire spread across or within an external cladding system.

CLADDING ON EXTERNAL WALL

- BS 8414 is a large-scale system test that mimics a fire breaking out of a window and exposing a cladding system to a severe fire.
- The cladding system must be tested to the full test duration of 60 minutes without any early termination of the test. The 60 minute test measures and evaluates fire spread and mechanical performance, including a 30 minute observation to evaluate propagation behaviour post exposure.
- Performance criteria for assessing cladding systems tested using BS 8414 are as follows:
 - **1. External Fire Spread**
 - Failure due to external fire spread is deemed to have occurred if the temperature rise above start temperature, T_s of any of the external thermocouples at level 2 exceeds 600°C for a period of at least 30 seconds, within 15 minutes of the start time, t_s .
 - **2. Internal fire spread**
 - Failure due to internal fire spread is deemed to have occurred if the temperature rise above start temperature, T_s of any of the internal thermocouples at level 2 exceeds 600°C, for a period of at least 30 seconds, within 15 minutes of the start time t_s .
 - **3. Visible flaming**
 - Failure of the system is deemed to have occurred if visible flaming, which exceeds the confines of the test rig either vertically or laterally during the full 60 minute test period, is observed. For the purposes of this clause, visible flaming is defined as a continuous flame which is observed for more than 60 seconds duration (i.e. not intermittent or glowing)

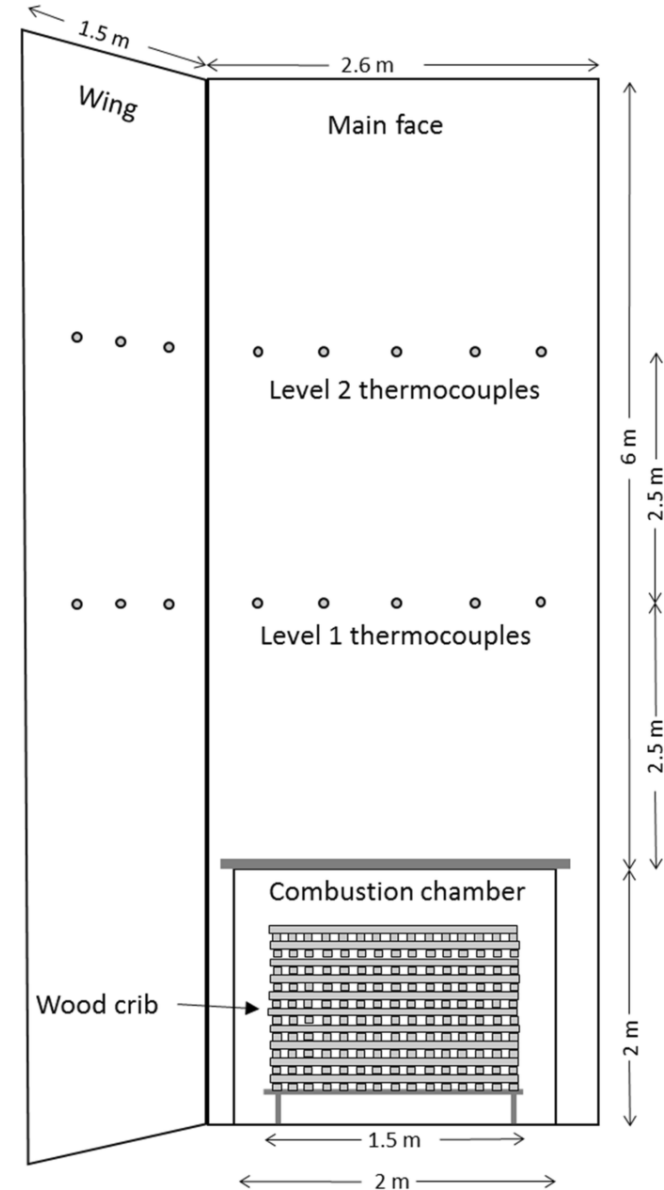


Image source: BS 8414

Diagram 4.5.11

Schematic of standard requirement for
Test Apparatus

BS 8414 TEST FOR EXTERNAL CLADDING

- **4. Mechanical performance**

- Failure will be deemed to have occurred if there is collapse of the system or part thereof, flaming or not, onto the floor of the test facility outside the designated crib collapse zone, see note 1, within the duration of the full 60 minute test period.

- **5. Burning debris and pool fires**

- Failure is deemed to occur if burning debris or a pool fire develops on the floor of the test facility, outside the designated crib collapse zone, see note 1.
- Burning debris is defined as visible flaming for more than 60 seconds duration (i.e. not intermittent or glowing) within the duration of the full 60 minute test period.
- *Note 1: The crib collapse zone is defined as a 2.4m x 1.2m positioned centrally on the centre line of the hearth opening (2.4m length parallel to the face of the hearth).*

- **6. Additional Requirement**

- Where system burn-through occurs so that fire reaches the internal surface, failure is deemed to have occurred if continuous flaming, defined as a flame with a duration in excess of 60 seconds, is observed on the internal surface of the test specimen at or above a height of 0.5m above the combustion chamber opening within 15 minutes of the start time t_s .

**Only for
Part 2 Test**

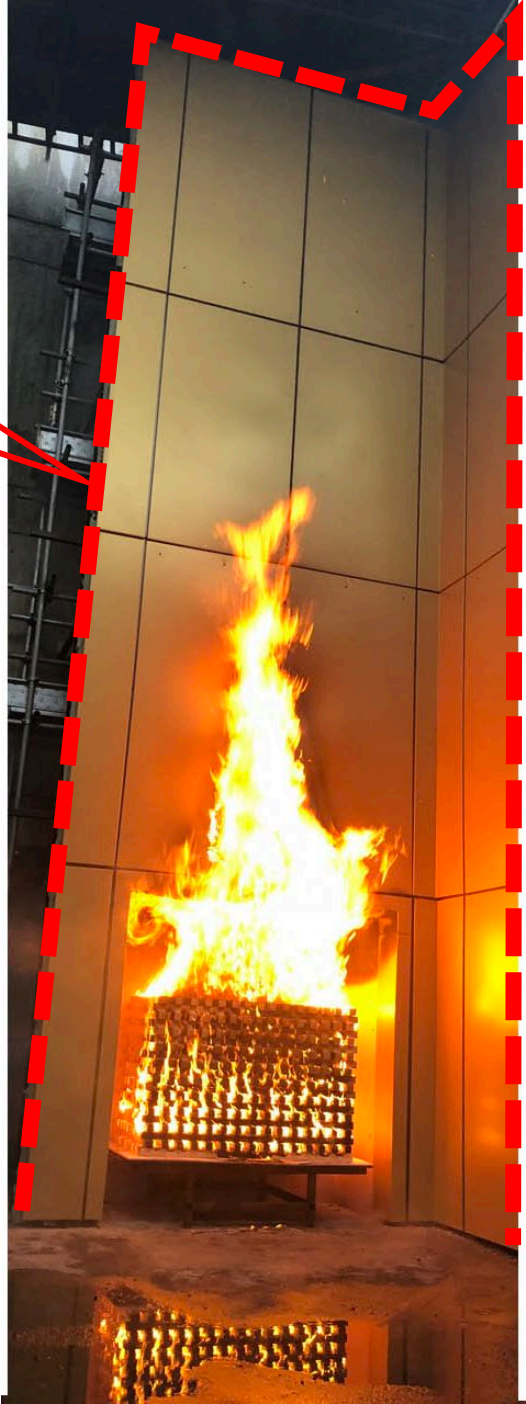


SIRIM Test Facility for BS8414

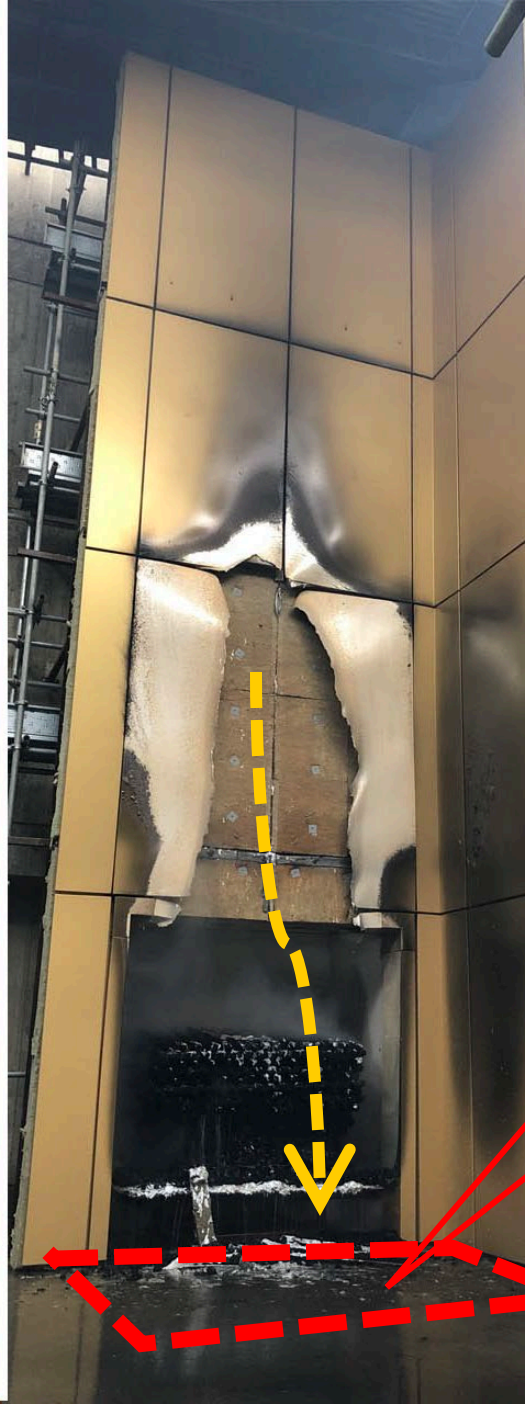
BS 8414-2

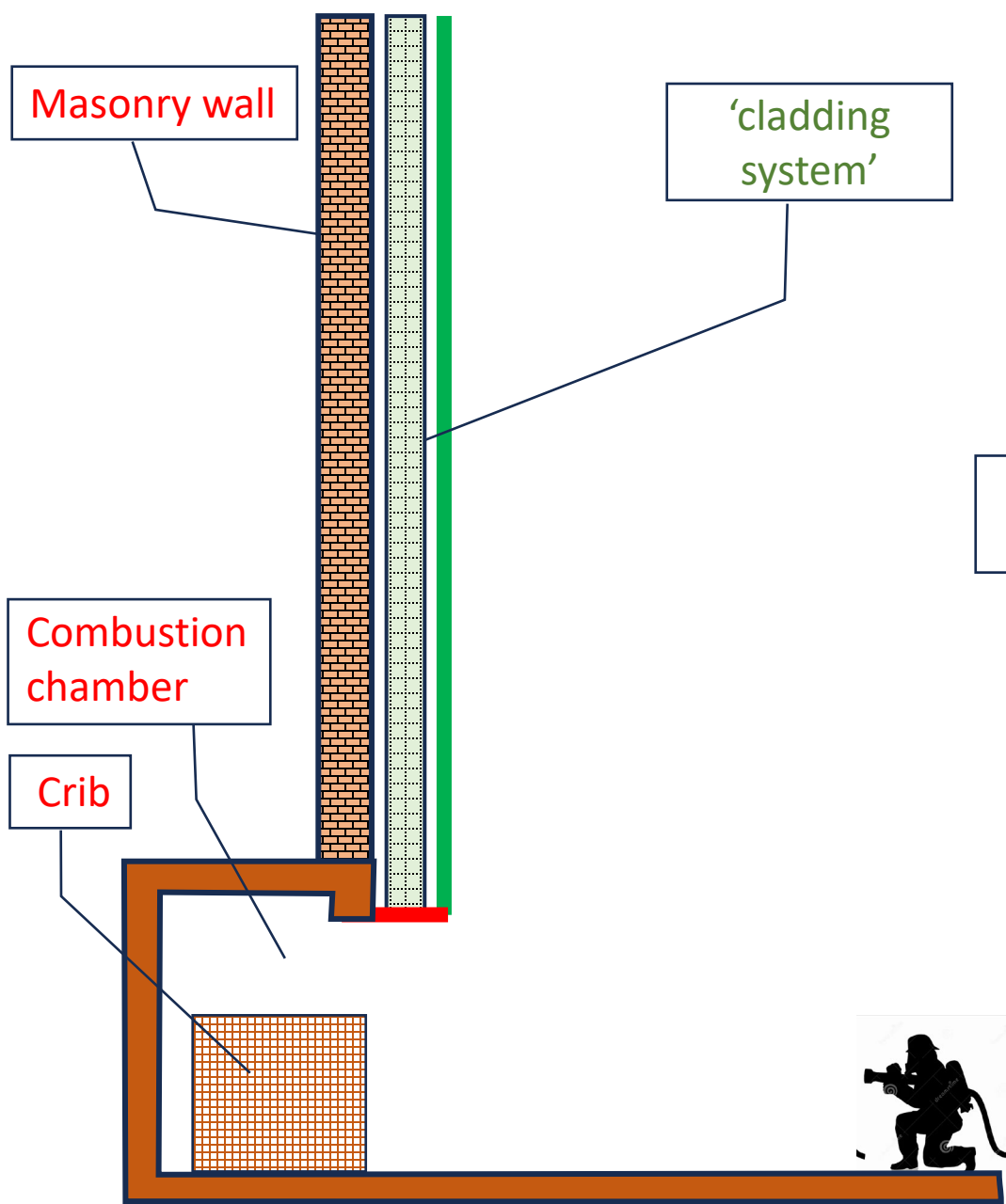


Visible
flame
zone

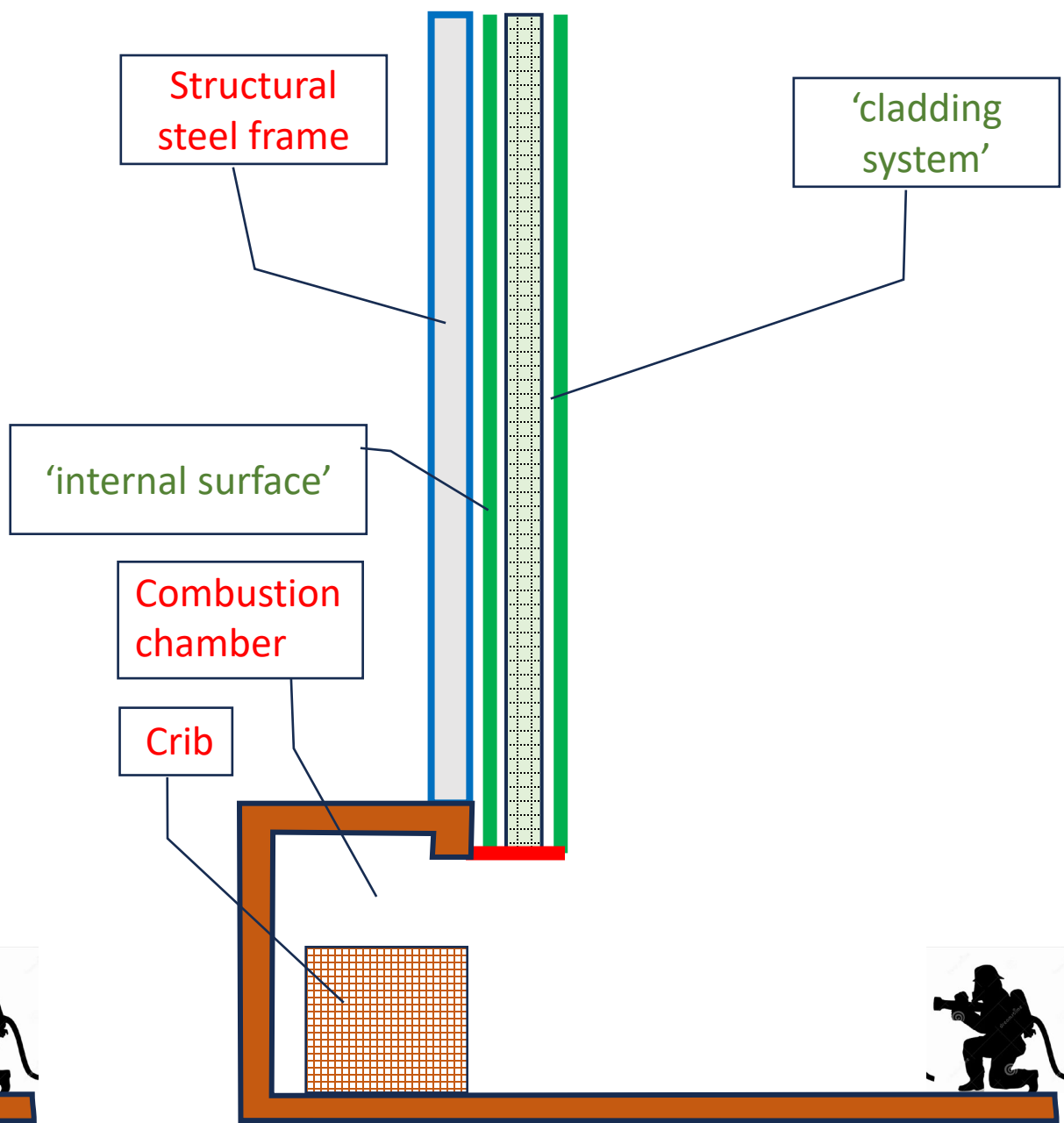


Crib
collapse
zone

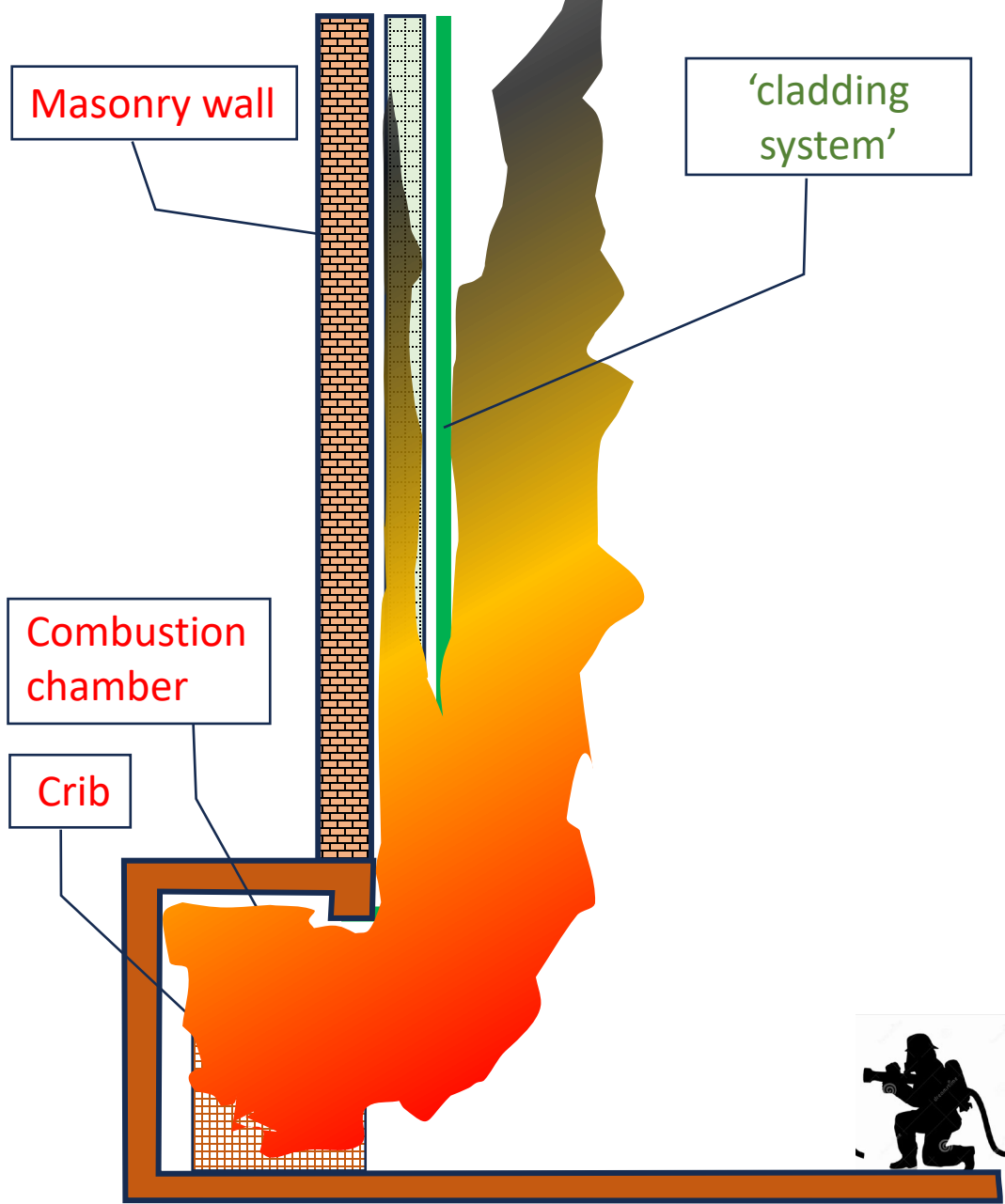




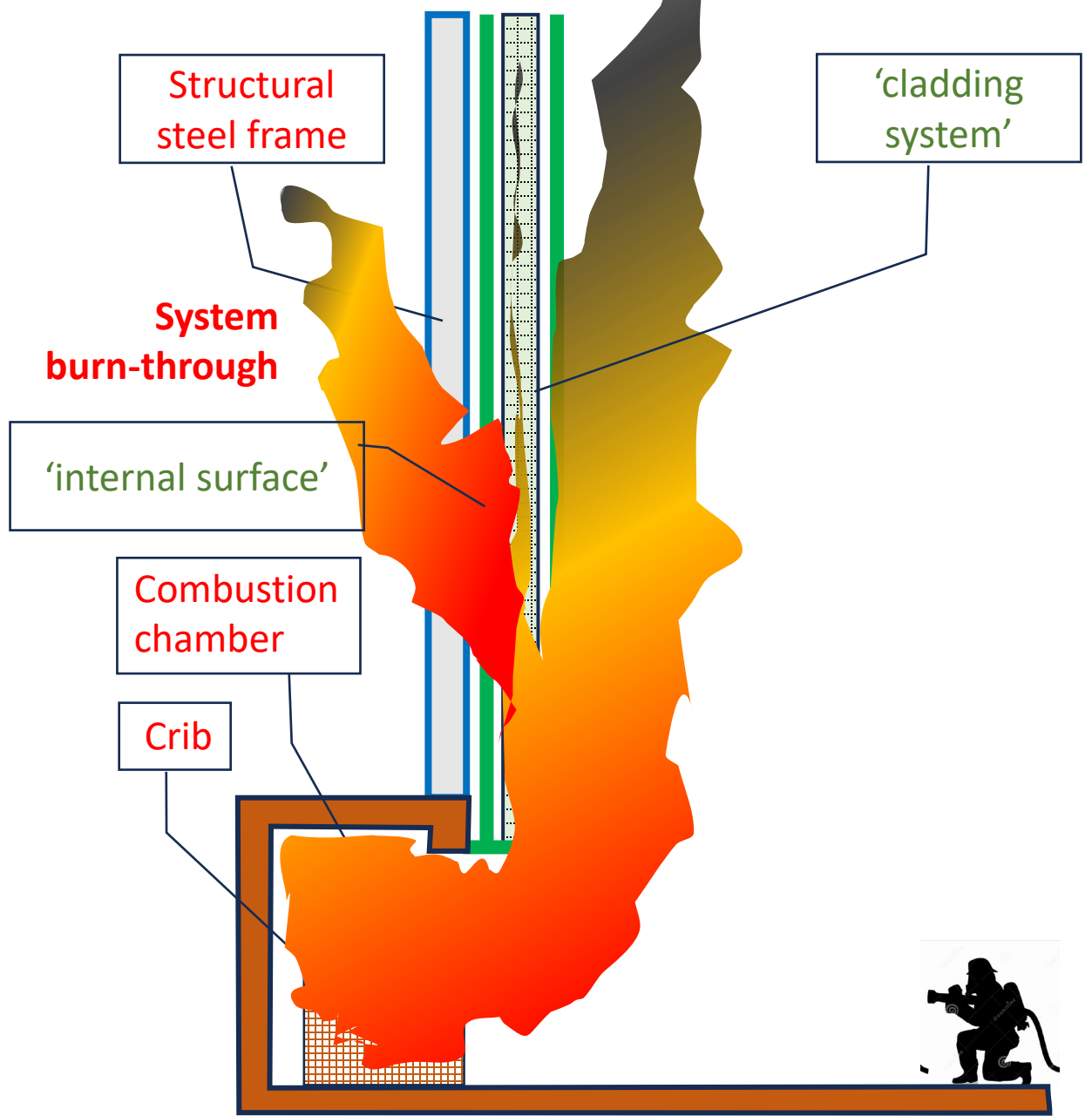
BS 8414-1



BS 8414-2



BS 8414-1



BS 8414-2



Extruded polystyrene XPS

Rockwool

PIR

Rockwool

ATRIUMS

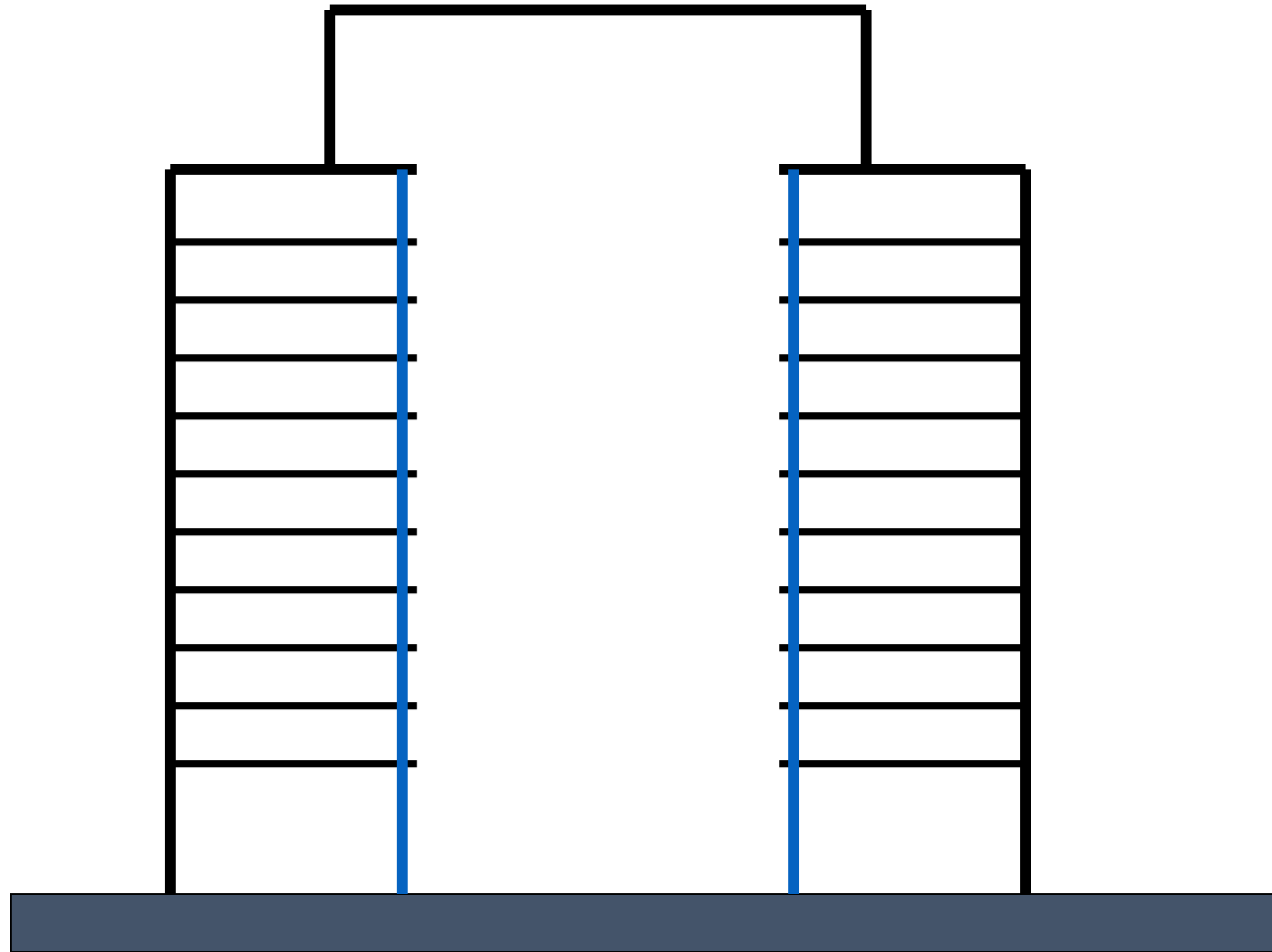
UBBL 2021 clause 137

UBBL 2021 clause 252A

MS 1183:2015 Annex B

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

Atrium Space



UBBL 1984

UBBL 2021

137	<p><u>Floor in building exceeding 30 metres in height to be constructed as compartment floor.</u></p> <p>In any building <u>which exceeds</u> 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.</p> <p>-None-</p> <p>-None-</p>	<p><u>Compartmentation by height.</u></p> <p>(1) In any building <u>not exceeding</u> 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.</p> <p><u>(2) In any building exceeding 30 metres in height, all floors shall be constructed as compartment floors, other than a compartment which is within a residential maisonette which may comprise two storey levels.</u></p> <p><u>(3) An atrium shall comply with the requirements of by-law 252A.</u></p>	<p>To provide stricter requirements in relation to the extent of subdivision of a building as compartment floors.</p>
-----	--	---	---

UBBL 1984

Clause 137 : Compartment Floor

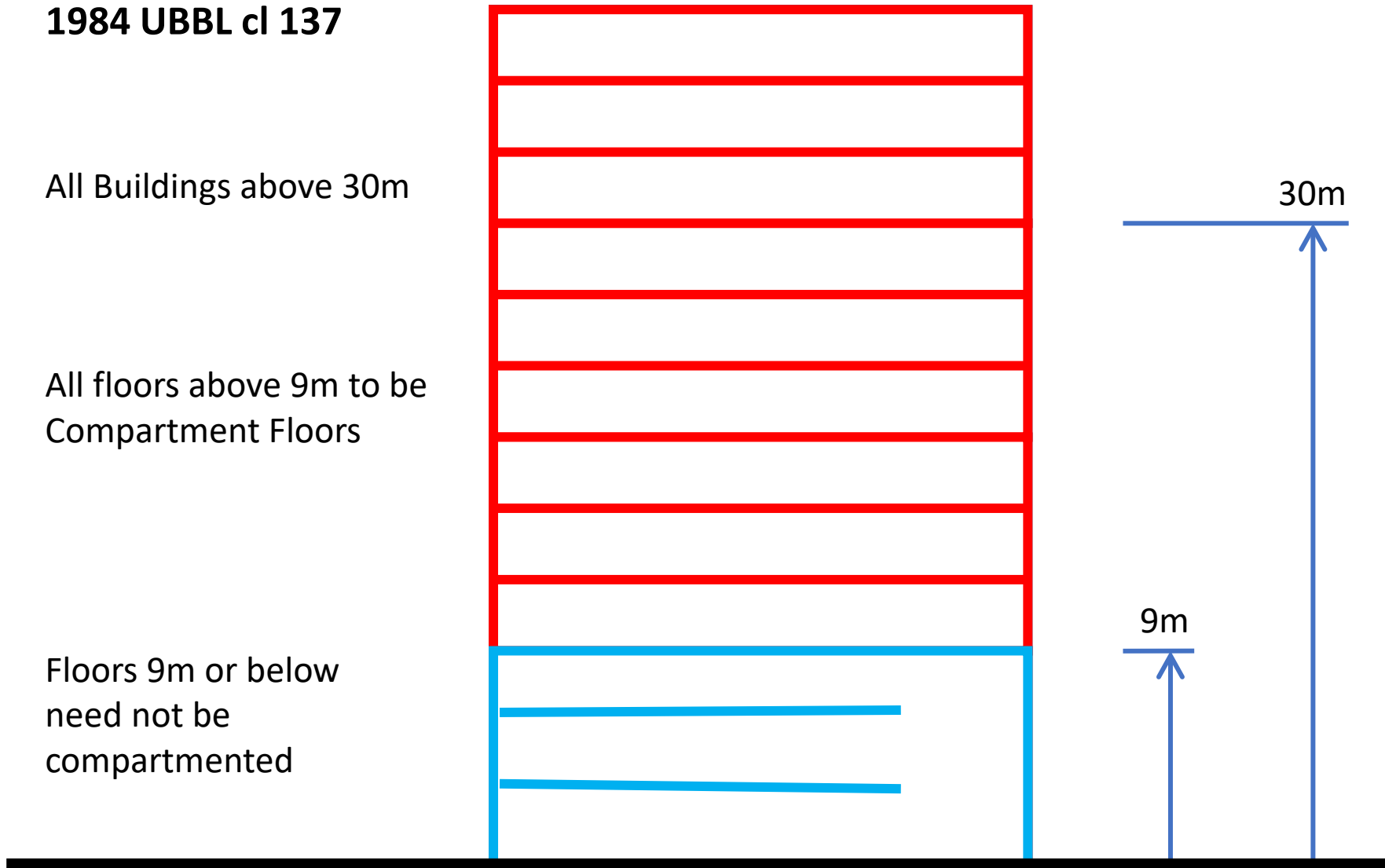
In any building which exceeds 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.

1984 UBBL cl 137

All Buildings above 30m

All floors above 9m to be
Compartment Floors

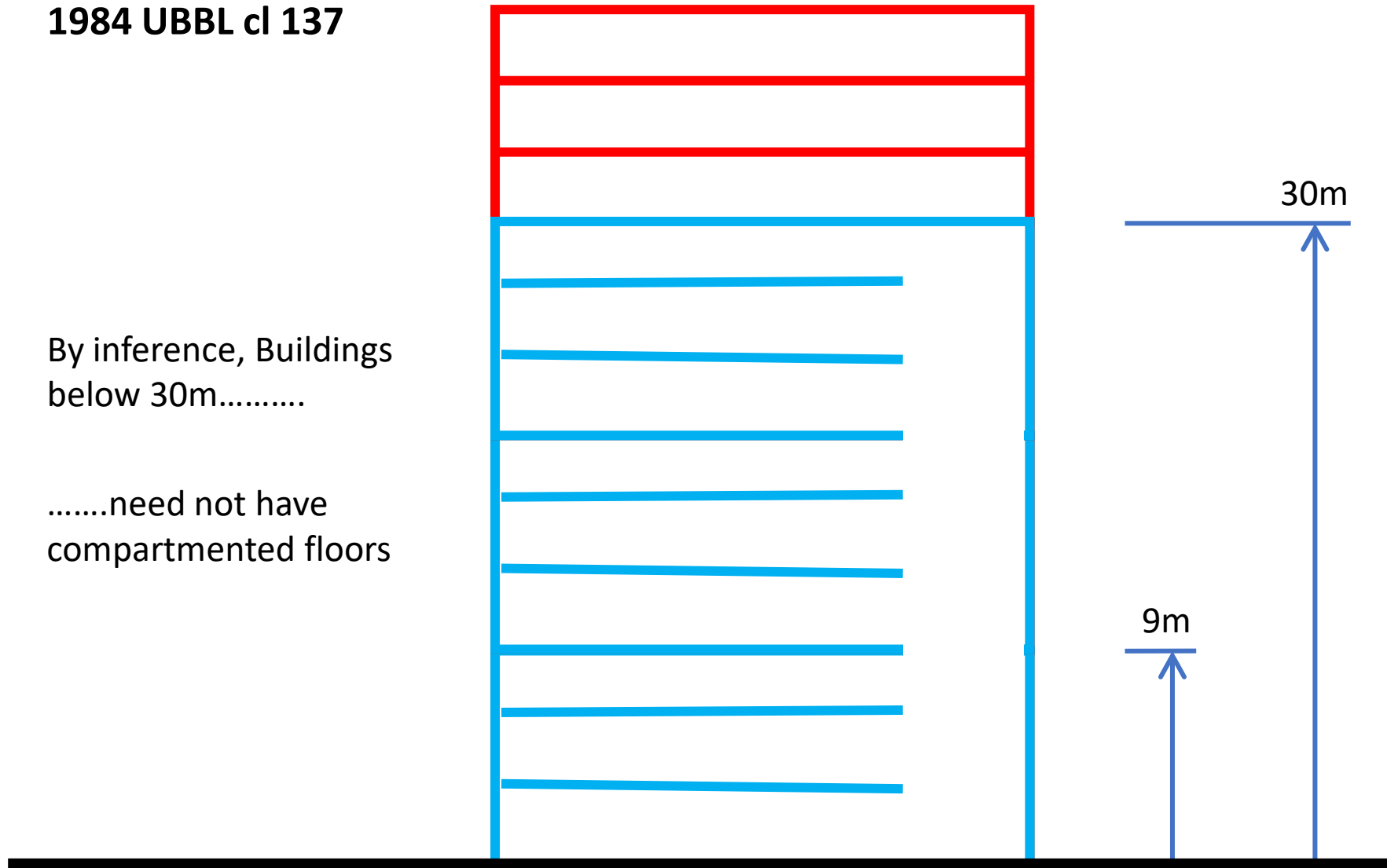
Floors 9m or below
need not be
compartmented



1984 UBBL cl 137

By inference, Buildings
below 30m.....

.....need not have
compartmented floors



UBBL 2021

Clause 137 : Compartment Floor

(1) In any building not exceeding 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.

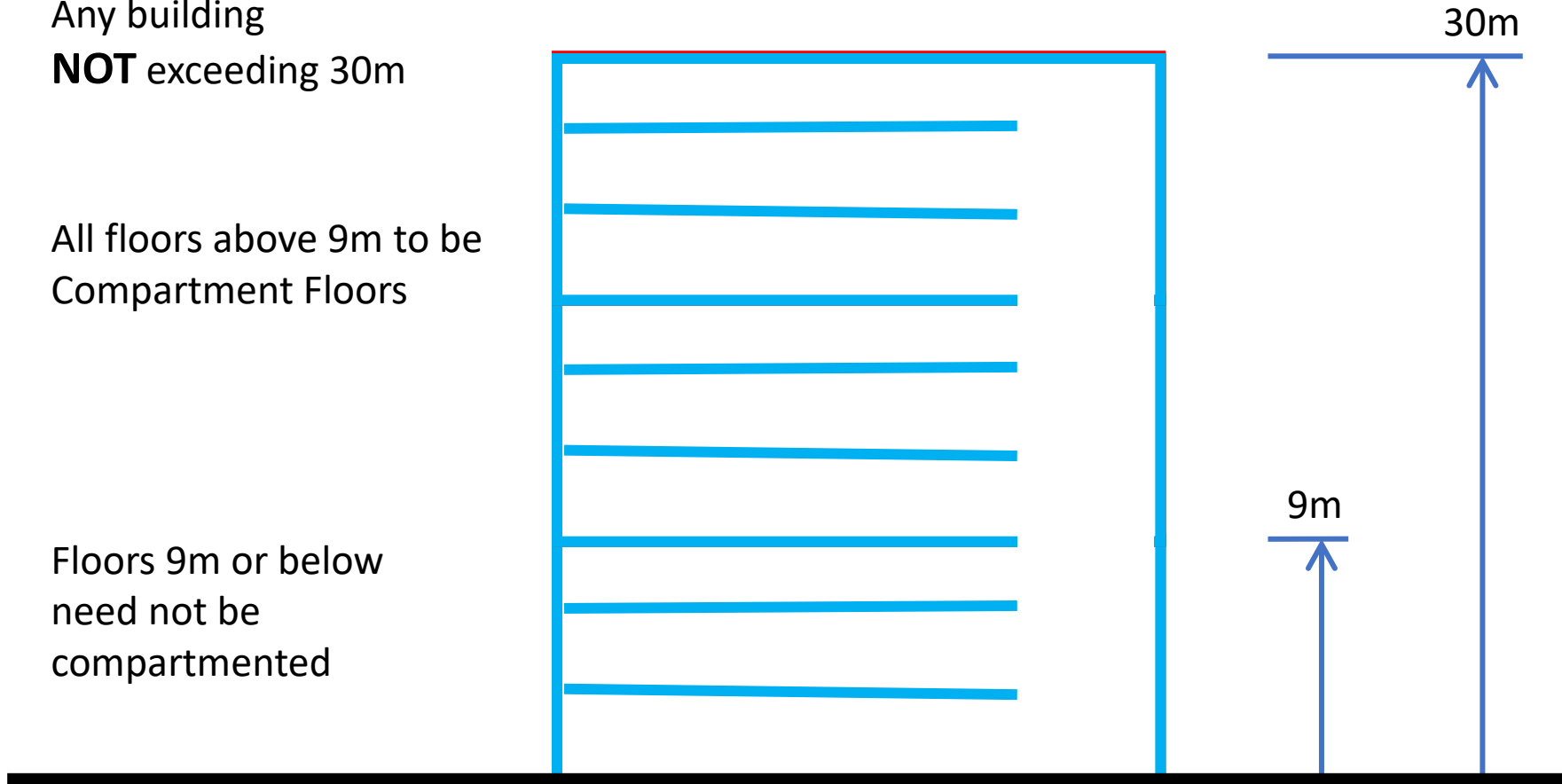
(2) In any building exceeding 30 metres in height, all floors shall be constructed as compartment floors, other than a compartment which is within a residential maisonette which may comprise two storey levels.

2021 UBBL cl 137

Any building
NOT exceeding 30m

All floors above 9m to be
Compartment Floors

Floors 9m or below
need not be
compartmented

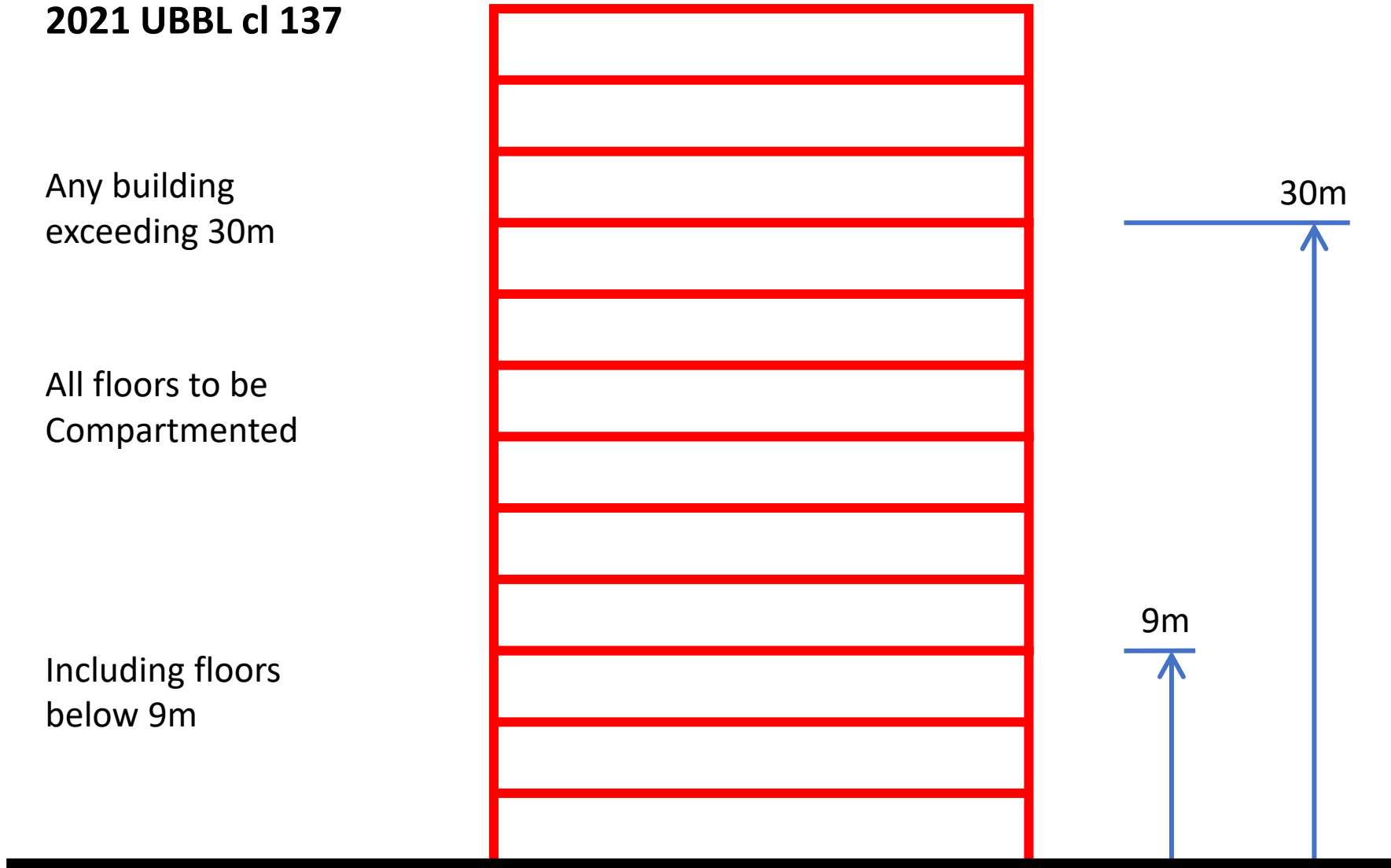


2021 UBBL cl 137

Any building
exceeding 30m

All floors to be
Compartmented

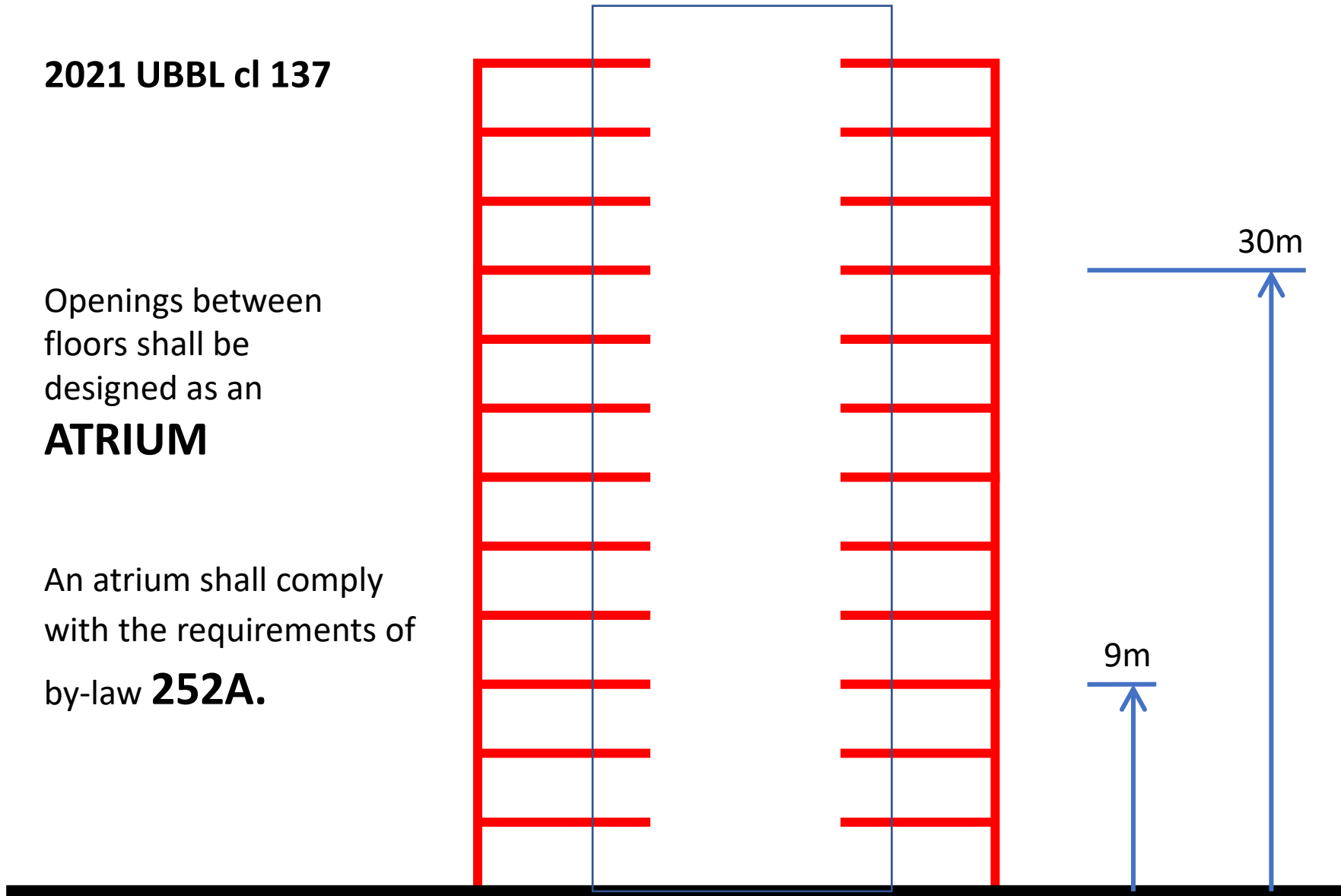
Including floors
below 9m



2021 UBBL cl 137

Openings between
floors shall be
designed as an
ATRIUM

An atrium shall comply
with the requirements of
by-law **252A**.

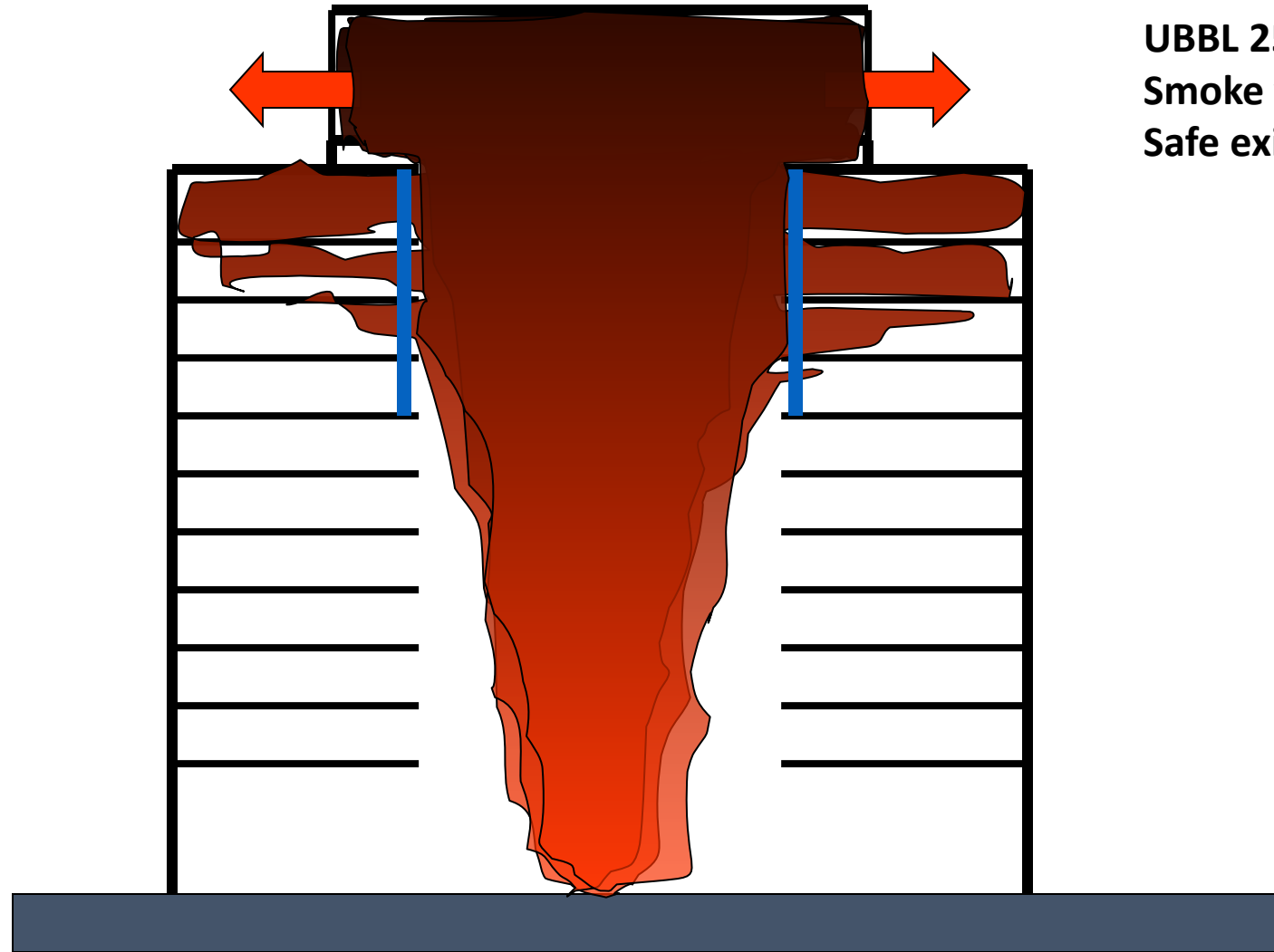


2021 UBBL 252A Atriums in buildings

1. Minimum dimensions: 6m and 95m²
2. Exits separated from atrium
3. 1 hour FRP separation
4. Automatic sprinklers
5. Smoke control/exhaust system

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

Atrium Space



UBBL 251

Smoke venting for
Safe exit

Protection of penetrations through compartments and elements

- **UBBL 141 : Separating walls**

- Diameter of combustible pipe < 25mm
- Diameter of non-combustible pipe <150mm
- No flue pipes allowed
- Doors to have equal or greater FRP as with the element

UBBL 148 : Compartment floor and walls

- Opening for protected shaft
- Ventilation duct with fire damper
- Encased ducts to have FRP no less than half of the element

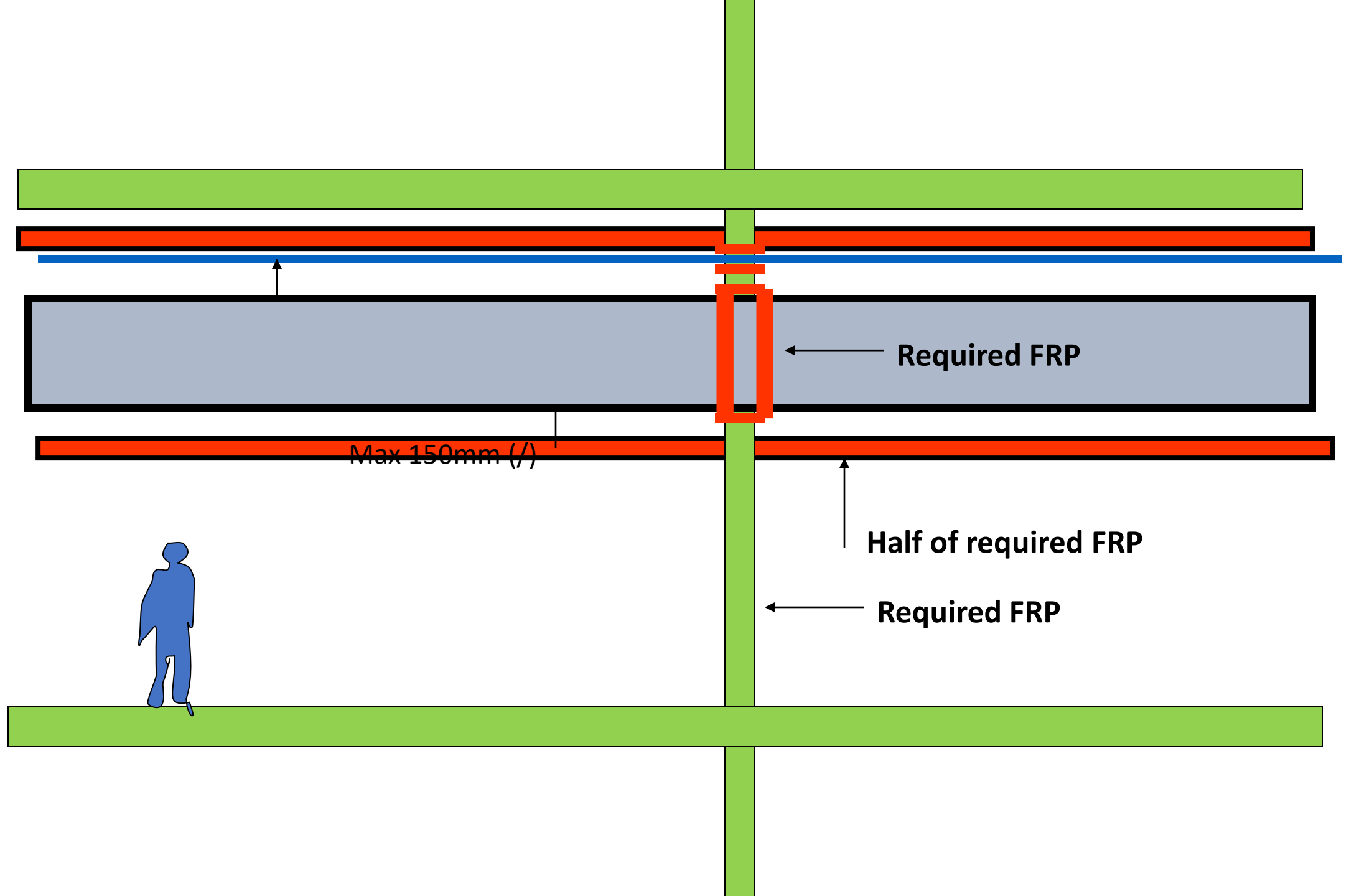
Protection of penetrations through compartments and elements

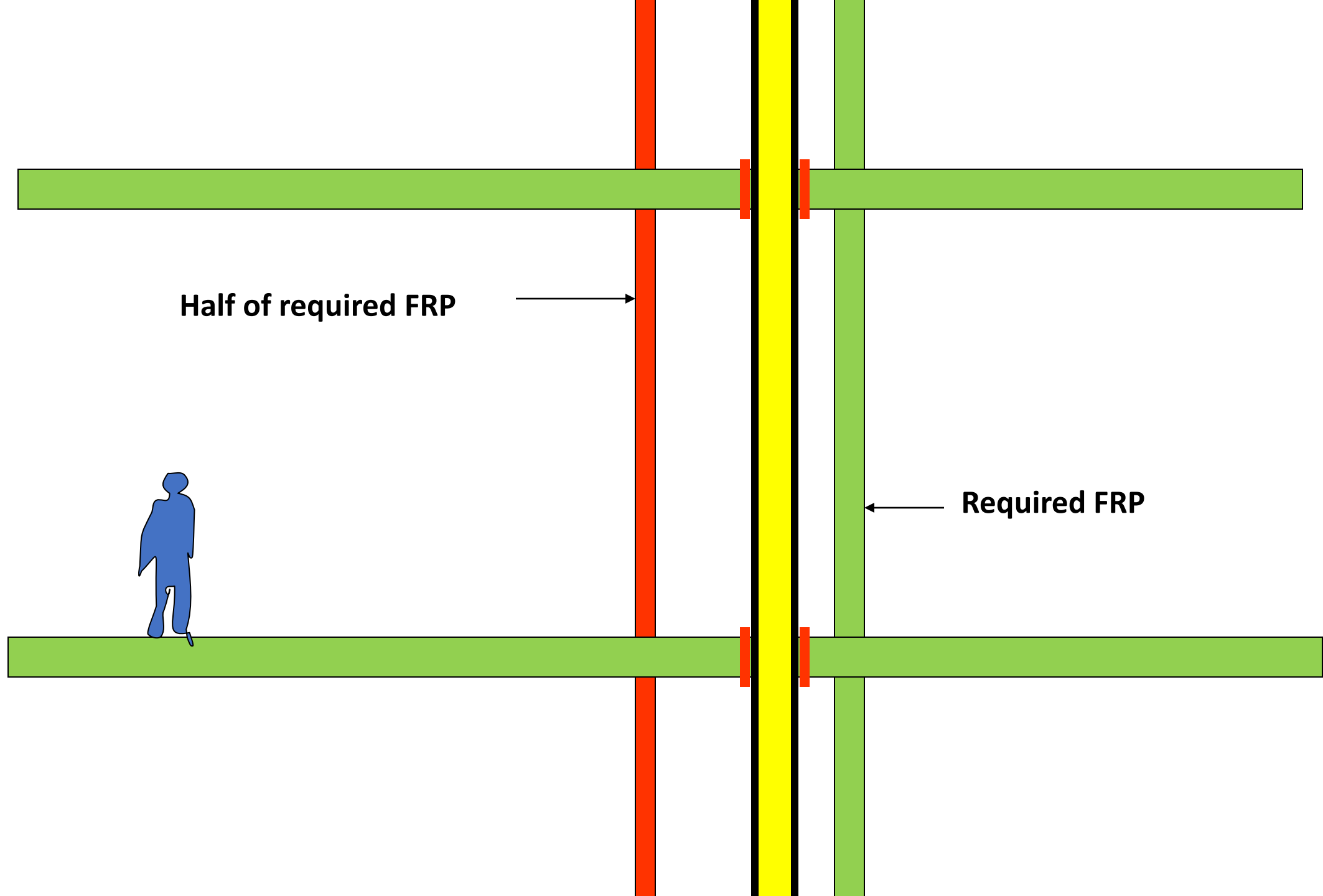
UBBL 150 : Protected Shafts

- for pipes, ducts, sanitary facilities, staircase, lift

UBBL 156 : Ventilating Duct in Protected Shaft

- To have automatic Fire Dampers at 'appropriate' intervals

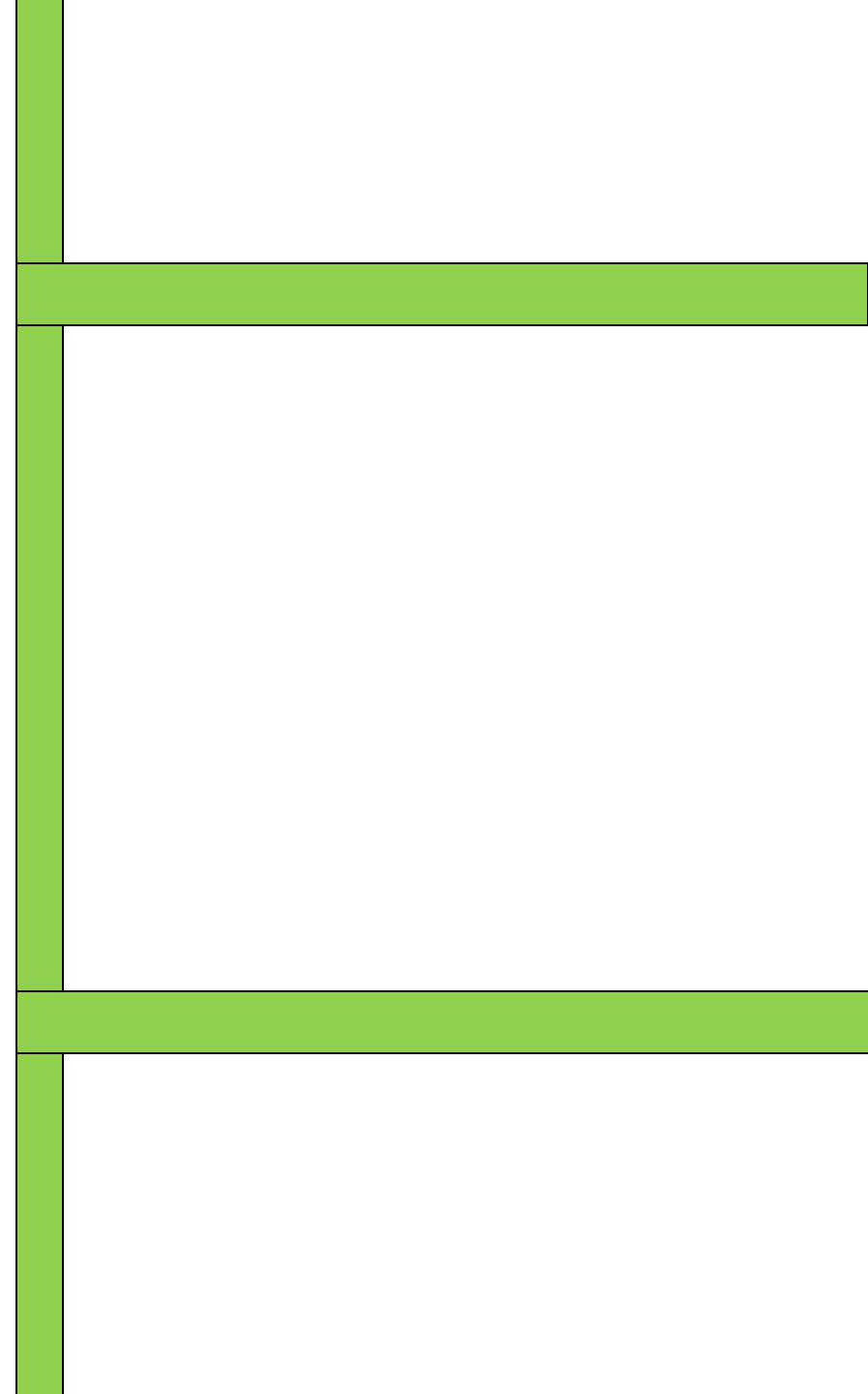
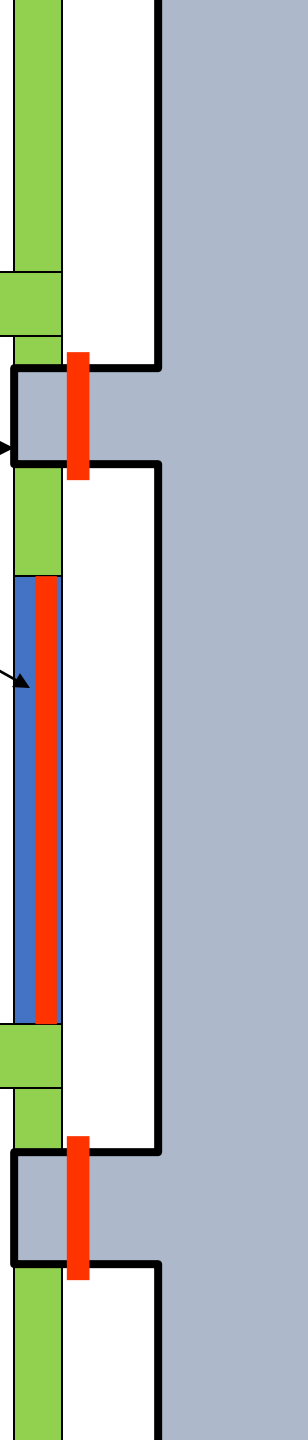
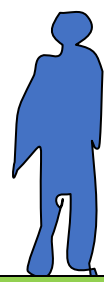
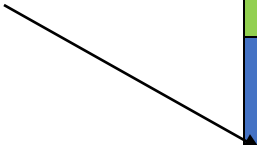




Full FRP for structures



Half of required FRP



Party Wall or Separating Wall or Compartment Wall?

Part VI

Constructional Requirements

By-law 86 Party wall

“Party Wall” means a wall forming part of a building and used or constructed to be used for separation of adjoining buildings belonging to different owners or occupied or constructed or adapted to be occupied by different persons either constructed over or abutting a common boundary

Part VII

Fire Safety Installation Requirements

By-law 136, 138, 148 Compartment walls and compartment floors

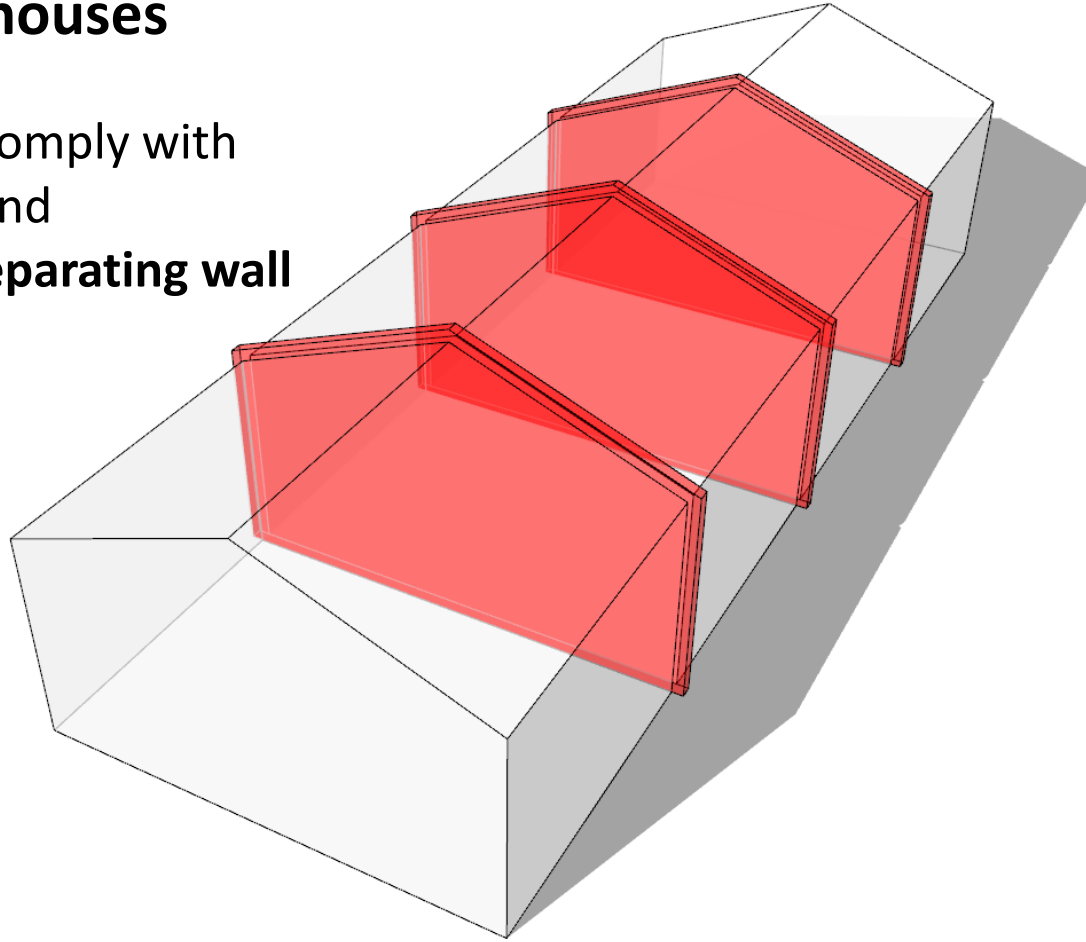
By-law 141, 147 Separating walls

“Compartment Wall” and “Compartment Floor” mean respectively a wall and a floor which comply with by-law 148, and which are provide as such for the purposes of by-law 136 to divide a building into compartments for any purposes in connection with by-law 213 or 147

“Separating Wall” means a wall or part of a wall which is common to two adjoining buildings

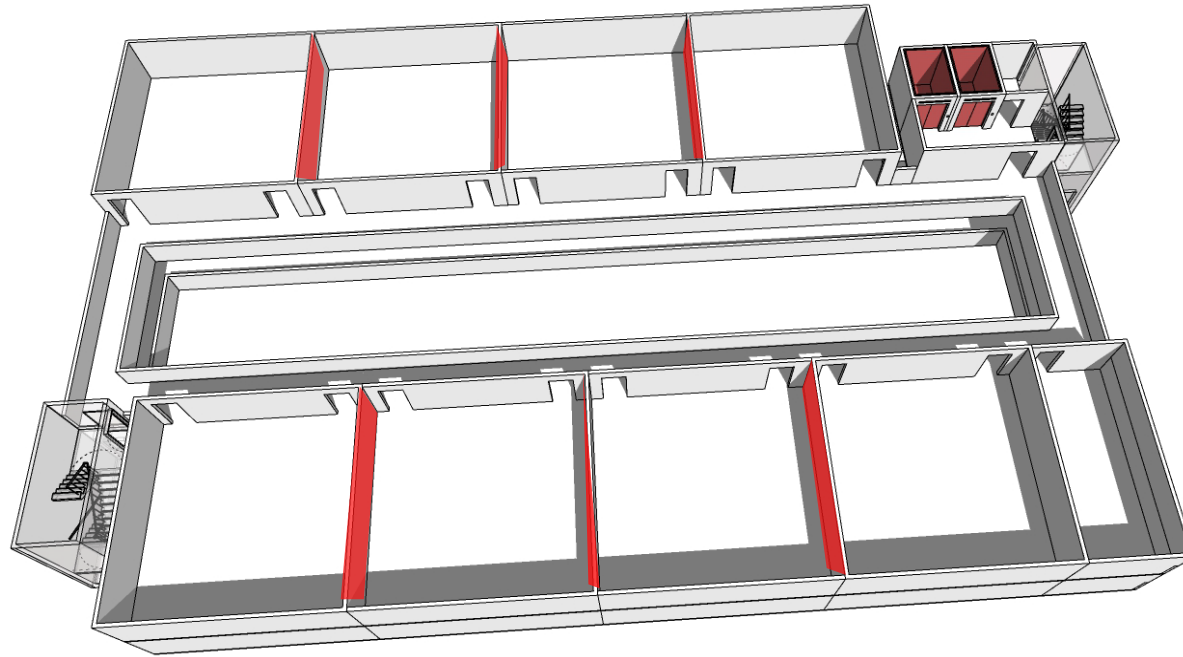
Example: Terrace houses

To be constructed to comply with
by-law 86 **Party wall** and
by-law 141 and 147 **Separating wall**



Example: multi-storey apartments

To be constructed to comply with
by-law 86 **Party wall** and
by-law 136, 138, 148 **Compartment wall**



UBBL 2021 136A : Use of Fire Shutters

Fire shutters with **Integrity and Insulation Fire Rating** may be used as

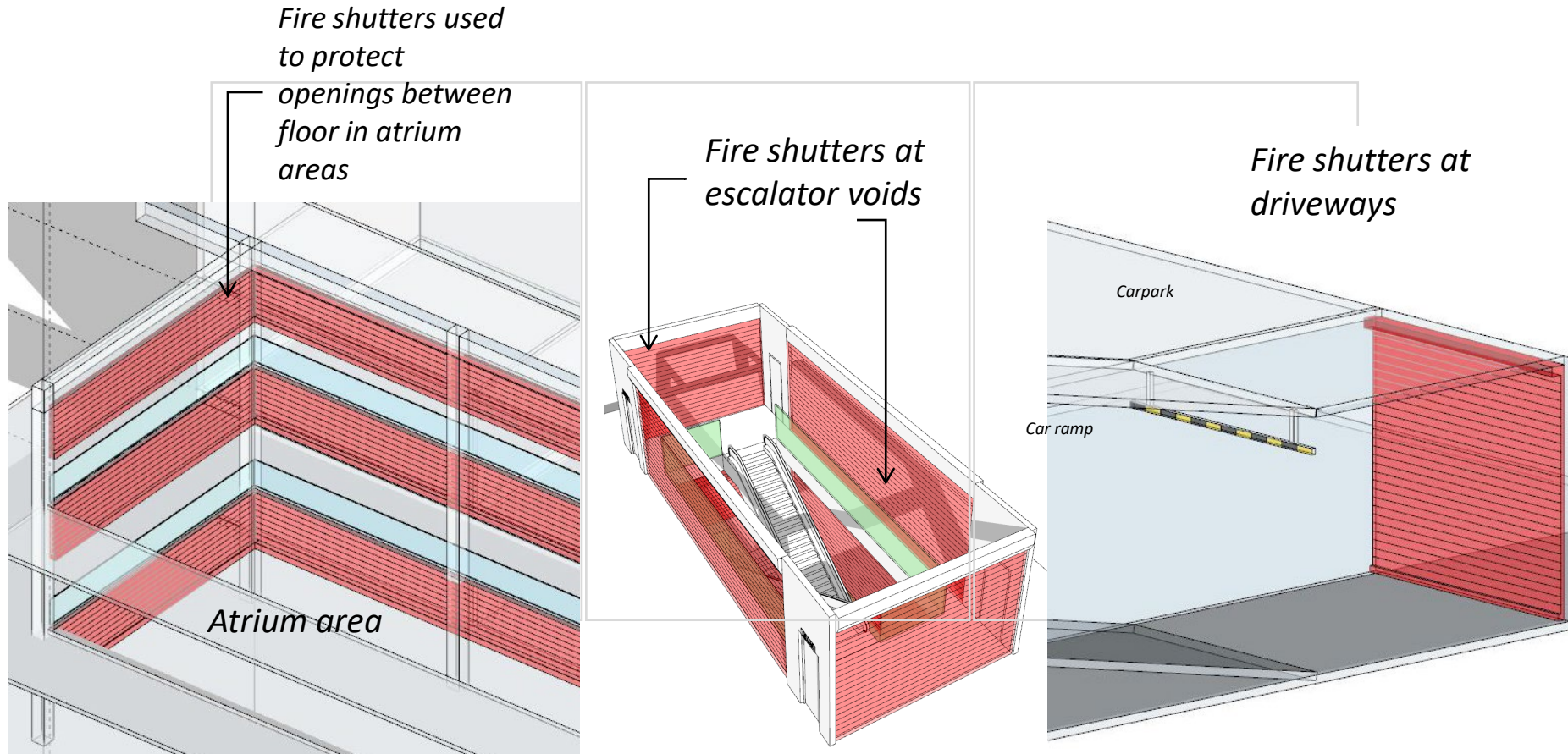
- 1) **A compartment wall**, **except** as walls enclosing
 - a) Fire Command Centres
 - b) protected lobbies
 - c) protected exit routes including stairs and corridors
- 2) **Protection of an opening** or doorway in a compartment wall or compartment floor

2) **Protection of an opening** or doorway in a compartment wall or compartment floor

However, the fire shutter which may be installed to any **areas without any intended fire load** such as the edge of atria or voids such as or escalator void areas, car park driveways and between the floors or door-ways, **may be without thermal insulation.**

136A FIRE RATED ROLLER SHUTTER (FRS)

Uninsulated Fire Rated Roller Shutter — *atriums, escalator voids, carpark driveways*







NTANGAN API AUTOMATIK
TOMATIC FIRE SHUTTER

Shops ↗

14c

LG2

HELP

VEHICLES WILL BE
CLAMPED & A FINE
OF RM 500 WILL BE
IMPOSED

WAS DILARANG MELETAK KENDERAAN DIBAWAH RINTANGAN API AUTOMATIK
CAUTION DO NOT PARK VEHICLE BENEATH THE AUTOMATIC FIRE SHUTTER

17
LG

All New Ford
Leave the parking to you
Active Park Assist.

?



UBBL 2021 163 : Fire Doors

Fire doors including frames shall be constructed in accordance with **MS 1073**

TABLE OF REQUIREMENT FOR THE FIRE ALARM SYSTEM AND FIRE EXTINGUISHMENT SYSTEM

[By-law 225 (1), 226A, 227, 228, 237, 238, 239]

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
I. Small residential		
(i) Private dwelling up to 2 storeys.	-	-
(a) Terrace type.	-	-
(b) Semi-detached.	-	-
(c) Detached.	-	7
(ii) Private dwelling of more than 2 storeys.		7
II. Institutional		
1. Education occupancy.		
(a) Building used for the instructional purpose only.		
(i) Open corridor design.		
(aa) Two storeys and below.	-	-
(ab) Three to five storeys.	G	2
(ac) Six storeys and above.	G	1 & 2
(ii) Other designs.		
(aa) Less than 500 square metres per floor.	-	-
(ab) 500 to 1,000 square metres per floor.	G	2
(ac) 1,001 to 2,000 square metres per floor or 18 metres to 30 metres in height.	G	1 & 2
(ad) Exceeding 2,000 square metres per floor or above 30 metres in height.	A & G	2, 4, 5 & 6
(b) Canteen detached or kitchen detached.	-	-

MS1745 Fire alarm systems

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
- ~~6. automatic fire monitoring system.~~
- ~~7. self-contained smoke detector.~~

A – automatic sprinkler system.
 B – water spray system.
 C – foam system.
 D – gaseous system.
 E – Deleted.
 F – other automatic extinguishing systems.
 G – hose reel system.
 H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
(c) Laboratory or workshop (total floor area per block).		
(i) Less than 1,000 square metres.	-	-
(ii) 1,000 to 2,000 square metres.	G	1 & 2
(iii) Exceeding 2,000 square metres.	A & G	2, 5 & 6
(d) Library (total floor area).		
(i) Less than 500 square metres.	-	-
(ii) 500 to 1,000 square metres.	G	2
(iii) 1,001 to 2,000 square metres.	G	1 & 2
(iv) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
(e) Detached multi-purpose hall (total floor area).		
(i) Single storey and less than 2,000 square metres.	-	-
(ii) Two storeys and above or exceeding 2,000 square metres.	G	2
(iii) Central air conditioning (total floor area) of exceeding 2,000 square metres.	A & G	2 & 6
(f) Educational institution in a commercial complex.	To be considered as part of an overall risk in within the complex.	
2. Hospital or nursing home (total floor area).		
(a) Clinic – day care.		
(i) Less than 750 square metres.	-	-

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.

B – water spray system.

C – foam system.

D – gaseous system.

E – Deleted.

F – other automatic extinguishing systems.

G – hose reel system.

H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
(ii) 751 to 1,000 square metres.	G	2
(iii) 1,001 to 2,000 square metres.	G	1 & 2
(iv) Exceeding 2,000 square metres.	A & G	2 & 6
(b) Patient accommodation.	To be considered as part of an overall risk with a special requirement for the emergency lighting, stretcher lift and so forth.	
(i) Part of a commercial complex.		
(ii) Single storey.	G	2
(aa) Less than 750 square metres.	G	1 & 3
(ab) 751 to 1,000 square metres.	A & G	2, 3, 4, 5 & 6
(ac) Exceeding 1,000 square metres.		
(iii) Two storeys and above (total floor area).	G	2
(aa) Less than 750 square metres.	G	1 & 3
(ab) 751 to 1,000 square metres.	A & G	2, 3, 4, 5 & 6
(ac) Exceeding 1,000 square metres.		
Notes for the hospital: All fire alarm systems within the wards shall be of the signal indicator type.		
III. Other residential		
1. Hotel.		
(a) An open corridor design with an open staircase with an extended lobby or tower staircase.		
(i) Two to three storeys.		
(aa) 50 rooms or less per block.	-	1 & 2

Hospitals : patient accommodation (wards)

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.
 B – water spray system.
 C – foam system.
 D – gaseous system.
 E – Deleted.
 F – other automatic extinguishing systems.
 G – hose reel system.
 H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
(ab) Exceeding 50 rooms per block.	G	1 & 2
(ii) Four storeys and above.		
(aa) 100 rooms or less per block.	G	1 & 2
(ab) Exceeding 100 rooms per block.	A & G	2, 4, 5 & 6
(b) Other designs.		
(i) Two to three storeys.		
(aa) Less than 20 rooms per block.	-	1 & 2
(ab) 20 to 100 rooms per block.	G	1 & 2
(ac) Exceeding 100 rooms per block.	A & G	2, 4, 5 & 6
(ii) Four storeys and above.		
(aa) Less than 50 rooms per block.	G	1 & 2
(ab) 50 rooms and over per block.	A & G	2, 4, 5 & 6
(c) Hotel above shop occupancy or hotel above office occupancy.	To provide not less than that required for an overall occupancy risk or refer Note 3 - 1 & 2.	
2. Hostel or dormitory.		
(i) Two storeys and below.	-	-
(ii) Open corridor design.		
(aa) Three to five storeys.	G	2
(ab) Six to ten storeys and its total floor area which is not exceeding 5,000 square metres.	G	1 & 2
(ac) Above ten storeys or a total floor area of exceeding 5,000 square metres.	A & G	2, 4, 5 & 6
(iii) Other designs.		
(aa) Three to five storeys and its total floor area which is not exceeding 3,000 square metres.	G	1 & 2

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.
 B – water spray system.
 C – foam system.
 D – gaseous system.
 E – Deleted.
 F – other automatic extinguishing systems.
 G – hose reel system.
 H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
(ab) Above five storeys or a total floor area of exceeding 3,000 square metres.	A & G	2, 4, 5 & 6
<p>Note: If the hotel is situated at a location that may not be reached within the reasonable time or inaccessible to required types and number of fire appliances, a higher safety requirement shall be provided and as required by the Director General.</p>		
3. Apartment or flat.		
(a) Five storeys and below.	-	7
(b) Open corridor design.		
(i) Six to forty storeys or less than 120 metres in height.	G	2, 5 & 7
(ii) Above forty storeys or of exceeding 120 metres in height.	A & G	2, 5 & 6
(c) Internal staircase or a core design.		
(i) Six to ten storeys or less than 30 metres in height.	G	2 & 7
(ii) Eleven to forty storeys or less than 120 metres in height.	G	2, 5 & 7
(iii) Above forty storeys and of exceeding 120 metres in height.	A & G	2, 5 & 6
<p>Note: For the purpose of group 3(b) or (c) in this Schedule, an automatic fire detection system when required shall be confined to the common area only.</p>		
4. Service apartment.		
(i) Ten storeys and below per block or less than 30 metres in height.	G	2, 5 & 7
(ii) Above ten storeys or of exceeding 30 metres in height.	A & G	2, 4, 5 & 6
<p>Note: Any purpose group in mixed development (such as combinations of residential and office or shop) to be considered as part of an overall risk within a complex unless any part of the building shall be separated completely throughout its height both above and below the ground from all other parts by one compartment wall or more in the same continuous vertical plane.</p>		

Tall apartments

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.

B – water spray system.

C – foam system.

D – gaseous system.

E – Deleted.

F – other automatic extinguishing systems.

G – hose reel system.

H – pressurised hydrant system.

Service apartments

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
IV. Office Total gross floor area.		
1. Four storeys and below or less than 1,000 square metres.	-	-
2. Five storeys and above or of exceeding 1,000 square metres.	G	2
3. Exceeding 18 metres in height and less than 10,000 square metres.	G	1 & 2
4. 30 metres and above in height or of exceeding 10,000 square metres.	A & G	2, 4, 5 & 6
V. Shop		
1. Floor area which is not exceeding 250 square metres per floor that is built as a separate compartment for -		
(a) a building less than 4½ storeys or 15 metres in height; or	-	-
(b) a building less than 4½ storeys or 15 metres in height with the combination of a ground floor shop, and residential on upper floor or office on upper floors floor.	-	-
2. Single storey		
(a) Less than 1,000 square metres.	-	-
(b) 1,000 to 2,000 square metres.	G	1 & 2
(c) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
3. Two storeys and above (total floor area).		
(a) Less than 750 square metres.	-	-
(b) 750 to 1,000 square metres.	G	2
(c) 1,001 to 3,000 square metres.	G	1 & 2
(d) Exceeding 3,000 square metres.	A & G	2, 4, 5 & 6

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.

B – water spray system.

C – foam system.

D – gaseous system.

E – Deleted.

F – other automatic extinguishing systems.

G – hose reel system.

H – pressurised hydrant system.

Occupancy hazard	Extinguishing system	Fire alarm system Note 3
Note 2		
4. Hawker centre, food court, wet market or dry market. (a) Detached building less than 2,000 square metres with an open structure design and naturally ventilated. (b) Exceeding 2,000 square metres.	- G	- 2
5. Combination of shop occupancy, and hotel occupancy or office occupancy.	Gross area calculated against the highest risk requirement.	
VI. Factory		
1. Single storey detached unit, semi-detached unit or terrace unit. (a) Less than 750 square metres. (b) 750 to 1,000 square metres. (c) 1,001 to 2,000 square metres. (d) Exceeding 2,000 square metres.	- G G A & G	- 2 1 & 2 2, 4 & 6
2. Open structure design. (a) Steel fabrication work or metal fabrication work, engineering work or metal work or similar low fire risk establishment. (b) Sawmill. (c) Steel mill.	- G & H G & H	- 2 2
3. Two storeys and above and in the types of detached unit, semi-detached unit or terrace unit. Each floor is built as a separate compartment. (a) Less than 500 square metres per floor. (b) 500 to 1,000 square metres per floor. (c) Exceeding 1,000 square metres per floor.	- G A & G	2 1 & 2 2, 5 & 6

Hawker centres, food courts, markets

Large single storey factories

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.

B – water spray system.

C – foam system.

D – gaseous system.

E – Deleted.

F – other automatic extinguishing systems.

G – hose reel system.

H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
4. Flatted factory block (two storeys and above).		
(a) Less than 500 square metres per floor.	-	2
(b) 500 to 1,000 square metres per floor.	G	2
(c) Exceeding 1,000 square metres per floor or of exceeding 7,000 cubic metres per compartment.	A & G	2, 5 & 6
5. Vehicle assembly or a similar plant.		
(a) Less than 1,000 square metres total floor area.	-	-
(b) 1,000 to 2,000 square metres total floor area.	-	2
(c) 2,001 to 5,000 square metres total floor area.	G & H	1 & 2
(d) Exceeding 5,000 square metres total floor area.	A, G & H	2, 5 & 6
6. Special structure.		
(a) Factory complex such as palm oil mill complexes, palm oil refineries, sugar mills, or cement work.	G & H	2
(b) Wet process.	G	2
(c) Hazardous process.	A, B, C, D, F, G, & H (See Note 2)	1, 2, 3, 4, 5 & 6 (See Note 2)
Note: 1. Factory in operation after an hour of darkness shall be required to provide emergency lighting as required by the Director General. 2. A special risk or hazardous process or hazardous storage shall be required to provide fire fighting equipment or fire safety installation as required by the Director General.		
VII. Place of assembly		
1. Place of assembly below the level of exit discharge of exceeding 1,000 square metres (total floor area).	A & G	2 & 6

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.
 B – water spray system.
 C – foam system.
 D – gaseous system.
 E – Deleted.
 F – other automatic extinguishing systems.
 G – hose reel system.
 H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
2. Convention centre, community centre, private club, exhibition centre, museum or art gallery (total floor area).		
(a) Not exceeding 1,000 square metres.	-	-
(b) 1,001 to 2,000 square metres.	G	1 & 2
(c) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
3. Theatre, cinema, concert hall or auditorium (total floor area).		
(a) Not exceeding 1,000 square metres.	-	-
(b) 1,000 to 2,000 square metres.	G	1 & 2
(c) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
4. Amusement centre (total floor area).		
(a) Not exceeding 1,000 square metres.	-	-
(b) 1,000 to 2,000 square metres.	G	1 & 2
(c) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
5. Bus terminal, ferry terminal, train station or airport (total floor area).		
(a) Not exceeding 1,000 square metres.	-	2
(b) 1,000 to 2,000 square metres.	G	1 & 2
(c) Exceeding 2,000 square metres.	A & G	2, 4, 5 & 6
6. Place of worship. Place of assembly used purely for a religious purpose.	-	-

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.

B – water spray system.

C – foam system.

D – gaseous system.

E – Deleted.

F – other automatic extinguishing systems.

G – hose reel system.

H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
VII. Storage and general		
1. Car park.		
(a) Open structure car park above the ground.		
(i) Single storey or less than 750 square metres.	-	-
(ii) Two storeys and above or of exceeding 750 square metres per floor.	G	2
(b) Enclosed car park or underground car park.		
(i) Less than 2,000 square metres (total floor area).	G	2
(ii) Exceeding 2,000 square metres (total floor area).	A & G	2, 4, 5 & 6
(c) Automated multilevel car park.	A & G	2, 5 & 6
2. Warehouse of non-combustible product or storage of non-combustible product such as clay or bleaching earth.		
(a) Single storey.		
(i) Less than 2,000 square metres.	-	-
(ii) Exceeding 2,000 square metres.	G	2
(b) Two storeys and above.	G	2
3. Warehouse of combustible product or storage of combustible product.		
(a) Single storey (total floor area).		
(i) Open sided of exceeding 1,000 square metres.	G	2
(ii) Less than 250 square metres.	-	-
(iii) 250 to 500 square metres.	-	2
(iv) 501 to 1,000 square metres and less than 7,000 cubic metres.	G	1 & 2

Enclosed carpark (non-open structure)

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.
 B – water spray system.
 C – foam system.
 D – gaseous system.
 E – Deleted.
 F – other automatic extinguishing systems.
 G – hose reel system.
 H – pressurised hydrant system.

Occupancy hazard	Extinguishing system Note 2	Fire alarm system Note 3
(v) 1,001 square metres to 10,000 square metres and 7,001 cubic metres to 70,000 cubic metres.	A & G	2 & 6
(vi) Exceeding 10,000 square metres or of exceeding 70,000 cubic metres.	A, G & H	2 & 6
(b) Two storeys and over (total floor area).		
(i) Less than 1,000 square metres or less than 7,000 cubic metres.	G	1 & 2
(ii) Exceeding 1,000 square metres or of exceeding 7,000 cubic metres.	A & G	2 & 6
<p>Open Structure.</p> <p>(1) A total surface area of an opening shall not be less than 40 percent of the total perimeter wall area enclosing a floor or compartment.</p> <p>(2) The opening shall be shaped and located in such a way that the total length in a plan of the opening shall not be less than 50 percent of the perimeter of the floor or compartment.</p> <p>Open Corridor.</p> <p>(1) A total surface area of an opening shall not be less than 25 percent of the total perimeter wall area enclosing a balcony.</p> <p>(2) The opening shall be shaped and located in such a way that total length in a plan of the opening shall not be less than 50 percent of the perimeter of the balcony.</p> <p>Open Sided.</p> <p>(1) All sides shall be opened.</p> <p>"Opening" shall be opened to outside, unenclosed space or permitted air well. Any individual opening consists of a surface area less than 600 square millimetres or area width of an opening less than 25 millimetres shall not be regarded as the opening for this purpose.</p>		

Definition:
Open Structures
Open Corridors
Open Sided

1. automatic fire detection system.
2. manual electric fire alarm system.
3. signal indicator alarm system.
4. public address system.
5. fireman intercom system or fire command centre.
6. automatic fire monitoring system.
7. self-contained smoke detector.

A – automatic sprinkler system.
B – water spray system.
C – foam system.
D – gaseous system.
E – Deleted.
F – other automatic extinguishing systems.
G – hose reel system.
H – pressurised hydrant system.

OPEN STRUCTURES

OPEN CORRIDORS

UBBL 2021 10th Schedule

OPEN STRUCTURE

- (1) Total surface **area** of openings is to be no less than **40%** of the total perimeter wall area enclosing the floor or compartment
- (2) The opening is to be shaped and located in such a way that total **length** in plan of the opening(s) is to be no less than **50%** of the perimeter of the floor or compartment

“ Openings” is to be opened to outside, unenclosed space or **permitted airwells**. Any individual opening having a surface area less than 600mm² or area width of opening is less than 25mm is not to be regarded as an opening for this purpose.

OPEN STRUCTURES

Example:

Total perimeter length $(25\text{m} + 50\text{m}) \times 2 = 150\text{m}$

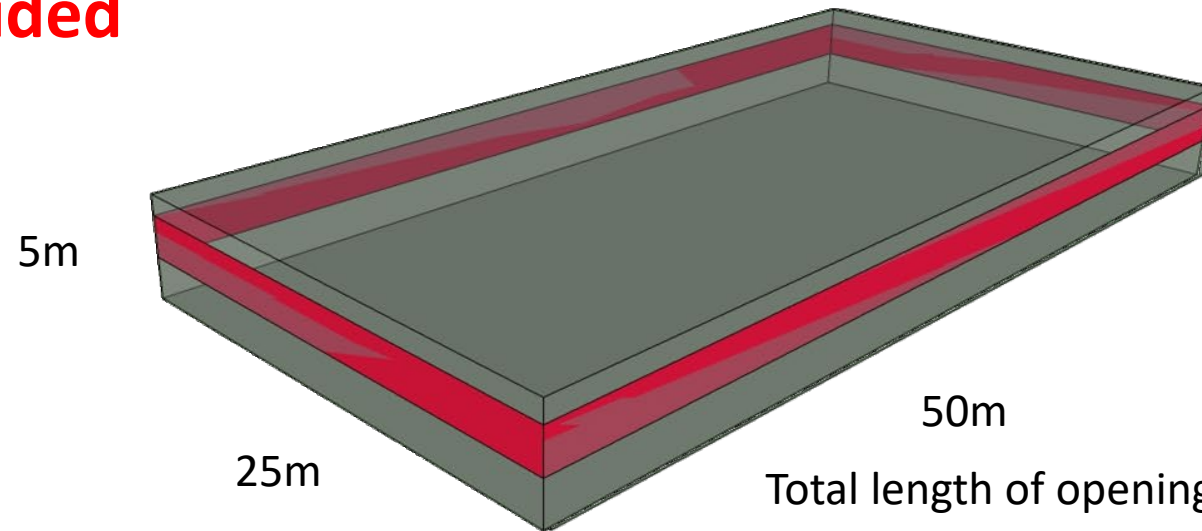
minimum 50% = 75m

Total perimeter wall area $150\text{m} \times 5\text{m} = 750\text{m}^2$

minimum 40% = 300m²

This is also defined as

open sided



Total length of openings : $25\text{m} + 50\text{m} = 75\text{m}$

Total area of openings : **$75\text{m} \times 4\text{m} = 300\text{m}^2$**

Total length of openings : $50\text{m} + 50\text{m} = 100\text{m}$

Total area of openings : **$100\text{m} \times 3\text{m} = 300\text{m}^2$**

Total length of openings $(25\text{m} + 50\text{m}) \times 2 = 150\text{m}$

Total area of openings : **$150\text{m} \times 2\text{m} = 300\text{m}^2$**

OPEN CORRIDOR

(1) Total surface **area** of opening(s) is to be no less than **25%** of the total perimeter wall area enclosing the balcony (corridor)

(2) The opening(s) is to be shaped and located in such a way that total **length** in plan of the opening(s) is to be no less than **50%** of the perimeter of the floor or compartment

“ Openings” is to be opened to outside, unenclosed space or **permitted airwells**. Any individual opening having a surface area less than 600mm² or area width of opening is less than 25mm is not to be regarded as an opening for this purpose.

OPEN CORRIDOR

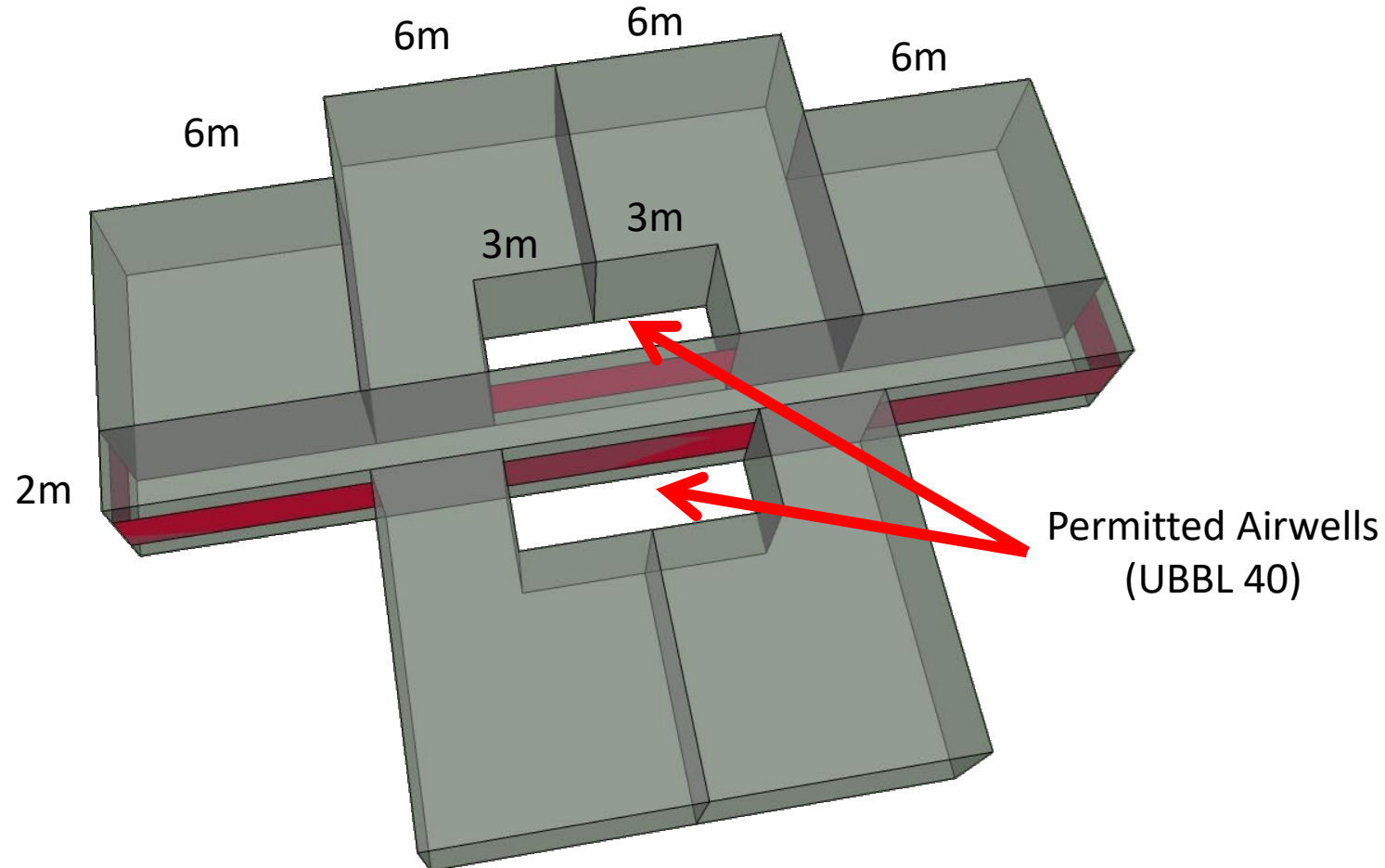
Example (corridor)

Total perimeter length $(24\text{m} + 2\text{m}) \times 2 = 52\text{m}$

minimum 50% = 26m

Total perimeter wall area $52\text{m} \times 3\text{m} = 156\text{m}^2$

minimum 25% = 39m²



Total length of openings $24\text{m} + 2\text{m} + 2\text{m} = 28\text{m}$

Total area of openings : $28\text{m} \times 1.5\text{m} = 42\text{m}^2$

10th SCHEDULE

VI. Factory		
1. Single storey detached unit, semi-detached unit or terrace unit. (a) Less than 750 square metres. (b) 750 to 1,000 square metres. (c) 1,001 to 2,000 square metres. (d) Exceeding 2,000 square metres.	- G G A & G	- 2 1 & 2 2, 4 & 6
2. Open structure design. (a) Steel fabrication work or metal fabrication work, engineering work or metal work or similar low fire risk establishment. (b) Sawmill. (c) Steel mill.	- G & H G & H	- 2 2
3. Two storeys and above and in the types of detached unit, semi-detached unit or terrace unit. Each floor is built as a separate compartment. (a) Less than 500 square metres per floor. (b) 500 to 1,000 square metres per floor. (c) Exceeding 1,000 square metres per floor.	- G A & G	2 1 & 2 2, 5 & 6

10th SCHEDULE

VII. Storage and general

1. Car park.

(a) Open structure car park above the ground.

(i) Single storey or less than 750 square metres.

(ii) Two storeys and above or of exceeding 750 square metres per floor.

-

-

G

2

(b) Enclosed car park or underground car park.

(i) Less than 2,000 square metres (total floor area).

G

2

(ii) Exceeding 2,000 square metres (total floor area).

A & G

2, 4, 5 & 6

(c) Automated multilevel car park.

A & G

2, 5 & 6

10th SCHEDULE

II. Institutional		
1. Education occupancy.		
(a) Building used for the instructional purpose only.		
(i) Open corridor design.		
(aa) Two storeys and below.	-	-
(ab) Three to five storeys.	G	2
(ac) Six storeys and above.	G	1 & 2
(ii) Other designs.		
(aa) Less than 500 square metres per floor.	-	-
(ab) 500 to 1,000 square metres per floor.	G	2
(ac) 1,001 to 2,000 square metres per floor or 18 metres to 30 metres in height.	G	1 & 2
(ad) Exceeding 2,000 square metres per floor or above 30 metres in height.	A & G	2, 4, 5 & 6
(b) Canteen detached or kitchen detached.	-	-

SMOKE CONTROL

UBBL 2021

249 Smoke control

“a smoke control system, whether natural or mechanical, in accordance with **MS 1780** shall be provided where.....

MS 1780: 2017

8 Applications

8.1 Basement smoke control system

8.1.1 Smoke vents (are permitted) for areas below 1,000m²

8.1.2 Smoke control systems for areas exceeding 1,000m²

8.2 Smoke control systems for above ground premises

**8.2.1 Smoke control systems for areas exceeding 1,000m²
or volume exceeding 7,000m³**

UBBL 2021 cl 249 (b) : any compartment.....exceeds 2,000m²....

226A Hose reels

10th schedule and MS1489



IBU PEJABAT
JABATAN BOMBA DAN PENYELAMAT MALAYSIA
Fire And Rescue Department of Malaysia
Lebuh Wawasan, Presint 7
62250 Putrajaya
MALAYSIA

Telefon : 603-8892 7600
Faks : 603-88927977/78
Portal Rasmi : www.bomba.gov.my
E-mel : bkkjbpm@bomba.gov.my



Ruj. Tuan :
Ruj. Kami : JBPM.IP.BKK.700-2/6/1 Jld. 11 (7)
Tarikh : 15 Ogos 2022

SENARAI EDARAN

YS Dato'/Tuan/Puan,

PENJELASAN BERKENAAN PENEMPATAN (*SITING*) HOSE REEL BAGI TUJUAN KELULUSAN PELAN BANGUNAN DAN PELAN MEKANIKAL DAN ELEKTRIKAL (M&E)

Adalah saya dengan hormatnya merujuk kepada perkara di atas adalah berkaitan.

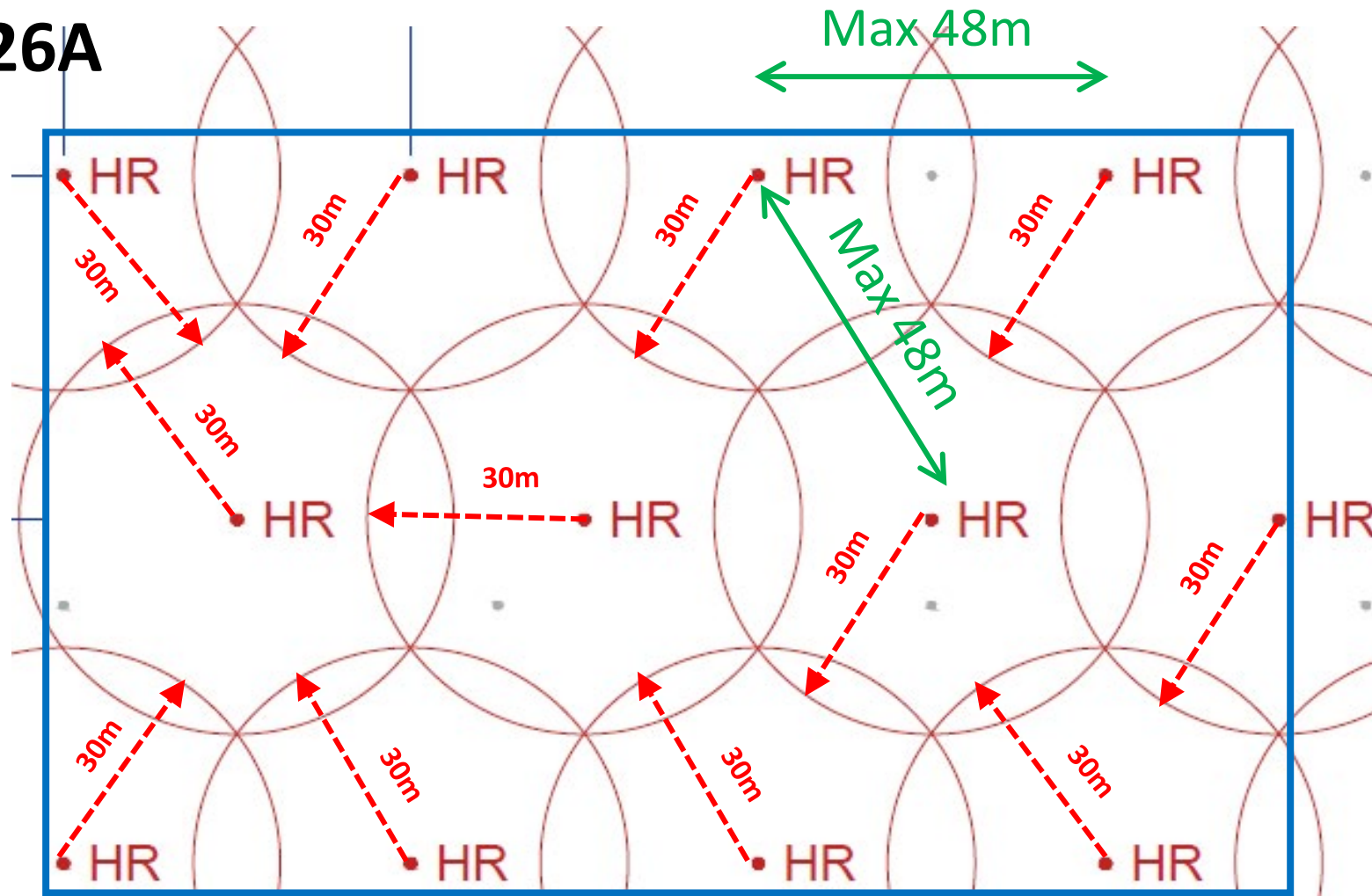
2. Sukacita dimaklumkan bahawa Majlis Perundingan Jabatan Bomba dan Penyelamat Malaysia bersama Badan Profesional telah diadakan pada 7 Mac 2022. Di dalam majlis tersebut sebanyak 18 usul telah diangkat dan dibincangkan termasuklah usul berkaitan penempatan (*siting*) hose reel.

3. Hasil daripada perbincangan tersebut, penetapan dan penjelasan berkenaan penempatan (*siting*) hose reel adalah seperti berikut:

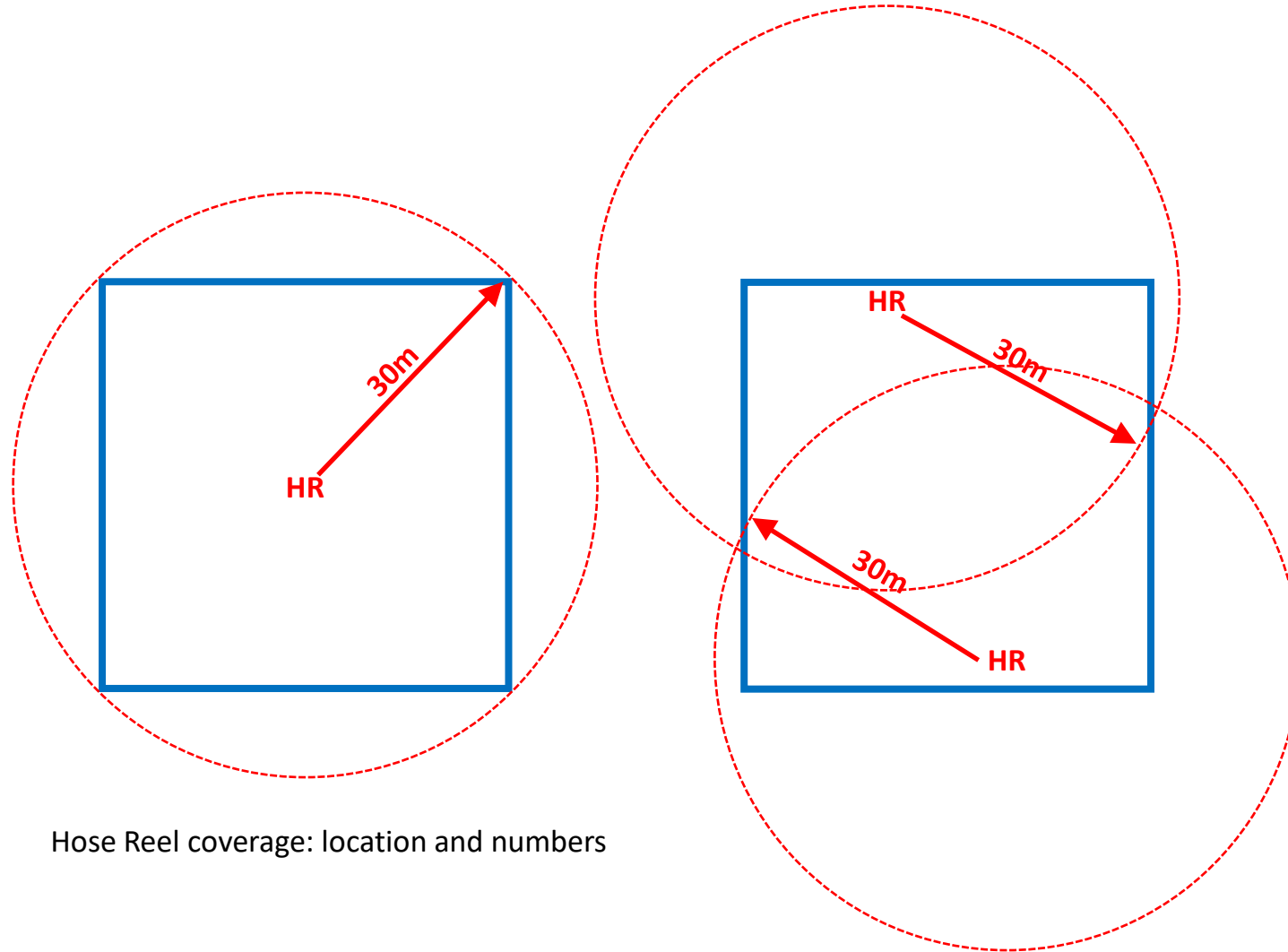
- 3.1 Secara umumnya penempatan (*siting*) hose reel hendaklah dirancang berdasarkan liputan radius atau **radial coverage** hose reel yang boleh mencapai keseluruhan pelan lantai sesuatu bangunan iaitu dengan mengambil kira halangan oleh apa-apa kelengkapan atau peralatan, dinding dalaman, *storage racking* dan sebagainya.
- 3.2 Bagi ruangan terbuka seperti tempat letak kereta, jarak maksimum dari hose reel ke hose reel adalah tidak melebihi 48 meter. Ini kerana jarak maksimum ini boleh mencapai liputan radius atau **radial coverage** untuk keseluruhan pelan lantai sesuatu bangunan berdasarkan MS 1489-1. Ilustrasi jarak dan liputan hose reel bagi ruangan terbuka adalah seperti di Lampiran 1.
- 3.3 Bagi rekabentuk *open plan concept*, jarak di antara hose reel ke hose reel adalah berdasarkan 2/3 daripada jarak maksimum tersebut.

- 3.1 Secara umumnya penempatan (*siting*) *hose reel* hendaklah dirancang berdasarkan **liputan radius atau *radial coverage* *hose reel*** yang boleh mencapai keseluruhan pelan lantai sesuatu bangunan iaitu dengan mengambil kira halangan oleh apa-apa kelengkapan atau peralatan, dinding dalaman, *storage racking* dan sebagainya.
- 3.2 Bagi ruangan terbuka seperti tempat letak kereta, **jarak maksimum dari *hose reel* ke *hose reel* adalah tidak melebihi 48 meter**. Ini kerana jarak maksimum ini boleh mencapai **liputan radius atau *radial coverage*** untuk keseluruhan pelan lantai sesuatu bangunan berdasarkan MS 1489-1. Ilustrasi jarak dan liputan *hose reel* bagi ruangan terbuka adalah seperti di **Lampiran 1**.
- 3.3 Bagi rekabentuk *open plan concept*, jarak di antara *hose reel* ke *hose reel* adalah berdasarkan **2/3 daripada jarak maksimum tersebut**.

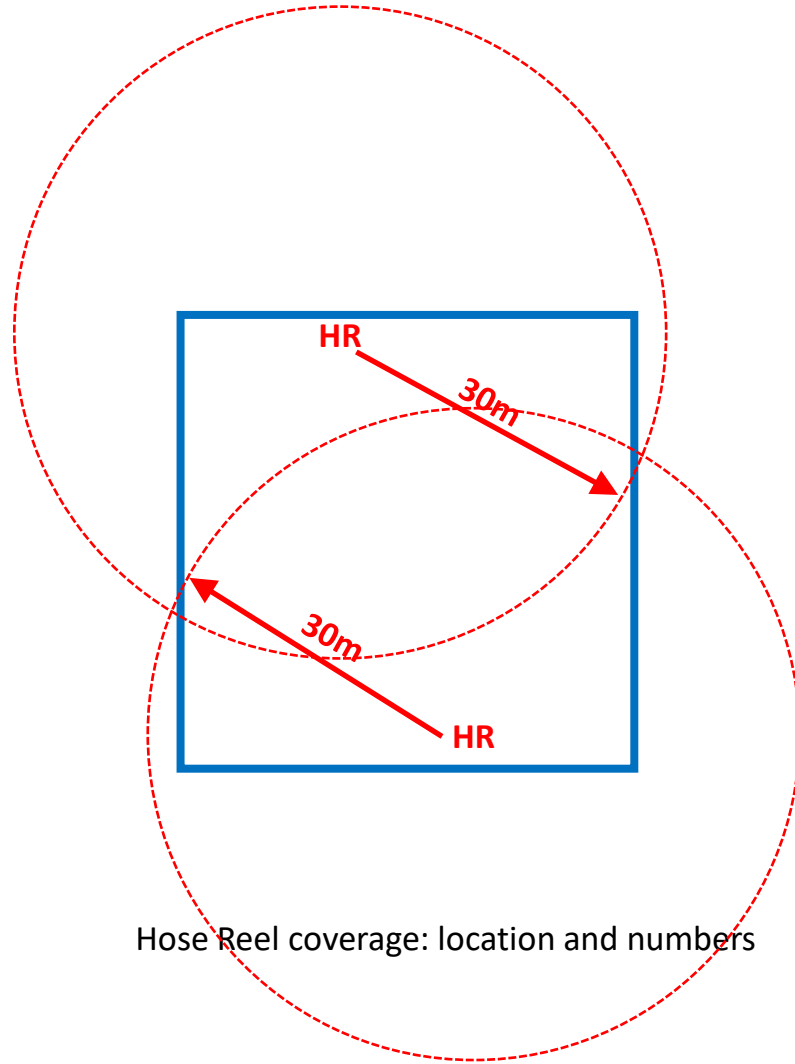
226A



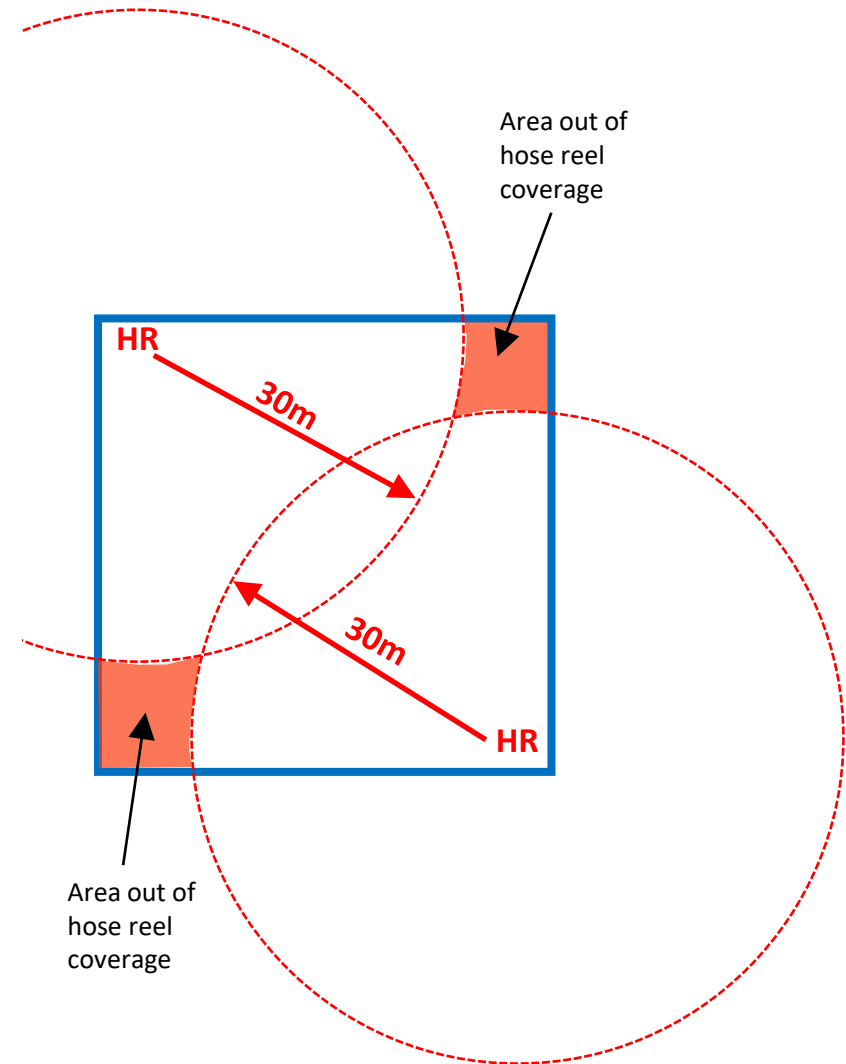
Hose Reel 30m radial coverage, maximum 48m point to point
For '**ruangan terbuka**', for example carpark floor

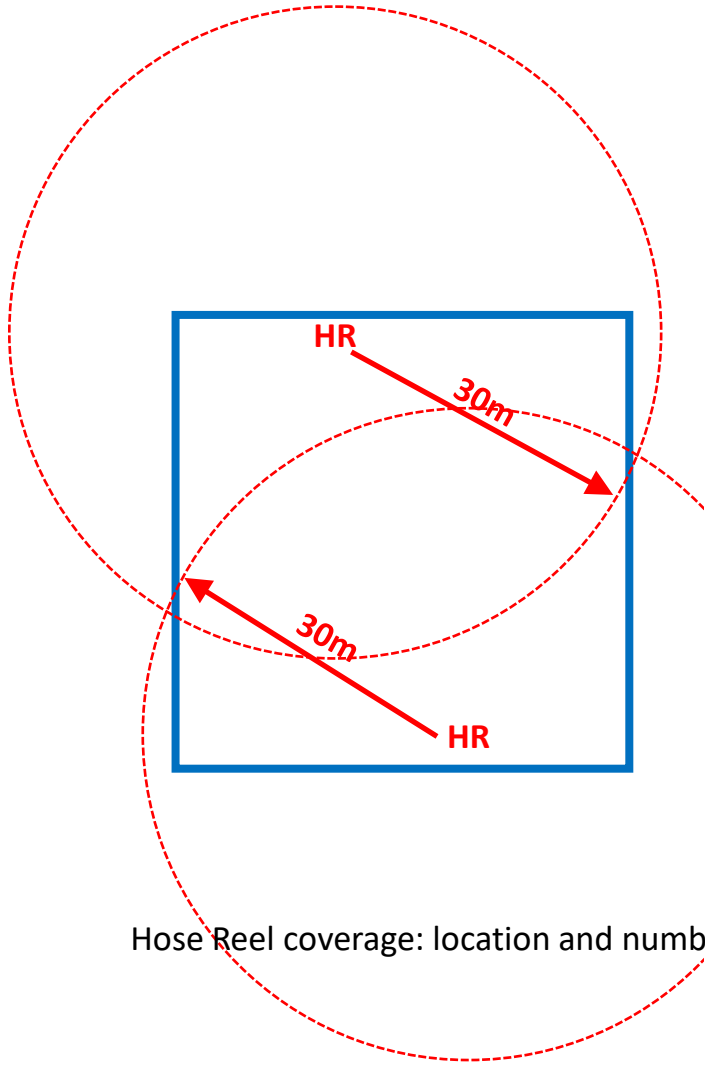


Hose Reel coverage: location and numbers

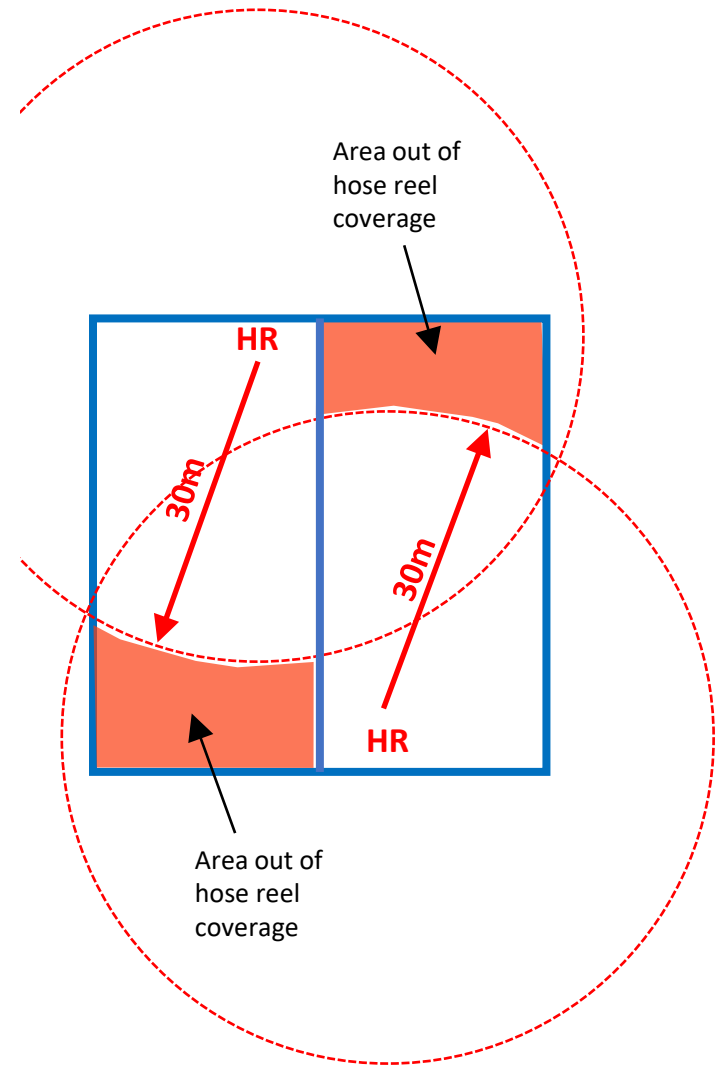


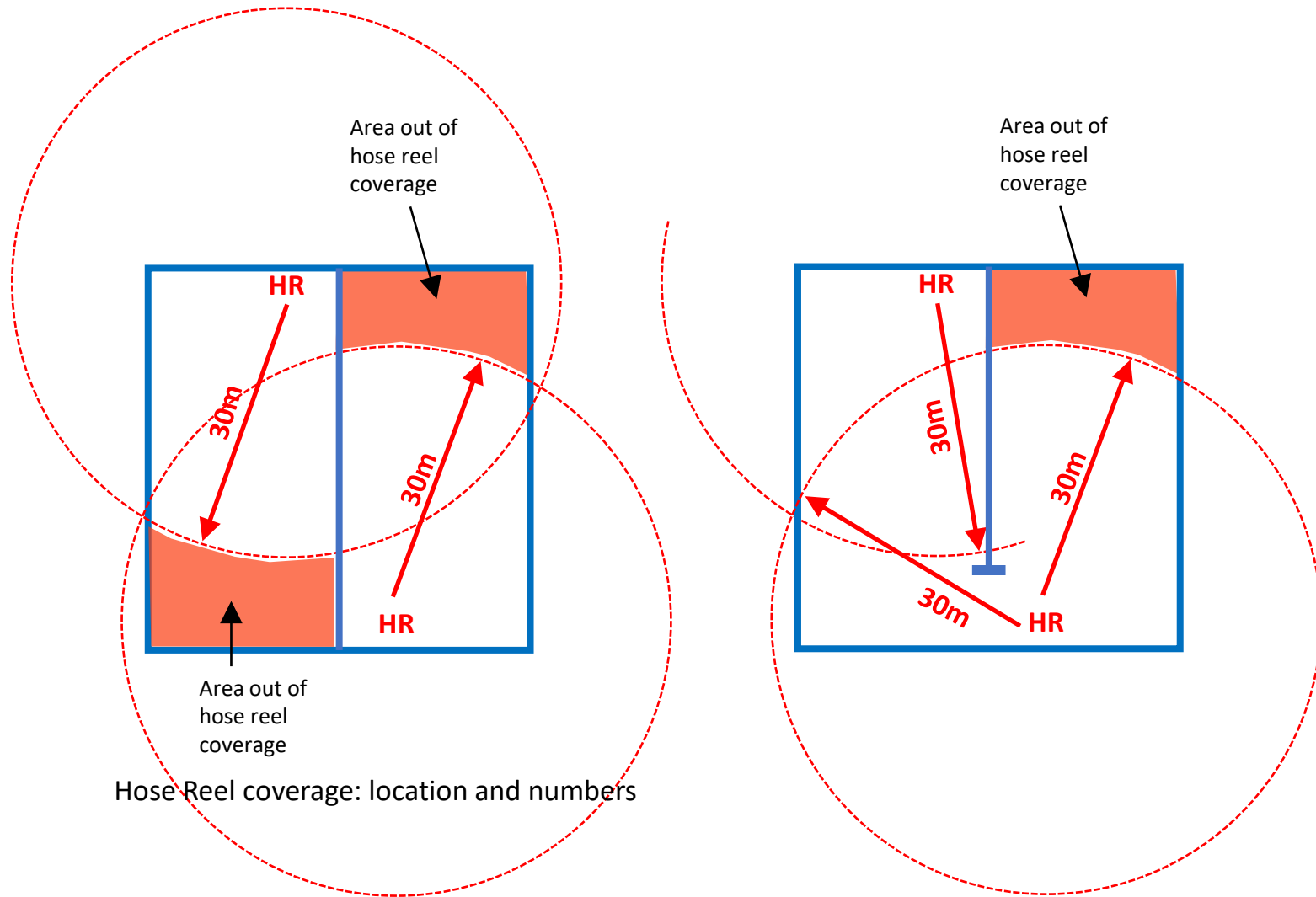
Hose Reel coverage: location and numbers





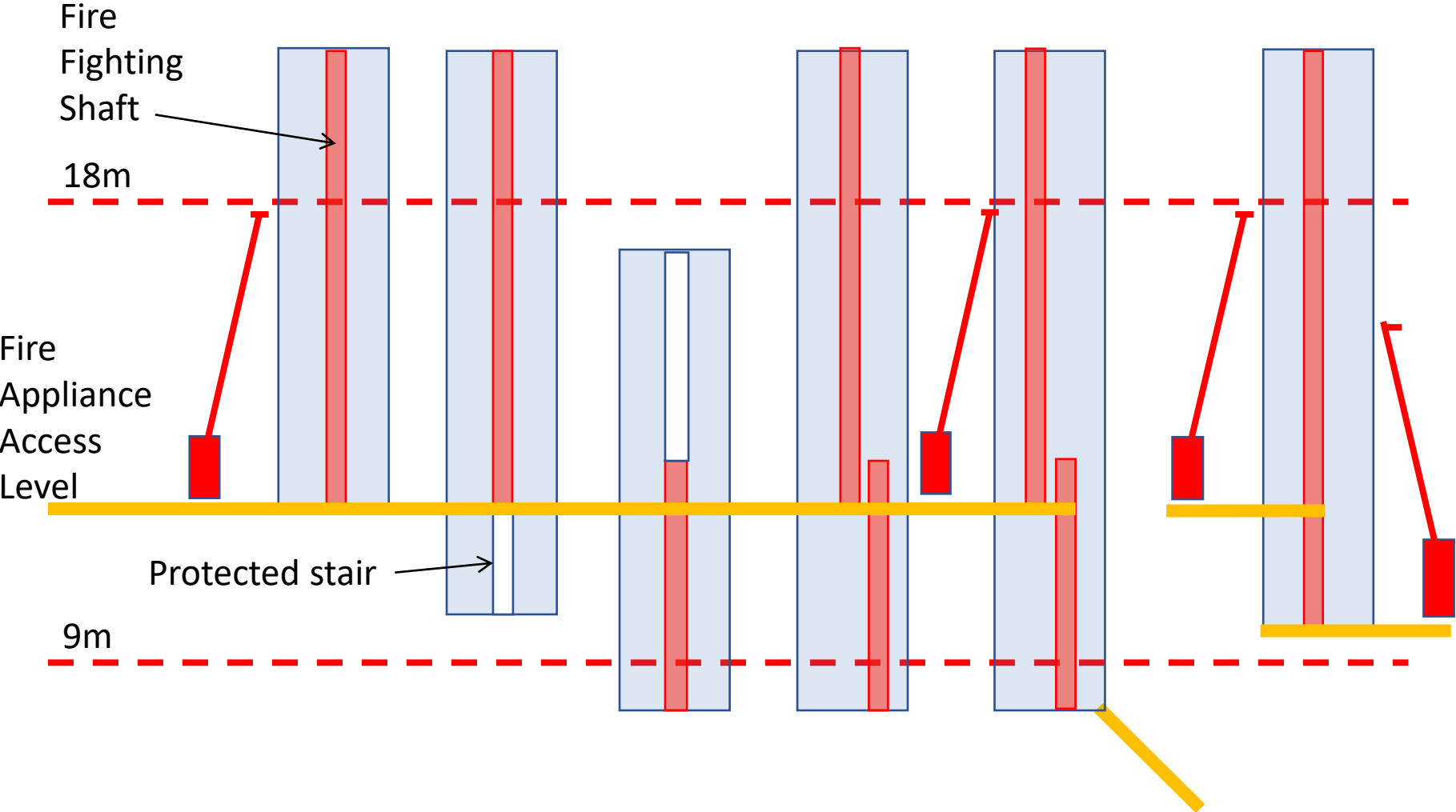
Hose Reel coverage: location and numbers





Hose Reel coverage: location and numbers

UBBL 2021 197A FIRE FIGHTING SHAFTS



FIRE FIGHTING SHAFTS : LOCATION

Radial distance

Risers (UBBL 230, 231)

All parts of floor within **45m** from a landing valve

Fire Fighting Access Lobbies (UBBL 197A)

Level distance from furthestmost point does not exceed **45m**

Route distance

Fire Lifts (UBBL 197A)

Not more than **60m** travel distance from furthestmost point

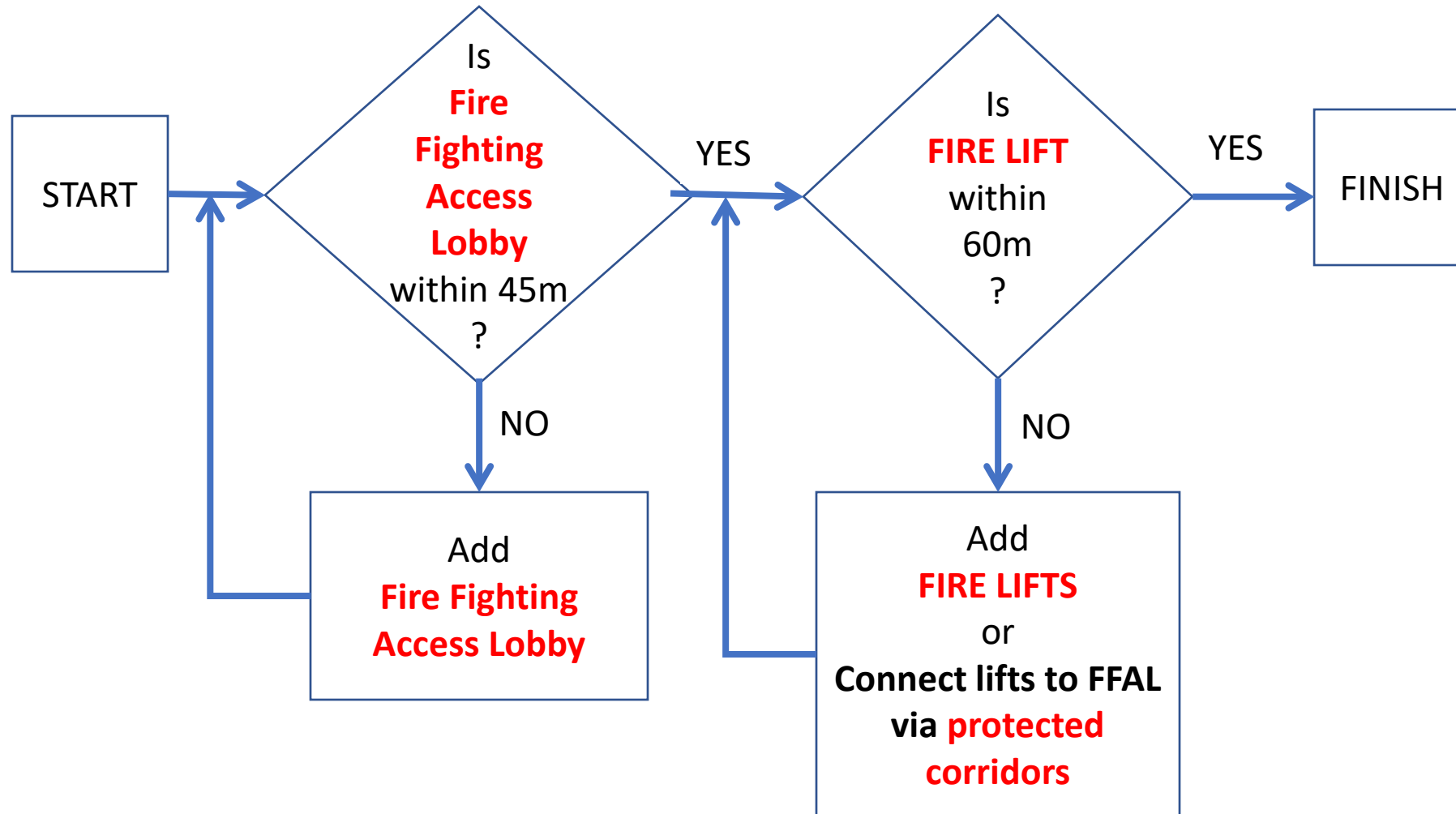
Fire Fighting Shafts (MS1183 21.2.3)

With Fire Lift, no more than **60m** from fire mains outlet measured on route in laying a hose

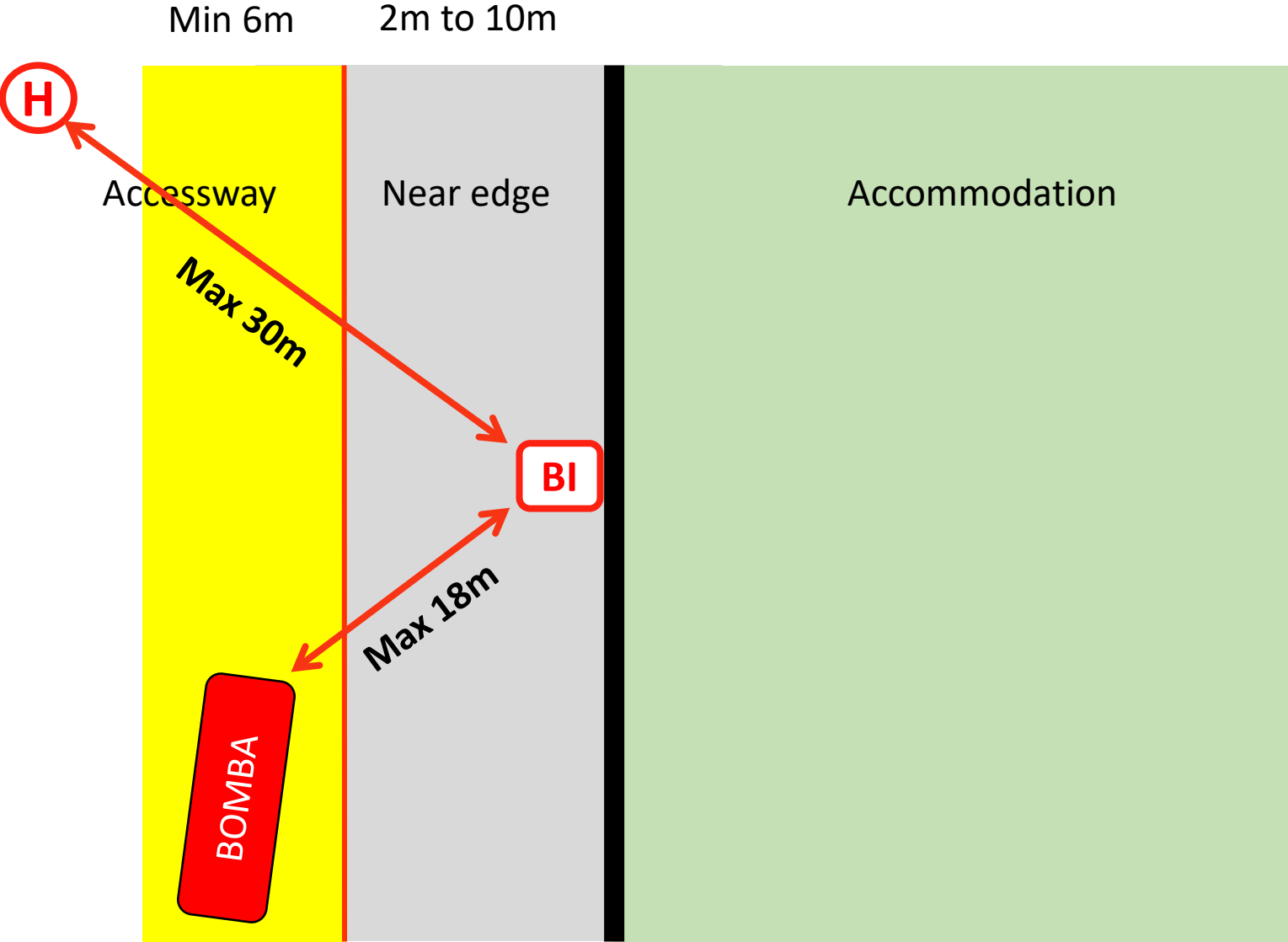
AND

Without Fire Lift, no more than **45m** from fire mains outlet measured on route in laying a hose

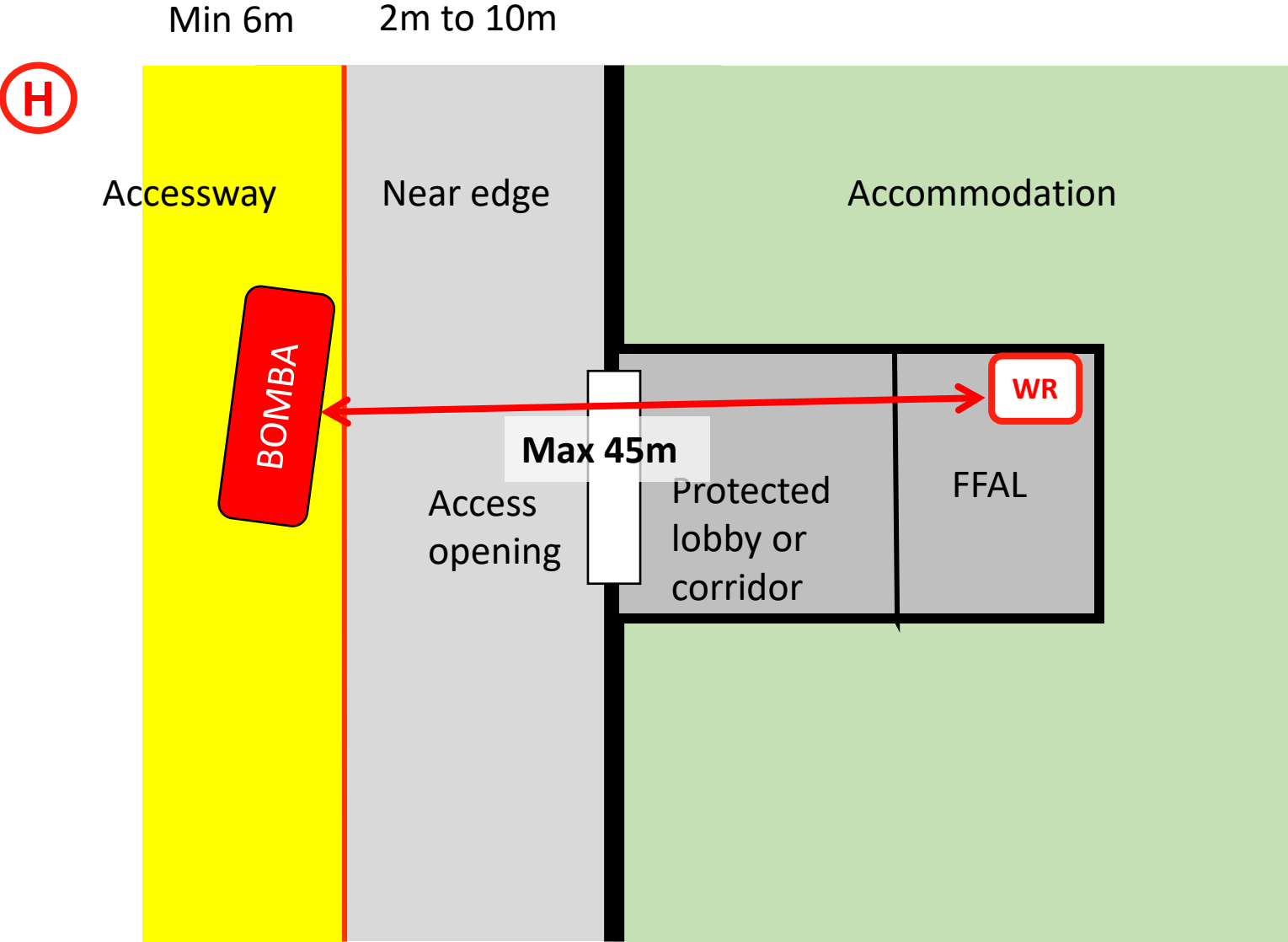
FIRE FIGHTING SHAFTS : LOCATION check with ROUTE DISTANCE



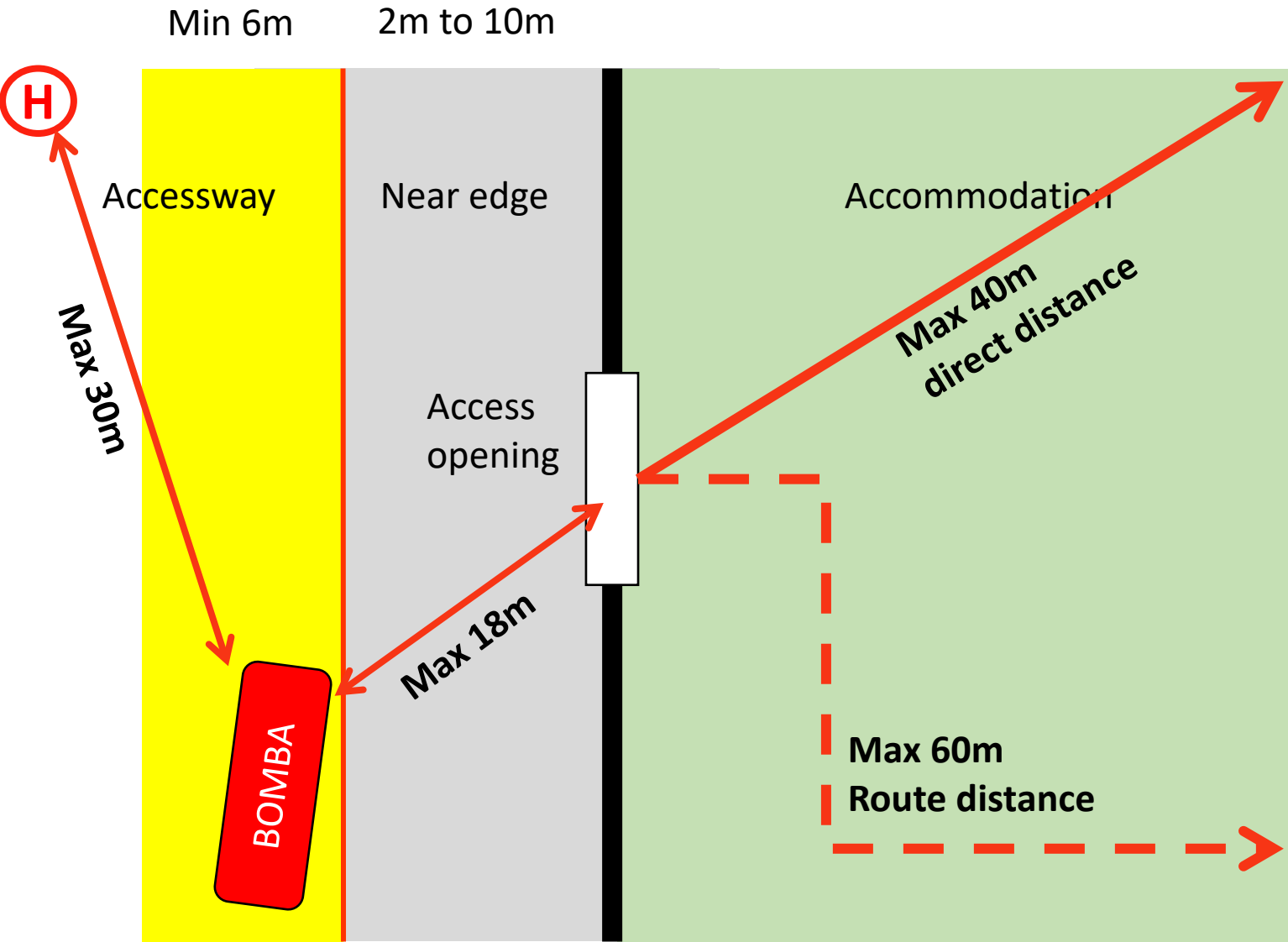
FIRE APPLIANCE ACCESS : to Breaching Inlets



FIRE APPLIANCE ACCESS : to Access Openings



FIRE APPLIANCE ACCESS to Access Openings without Fire Mains



Thank you