1. Fire Services Part 1

1.2 Fire services regulations and codes

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- Code of practice FSI
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Fire safety legislation in HK

- Two major fire legislations in Hong Kong:
  - Fire Services Ordinance (Cap 95)
  - Buildings Ordinance (Cap 123)
- Other related ordinances include:
  - Waterworks Ordinance (Cap 102) and Waterworks Regulations (Cap 102A)
  - Fire Safety (Buildings) Ordinance (Cap 572)
  - Fire Safety (Commercial Premises) Ordinance (Cap 502)
  - Fire Safety (Industrial Buildings) Ordinance (Cap 636)

Fire safety legislation in HK

- Fire Services Ordinance (Cap 95)
  - Duties & powers of Fire Services Dept. (FSD)
  - Prevention of fire hazards
  - Registration of fire service installation contractors
  - Fire service installations or equipment
- Buildings Ordinance (Cap 123)
  - Building & fire services installation plans submission requirements as well as fire resisting construction, means of escape (MoE), and means of access for fire fighting (MoA), enforced by the Buildings Department (BD)

Fire safety legislation in HK

- Regulations under Fire Services Ordinance (Cap 95)
  - FS (Installation Contractors) Regulations (Cap 95A)
  - FS (Installations and Equipment) Regulations (Cap 95B)
  - FSD (Reports and Certificates) Regulations (Cap 95C)
  - FSD (Welfare Fund) Regulations (all repealed) (Cap 95D)
  - FSD (Welfare Fund) Regulation (Cap 95E)
  - FS (Fire Hazard Abatement) Regulation (Cap 95F)
- Ordinances on special premises
  - Dangerous Goods Ordinance (Cap 295)
  - Place of Entertainment Ordinance (Cap 172)
  - Karaoke Establishments Ordinance (Cap 573)

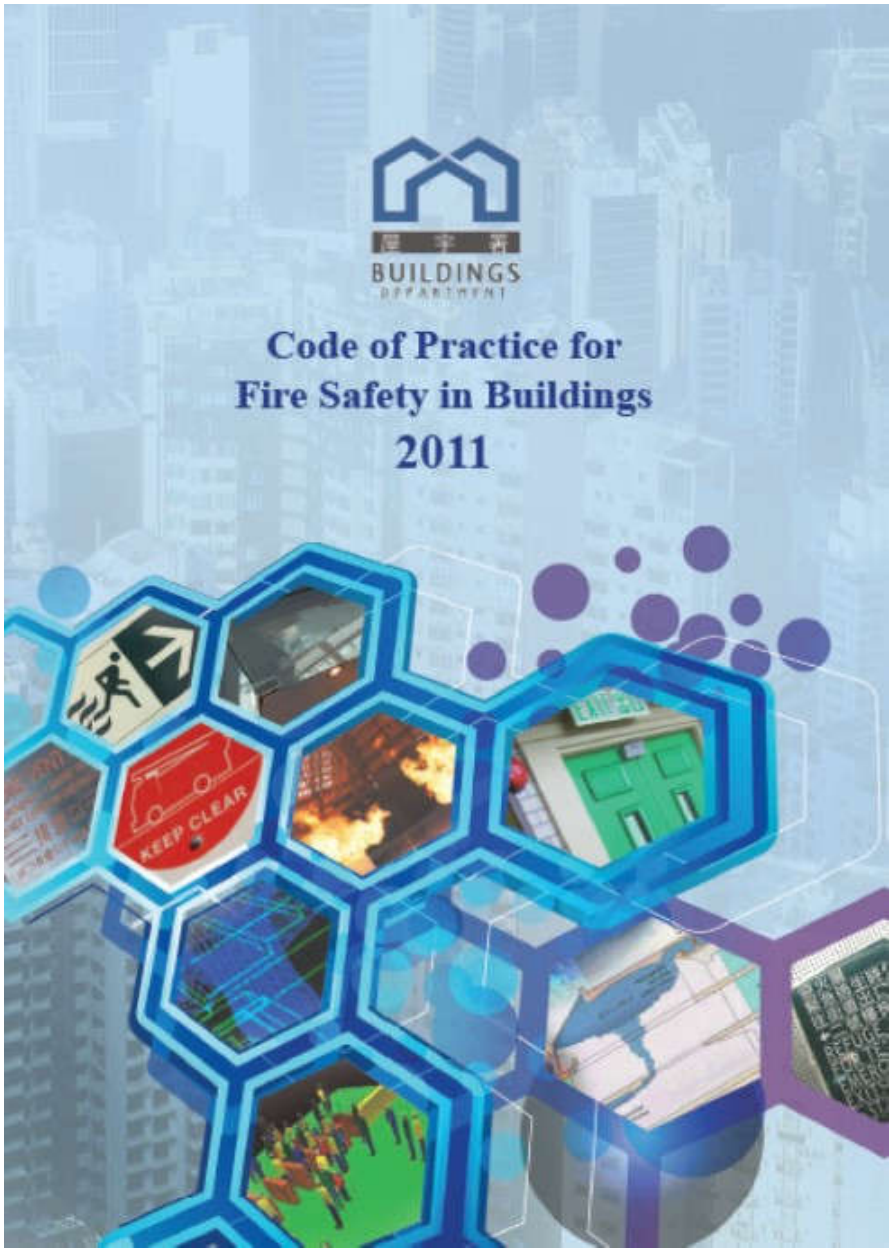
Fire safety legislation in HK

- Relevant technical codes & documents
  - Codes/Rules applied based on the ordinances, e.g.
    - Code of Practice for Fire Safety in Buildings 2011 (Buildings Department, BD) [CoP-FSB]
    - Code of Practice for Minimum Fire Services Installations and Equipment and Inspection and Testing of Installation and Equipment (Fire Service Department, FSD) [CoP-FSI]
  - Related practice notes, circular letters and notices issued from time to time by BD and FSD

Fire safety legislation in HK

- Fire Service Department (FSD)
  - List of FSD Circular Letters
    https://www.hkfsd.gov.hk/eng/fire_protection/notices/circular.html
  - Fire Protection Notice & Technical Guidance
    https://www.hkfsd.gov.hk/eng/fire_protection/notices/
- Buildings Department (BD)
  - BD codes, design manuals & guidelines
    https://www.bd.gov.hk/en/resources/codes-and-references/codes-and-design-manuals/
  - BD Practice Notes & Circular Letters
    https://www.bd.gov.hk/en/resources/codes-and-references/practice-notes-and-circular-letters/

Codes of practice (CoP) on fire safety in buildings and minimum fire service installations



CODES OF PRACTICE

FOR

MINIMUM FIRE SERVICE INSTALLATIONS

AND EQUIPMENT

AND

INSPECTION, TESTING AND MAINTENANCE OF

INSTALLATIONS AND EQUIPMENT

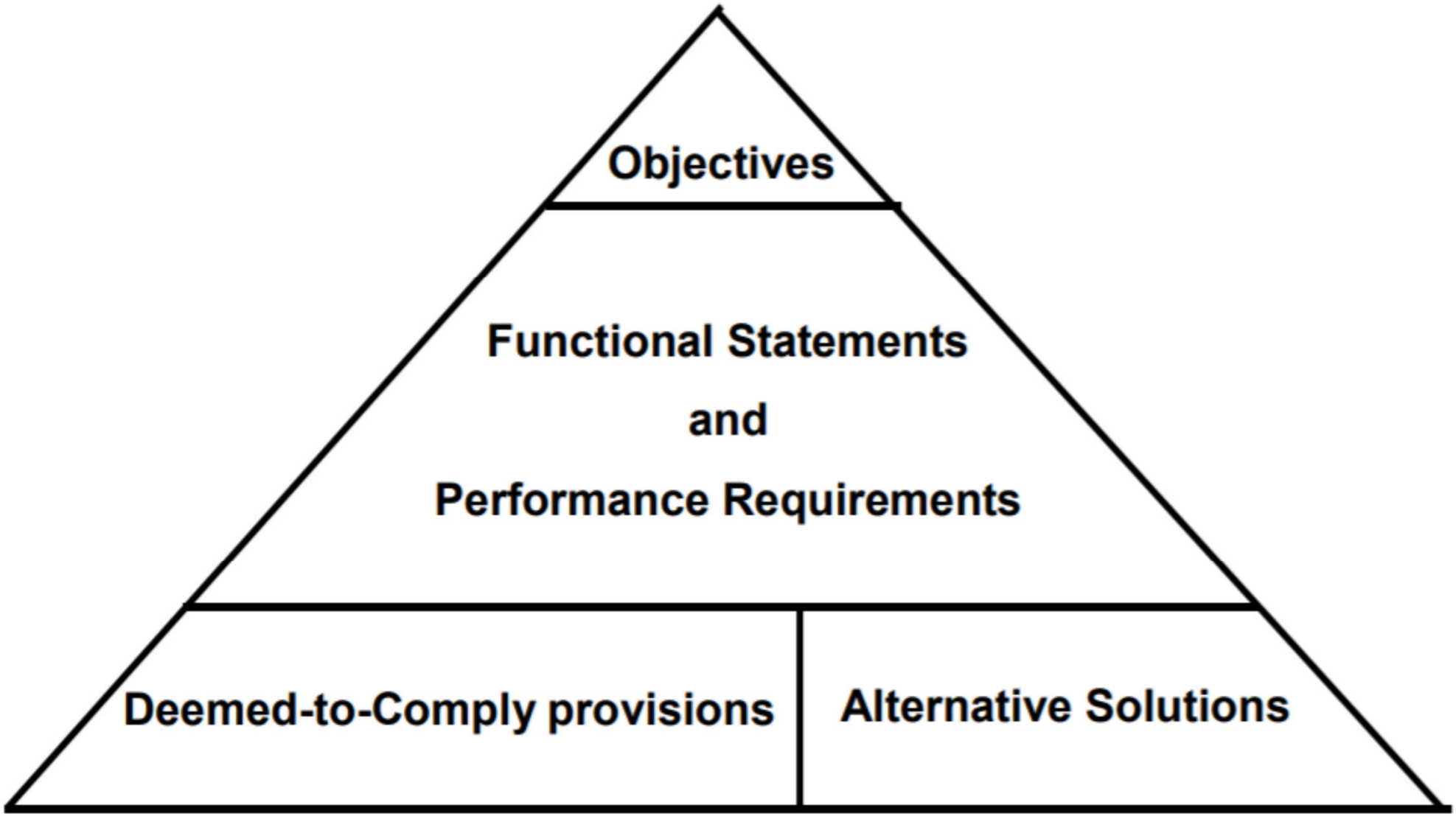
April 2012

Fire safety legislation in HK

- Code of Practice for Fire Safety in Buildings
  - Part A – Introduction
  - Part B – Means of Escape (MOE)
  - Part C – Fire Resisting Construction (FRC)
  - Part D – Means of Access (MOA)
  - Part E – Fire Properties of Building Elements and Components
  - Part F – Fire Safety Management
  - Part G – Guidelines on Fire Engineering

[Source: https://www.bd.gov.hk/en/resources/codes-and-references/codes-and-design-manuals/e_fs2011.html]

Framework for fire safety in buildings



[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

Fire safety objectives

(a) Life Safety

1. protection of life of building occupants
2. minimization of fire spread between fire compartments
3. prevention of building collapse as a result of fire
4. facilitation of firefighting and rescue by fire services personnel

(b) Property Protection

1. minimization of fire spread between fire compartments
2. prevention of building collapse as a result of fire
3. minimization of fire spread between buildings
4. facilitation of firefighting and rescue by fire services personnel

[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

Fire safety legislation in HK

- Types of premises (use classification):
  - 1. Residential
  - 2. Hotel & similar transient accommodation
  - 3. Institutional
  - 4. Commercial
  - 5. Assembly
  - 6. Industrial
  - 7. Carparks
  - 8. Plant rooms & the like

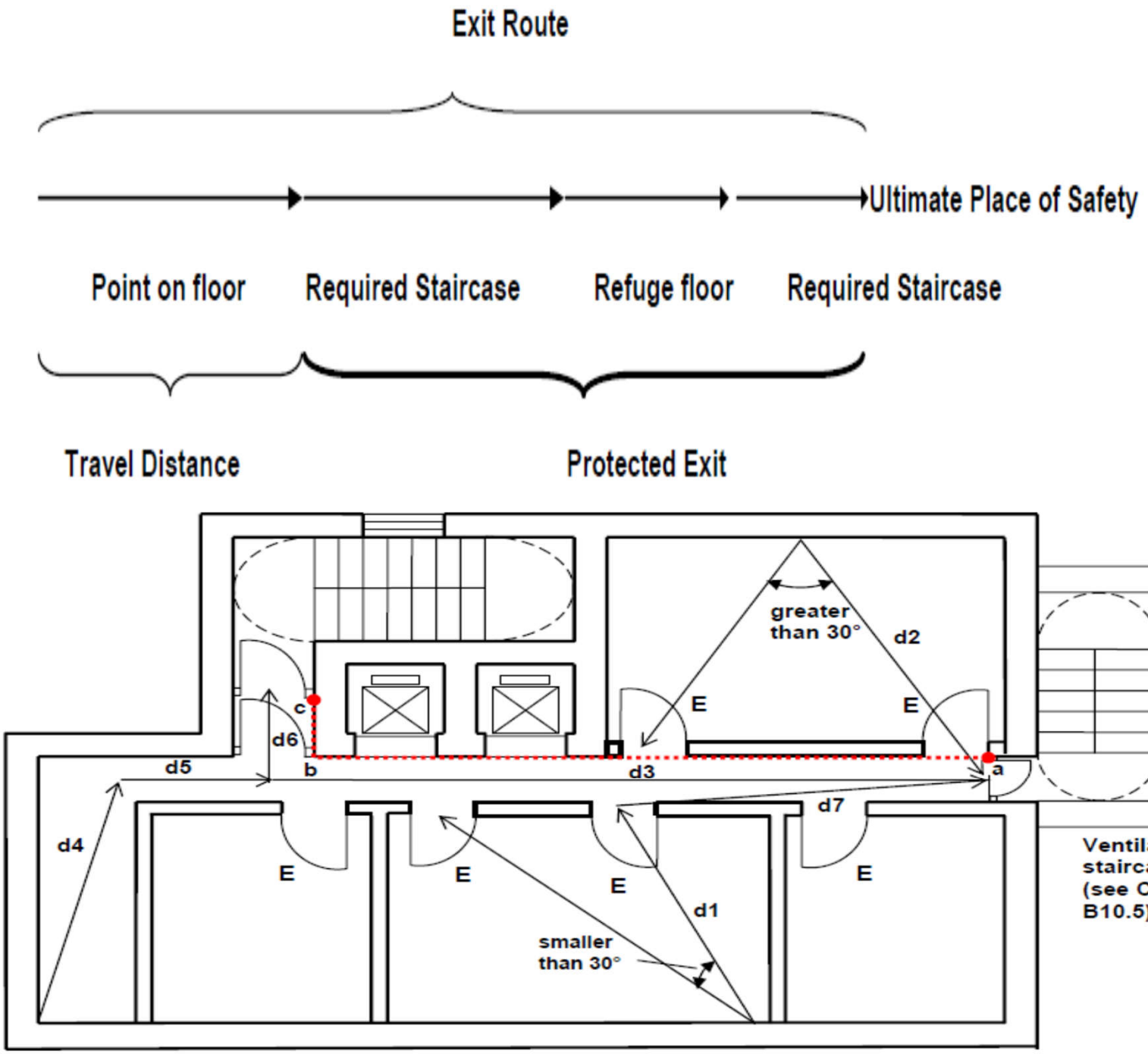
Performance requirements

- 1. Means of escape (MOE)
  - Adequate means of escape to evacuate safely
  - Adequate fire safety provisions to protect evacuating occupants
  - Adequate signs and identification of exits and paths of travel
  - Sufficient warning
  - Good management for orderly evacuation

Performance requirements

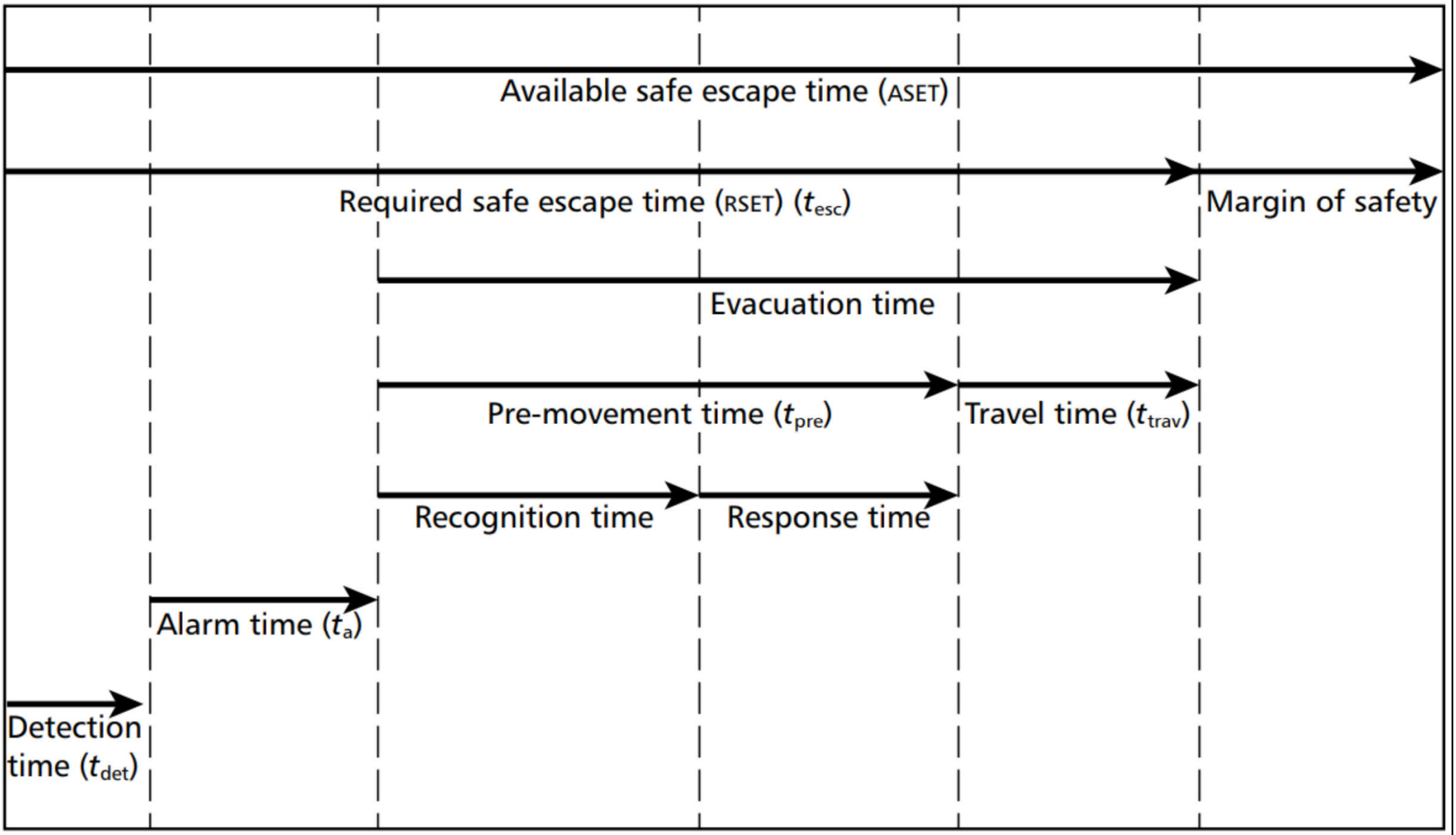
- 1. Means of escape (MOE): examples
  - Routes for occupants to escape in case of fire
    - To provide a clear & direct path to a place of safety
  - General concept is:
    - 1 minute traveling time to a place of safety
    - 5 minute evacuation time (from sprinklered building)
    - 2.5 minute (from non-sprinklered building)
  - Common configuration of an exit route
    - Clear height >=2000mm, corridor width >=1050mm, exit door width >=750mm (depend on population)

Planning for exit route (means of escape) in buildings



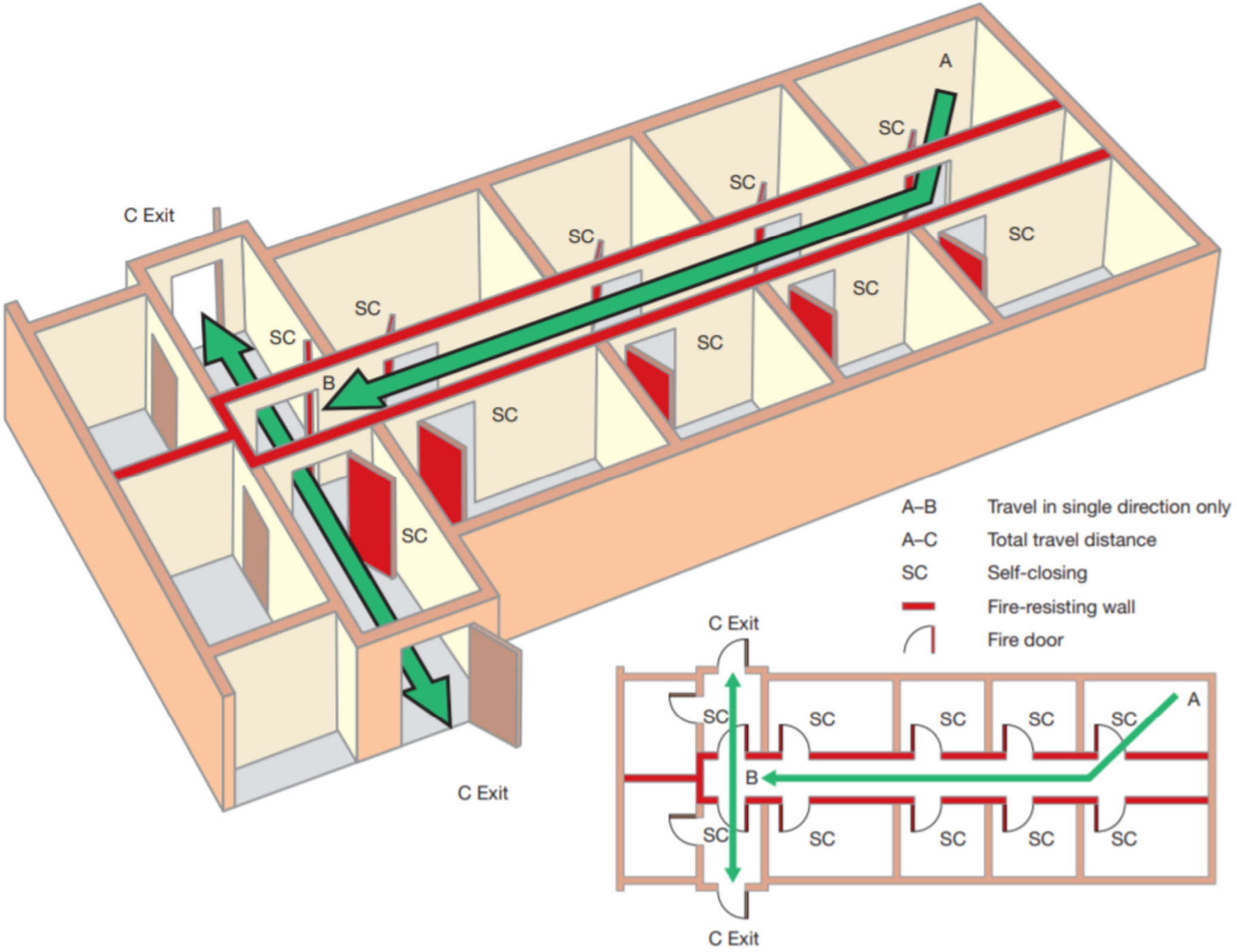
[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

Factors involved in assessing the total escape time



[Source: CIBSE, 2019. *Fire Safety Engineering*, CIBSE Guide E, 4th ed.]

Dead-end condition of escape route with fire-resisting construction



[Image source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/422175/9449_Offices_and_Shops_v2.pdf]

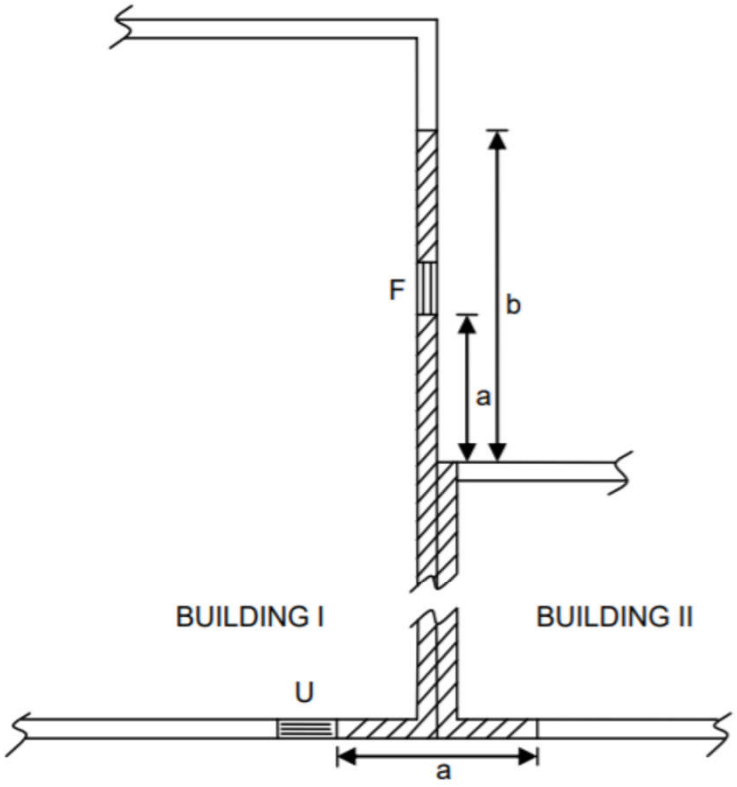
Performance requirements

- 2. Fire resisting construction (FRC)
  - Adequate provisions to inhibit the spread of fire
    - Within a building & between buildings
    - Allow occupants to evacuate safely & fire service intervention
  - Maintain its stability in case of fire
    - Allow sufficient time for occupants to evacuate safely
    - Allow fire service intervention
  - Others
    - Openings to be protected, minimise spread of smoke

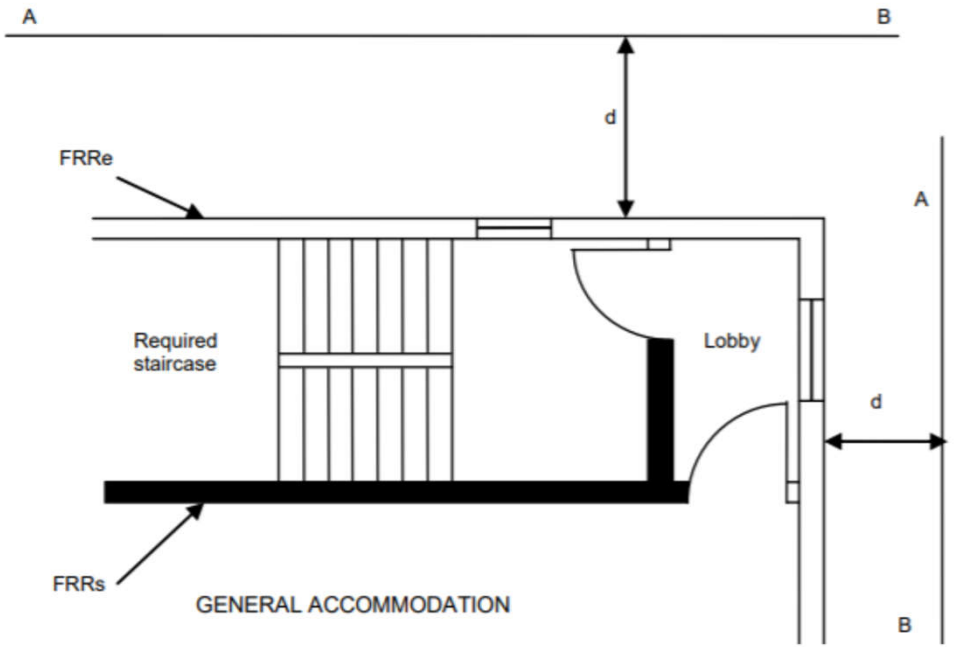
Performance requirements

- 2. Fire resisting construction (FRC): examples
  - Compartmentation inside building constructions and separation between constructions
    - Compartment volume and fire resistance rating
  - Fire resistance rating (FRR): three criteria
    - 1. Stability: ability to carry load without collapsing
    - 2. Integrity: cracks or perforations will not develop to allow passage of smoke and flame from one side to the other side of the element
    - 3. Insulation: ability to prevent the passage of heat from
    - one face to the other face of the element

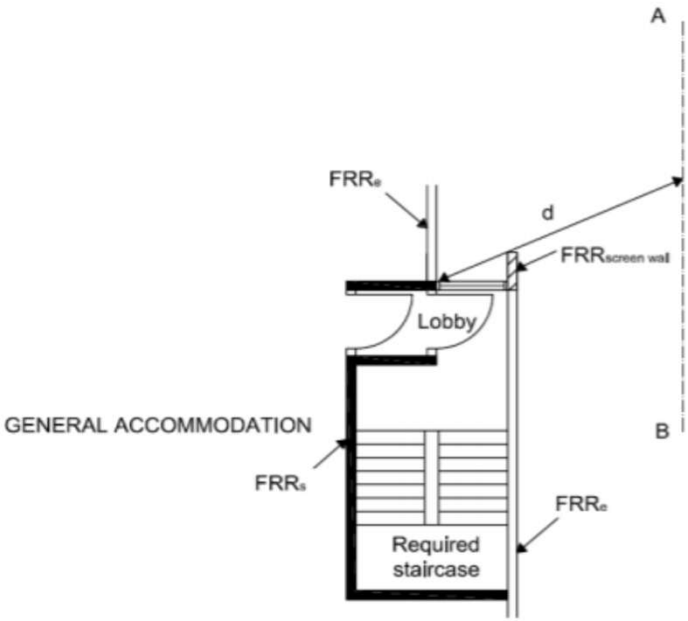
Fire resistance rating (FRR) of external walls and staircases

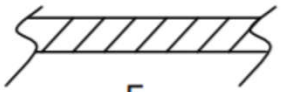


Example (a)



Example (b)





FRR of external walls ≥ FRR of that storey

F	fixed lights having an FRR not less than that of the storey
U	unprotected openings
a	min. 900mm
b	min. 1800mm

[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

A typical example of fire rated door

[Source: https://www.bd.gov.hk/en/safety-inspection/fire-safety/index_fsi_improvement.html]

Performance requirements

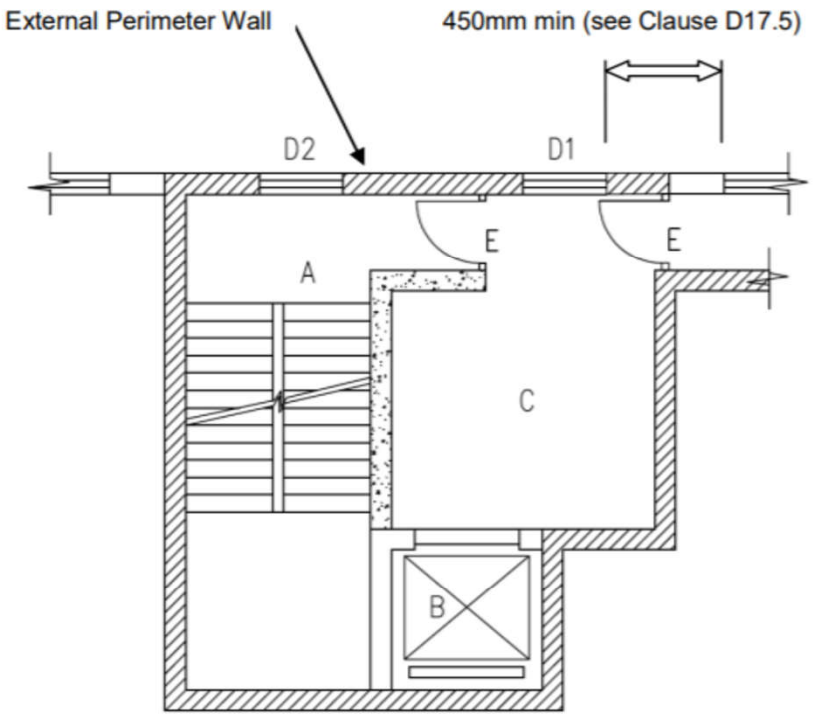
- 3. Means of access (MOA)
  - Adequate access to allow firemen safe and unobstructed access all floors of the building
  - Provide emergency vehicular access for safe and unobstructed access
  - Provisions for access staircases, firemen's lifts

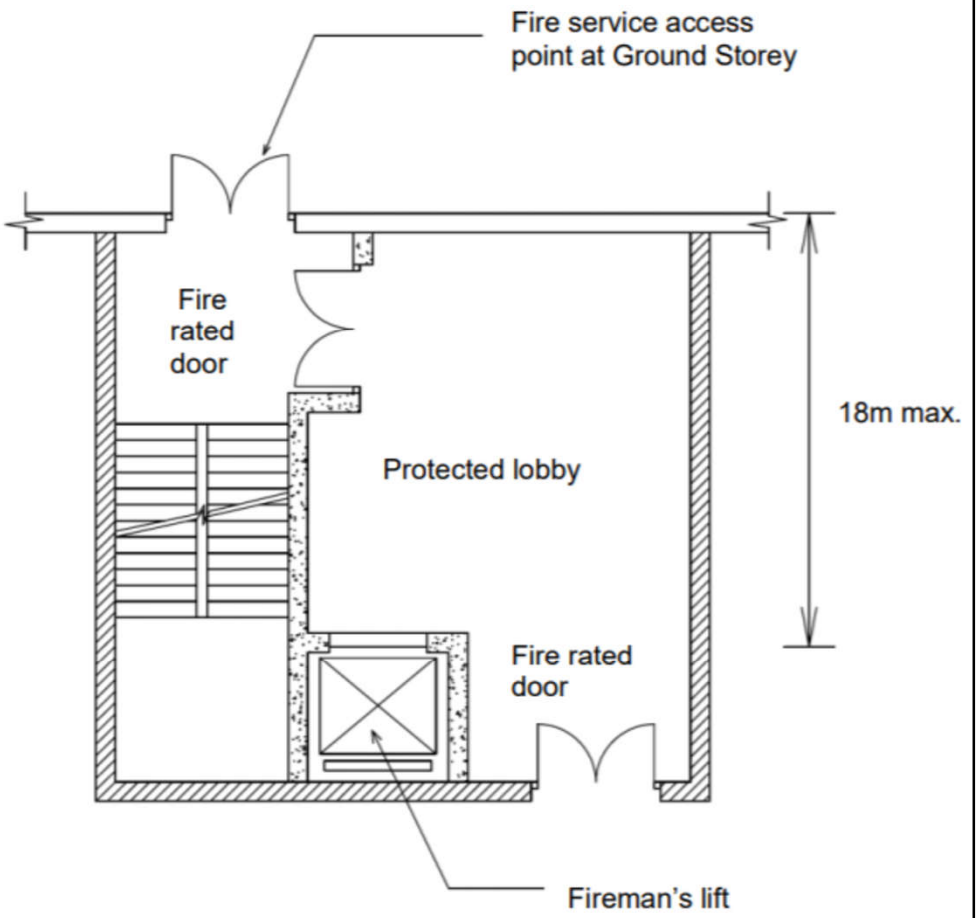
Performance requirements

- 3. Means of access (MOA): examples
  - Access by firefighters. Items include:
    - Access staircases
    - Fireman's lift
    - Firefighting and rescue stairways

  - Emergency vehicle access (EVA)
    - Access lane > 6 m wide
    - Headroom >= 4.5 m
    - Suitable for largest fire engine

Design for firefighting & rescue stairway and fireman's lift





Perimeter enclosure walls with FRR required in Clause D17.2

Lobby walls with FRR required in Clause D17.3

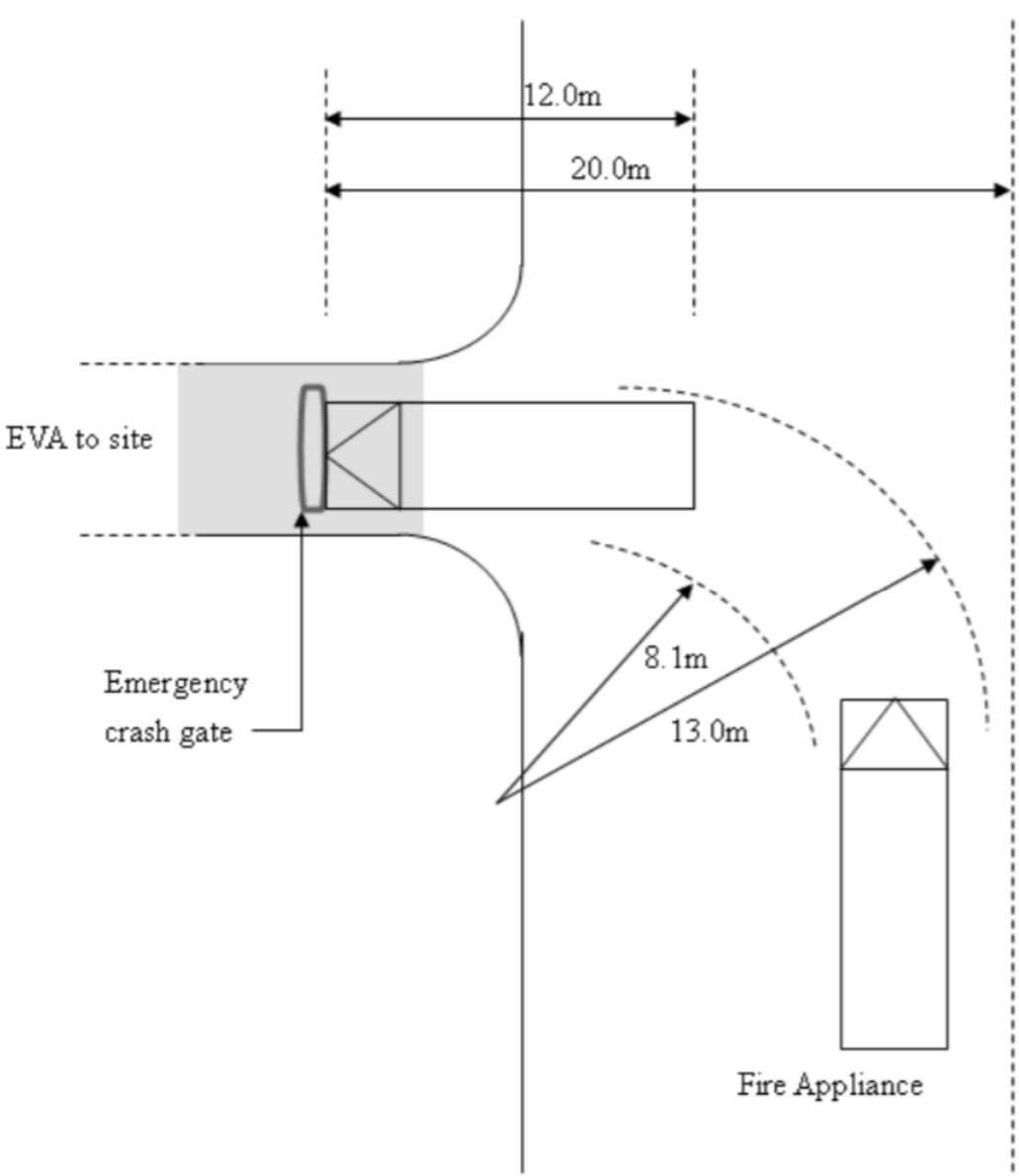
Minimum FRR required in Clause D7.3(b)

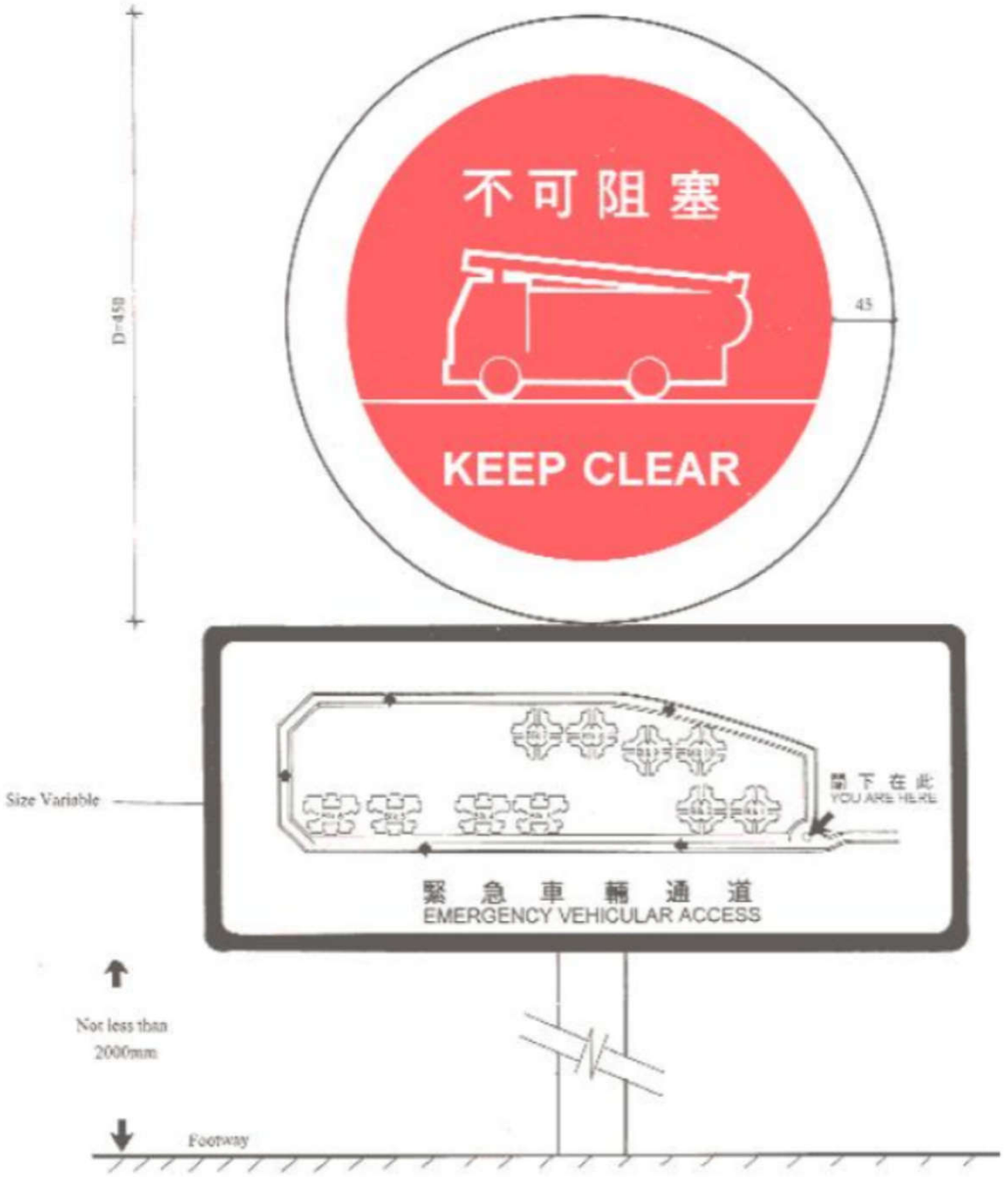
Minimum FRR required in Clause D7.3(b)

A	Access Staircase	- min. width 1.05m (see Clause D18.1 (a))
B	Fireman's Lift	- min. car size 1.35m²and rated load 680kg (see Clause D10.1)
C	Ventilated Lobby	- size 5m² - 10m² and min. dimension 1.5m (see Clause D16.1(a))
D1	Lobby Openings	- min. size 25% of lobby floor area (see Clause D16.1(c))
D2	Staircase windows	- min. size 15% of staircase area (see Clause D19.1(b))
E	Lobby Doors	- self-closing, complying with Part C (see Clause D17.4)

[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

Design of emergency vehicle access (EVA)





[Source: BD, 2011. *Code of Practice for Fire Safety in Buildings 2011*, Buildings Department (BD), Hong Kong.]

Performance requirements

- 4. Fire safety management
  - Assure that the fire safety provisions installed can operate effectively for the intended building life
  - Inspect, test, maintain & repair them:
    - Passive fire safety provisions
    - Active fire safety provisions
    - Ventilating systems
  - Provide a checklist on housekeeping to guide the carrying out of routine maintenance & repair works

Performance requirements

- 4. Fire safety management: examples
  - Fire safety management plan should include:
    - (a) Maintenance plan
    - (b) Training plan
    - (c) Fire action plan
  - Competent persons, e.g. authorized persons, should be commissioned by the building owners to carry out inspections, maintenance and certification of fire safety provisions

Code of practice FSI

- Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment [April 2012 revision] (CoP-FSI)
  - Prescriptive provisions for FSI design
  - Premises include:
    - High-rise, low-rise, curtain-walled
    - Commercial, industrial, domestic, institutional
    - Utilities, special purposes, plant rooms, etc.

Fire service systems/installations/equipment

- Audio/visual advisory system
- Automatic actuating devices
- Automatic fixed installations other than water
- Automatic fixed installation using water
- Deluge system
- Drencher system
- Dust detection system
- Dynamic smoke extraction system
- Emergency generator
- Emergency lighting
- Exit sign
- Fire alarm system
- Fire control centre
- Fire detection system
- Fire hydrant/hose reel system
- Fireman's lift
- Firefighting and rescue stairway
- Fixed automatically operated approved appliance
- Fixed foam system
- Gas detection system
- Gas extraction system
- Portable hand-operated approved appliance
- Pressurization of staircase
- Ring main system with fixed pumps
- Sprinkler system
- Static smoke extraction system
- Street fire hydrant system
- Supply tank
- Ventilation/air conditioning control system
- Water mist system
- Water spray system
- Water supply

Code of practice FSI

- Classification of fire fighting installation:
  - Active fire fighting installations
    - Fire hydrant & hose reel, automatic sprinkler system, drencher system, water spray system, gas flooding system, fire alarm system, smoke extraction & staircase pressurization systems, electrical power supply, emergency lighting & exit sign
  - Passive fire fighting installations
    - Fire rated enclosure/partition, means of escape, fire door

Relevant standards for each fire service installation

Fire hydrant/hose reel system (FH/HR) - CoP 2012: Section 5.14
Manual fire alarm (MFA) - CoP 2012: Section 5.11 & 5.14(b) - BS 5839 (fire detection & fire alarm system)
Ventilation/Air-conditioning control system (VAC) - CoP 2012: Section 5.27 - FSD Circular Letter No. 2/2005
Sprinkler system - FOC Rules for Automatic Sprinkler Installations (FOC 29 Edition) - LPC Rules for Automatic Sprinkler Installations - FSD Circular Letter No. 4/1996 (improvised sprinkler system)
Fire detection system - FOC Rules for Automatic Fire Alarm Installations - BS 5839 (fire detection & fire alarm system)
Emergency lighting system - CoP 2012: Section 5.9 - BS 5266: Part 1 & BS EN 60598-2-22
Portable fire extinguisher - Maintenance label according to FSD Circular Letter No. 4/1996

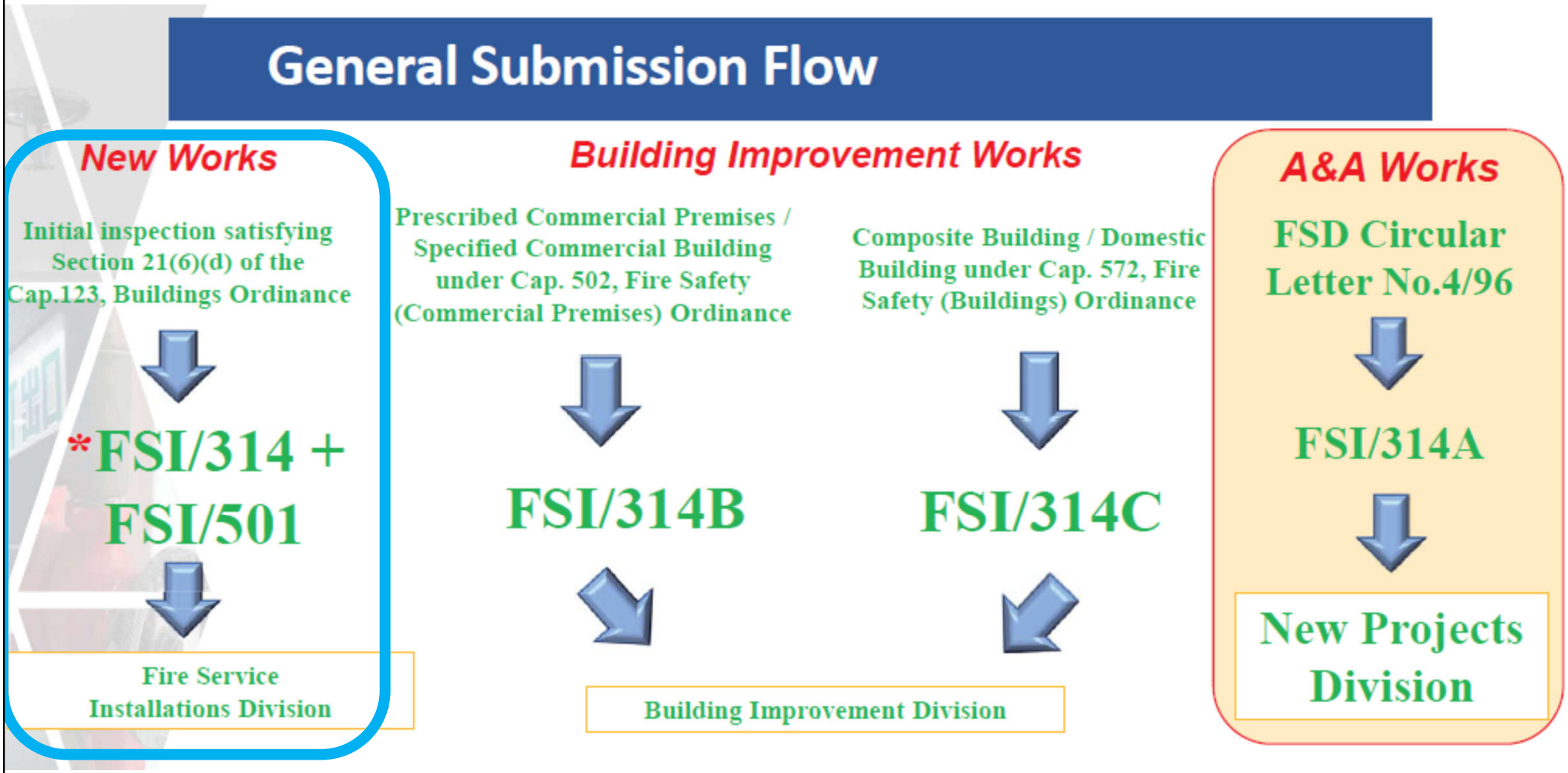
[Source: HKFSD]

Technical standards for sprinkler system

Before 1 April 1995	Rules of the F.O.C. for Automatic Sprinkler Installations F.O.C. Rule F.O.C. – Fire Offices' Committee
From 1 April 1995 to 31 December 2006	Rules for automatic sprinkler installations L.P.C. Rule BS 5306 Part 2 L.P.C. – Loss Prevention Council
After 1 January 2007	Fixed firefighting systems – Automatic sprinkler system – Design, installation and maintenance BS EN 12845:2003

[Source: HKFSD]

Statutory submission of fire service installations for new works, building improvement works and alternation & addition (A&A) works



Code of practice FSI

- Common defects found in FH/HR system
  - Water leakage from fire hose reel, fire hydrant and pressure reducing valve
  - FH and FS inlet cannot hold the instantaneous coupler firmly
  - Hose reel cannot be easily drawn off from the reel
  - Hand-wheel of FH is installed too close to wall and cannot be operated
  - Twin hydrant outlet not fitted with independent hand-wheel

Code of practice FSI

- Common defects found in sprinkler system
  - Sprinkler head provided at top of refuse chute is not of 57 ºC. Sprinkler is not provided underneath the platform of the chute inside refuse collection room
  - Changeover function of sprinkler pumps found defective
  - Size of suction pipe of sprinkler pump is smaller than the specifications indicated in LPC rules where appropriate
  - Duplicate pump power supply indicators for each phase are not provided
  - Audio and visual warning of pump power failure is not provided at control panel

Code of practice FSI

- Defective fire safety provisions
  - Lack of proper routine maintenance; failure of hinges/door closers of fire doors; mis-use
- Defective fire service installation & equipment
  - Blockage or leakage of components of pipes or valves; failure of pump; breakage of the supply system; damage, corrosion or failure of pipes, joints or valves; alarm wiring defect; short circuit; inadequate protection; poor management; and inadequate maintenance repair

Examples of defective fire safety installation & provisions

[Source: https://www.brplatform.org.hk/en/defects-and-orders/common-building-defects/defective-fire-safety-provisions-fire-service-installation-and-equipment]

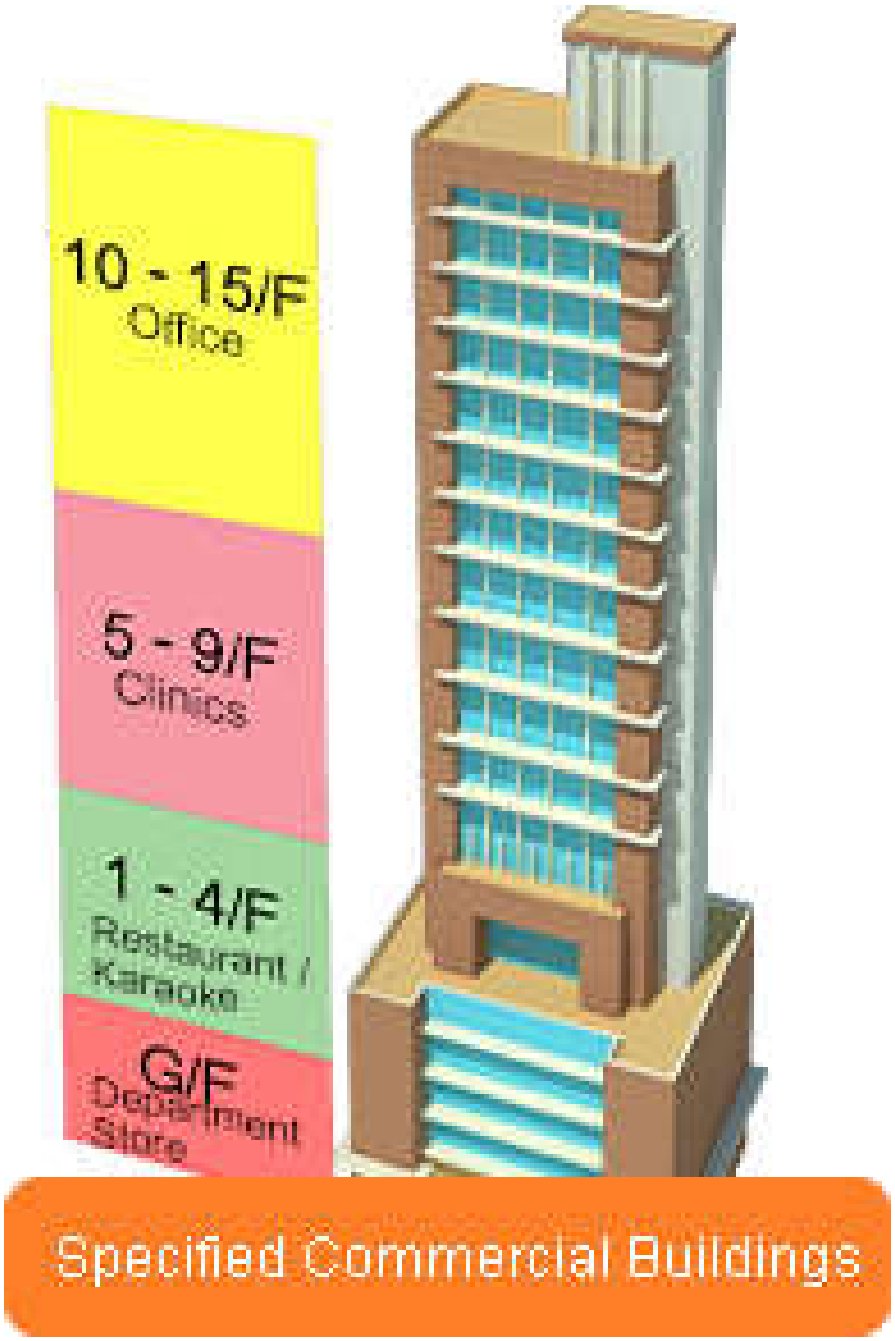
Fire safety improvement in existing old buildings is important

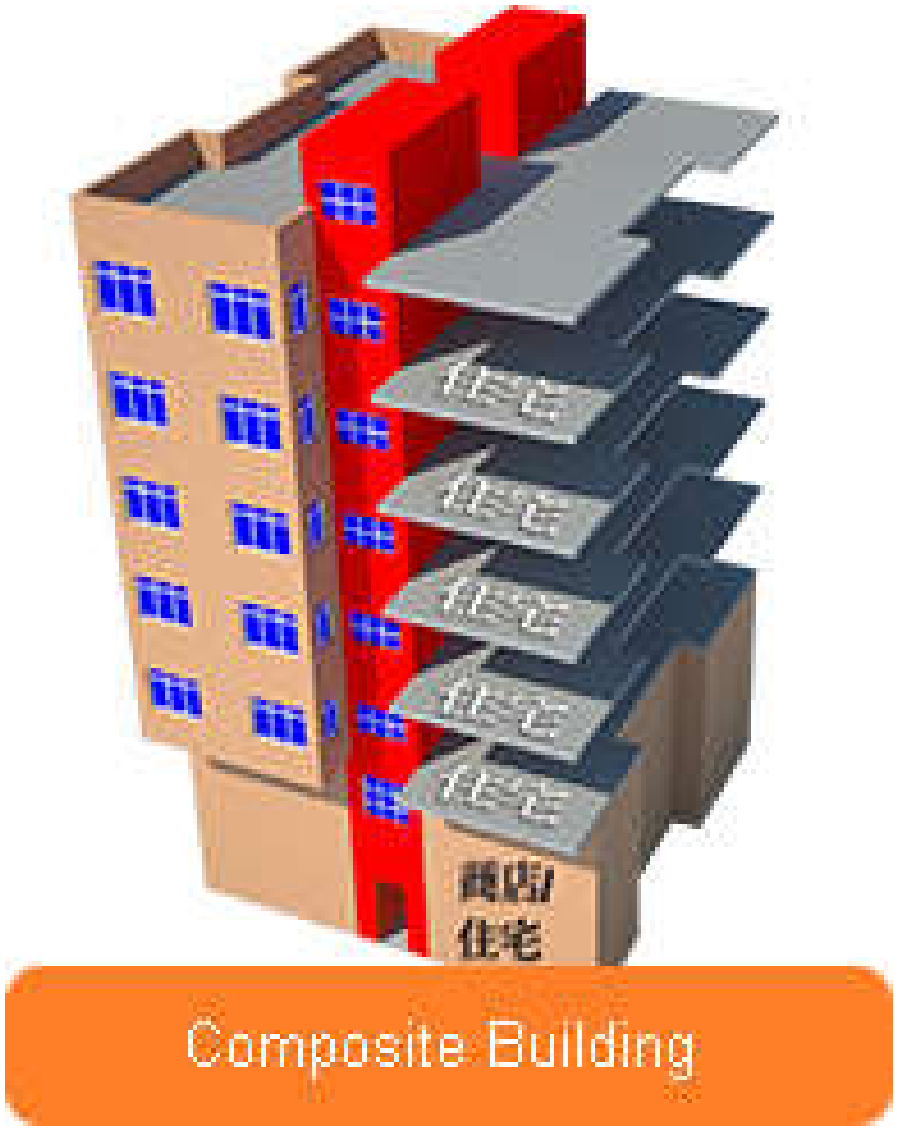
[Source: https://www.careyourbuilding.bd.gov.hk/]

Fire safety improvement

- Building improvement under Cap. 572
  - Enforced on 1 July 2007, requires that the fire safety measures of composite & domestic buildings constructed on or before 1 March 1987, be enhanced to a level that meets the current fire safety standards
  - A flexible & pragmatic approach is adopted on the premise of not compromising basic fire safety
  - Enforce certain requirements flexibly or accept alternative proposals put forward by the owners

Specified commercial buildings and composite building



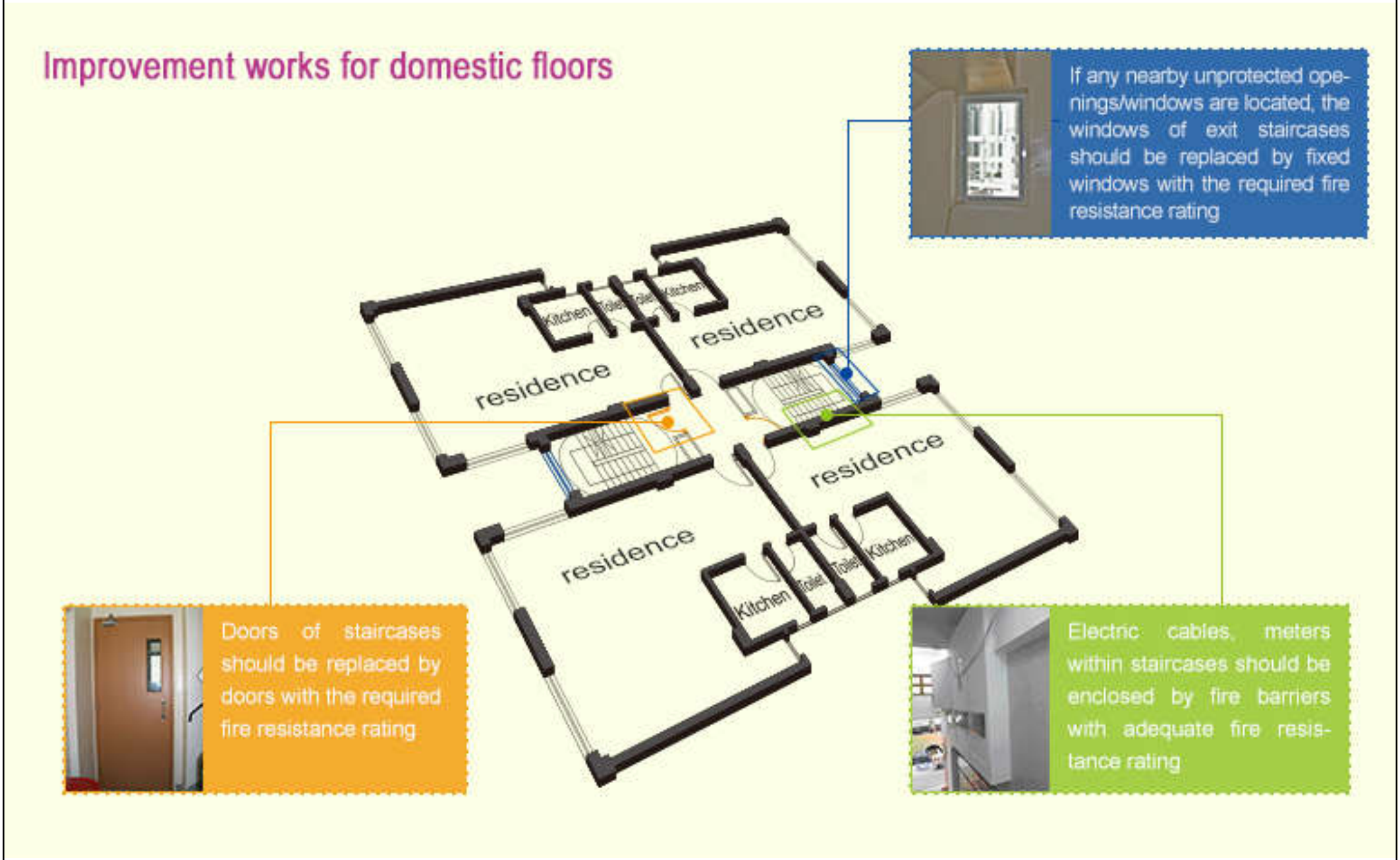


[Source: https://www.careyourbuilding.bd.gov.hk/]

Fire safety construction improvement works – commercial floors

[Source: https://www.careyourbuilding.bd.gov.hk/]

Fire safety construction improvement works – domestic floors

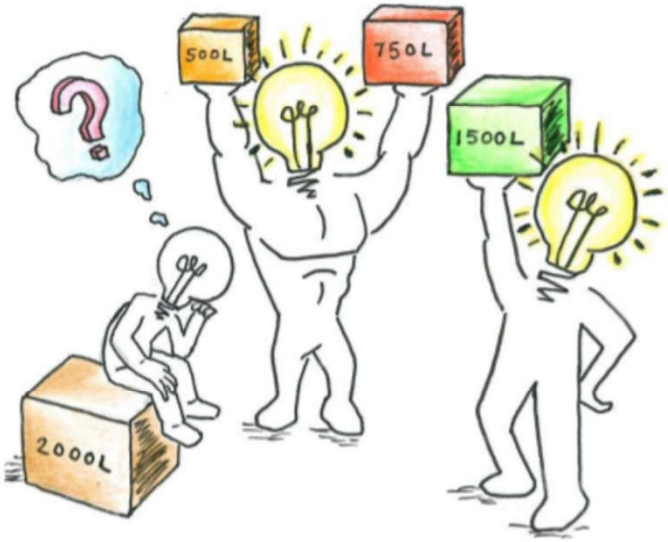


[Source: https://www.careyourbuilding.bd.gov.hk/]

Fire safety improvement

- Flexible and pragmatic approach (Cap. 572)
  - Reduced capacity FS water tank (9,000 litres effective volume for FH/HR system)
  - Improvised sprinkler system
    - 1. Direct Town Main (DTM)
    - 2. Connection from existing FS water tank
  - Application for relaxation of FS installation
    - Such as spatial and/or other constraints
    - Approval from BD regarding structural constraints
      - Structural Appraisal Report (SAR)

Revised supply tank capacity requirement for hose reel system of composite and domestic buildings of six storeys or below or less than 20 metres in height



For Buildings within	Requirement for the Effective Supply Tank Capacity of the Hose Reel System (in litres)
Built-up Areas	500
Dispersed Risks and Isolated Developments Areas	750 – 1,500

Supply Tank of 500-litre installed inside Roof-floor Staircase

Supply Tank of 500-litre installed on Roof-floor

[Source: https://www.hkfsd.gov.hk/eng//source/safety/Revised_Supply_Tank_Capacity_Requirement_eng.pdf]

Fire safety improvement

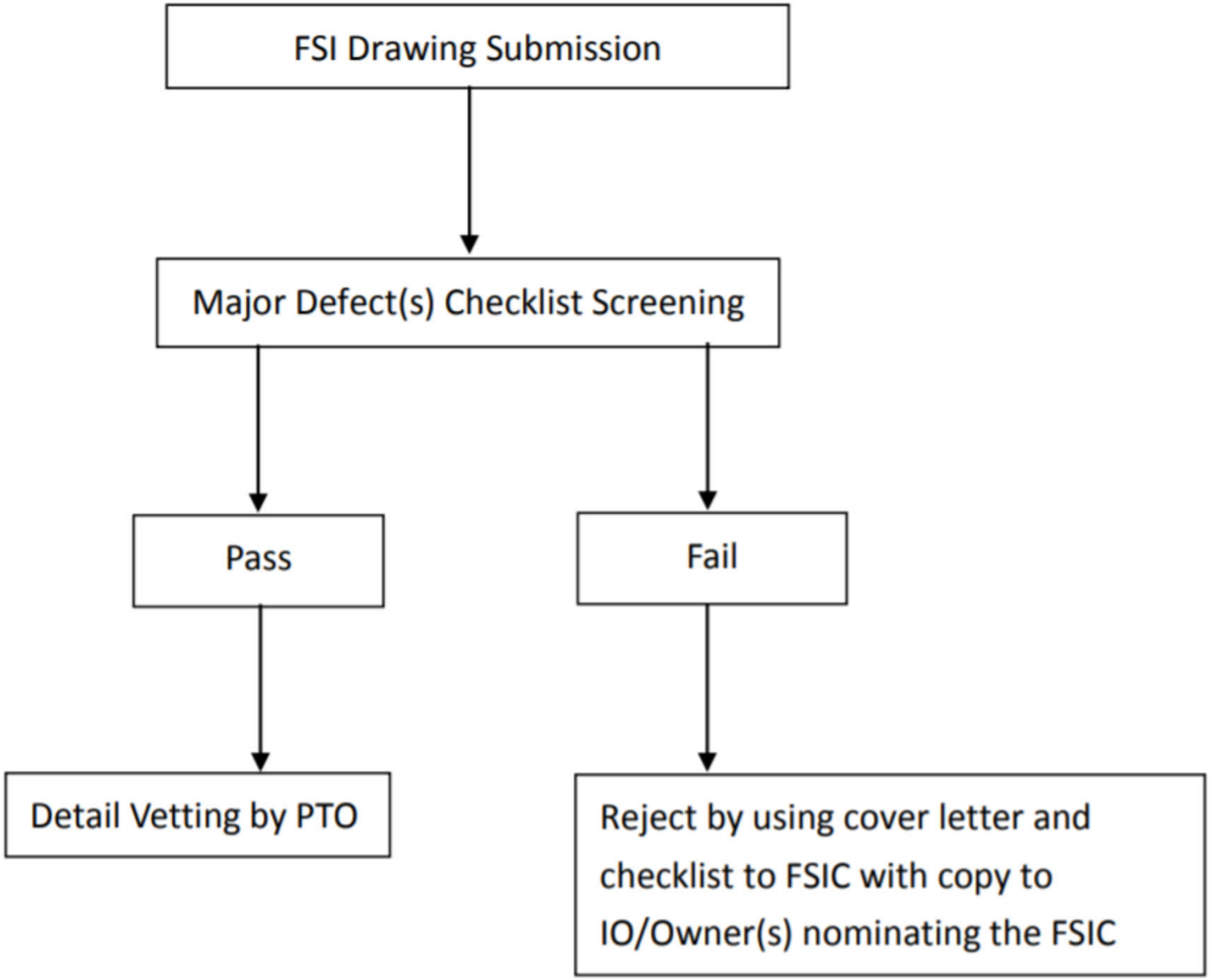
- Subsidy & assistance schemes:
  - Fire Safety Improvement Works Subsidy Scheme 消防安全改善工程資助計劃 https://brplatform.org.hk/en/subsidy-and-assistance/fire-safety-improvement-works-subsidy-scheme
  - Integrated Building Rehabilitation Assistance Scheme (IBRAS) 樓宇復修綜合支援計劃 – by Urban Renewal Authority (URA) https://brplatform.org.hk/en/subsidy-and-assistance/integrated-building-rehabilitation-assistance-scheme
  - Building Maintenance Grant Scheme for Needy Owners (BMGSNO) 有需要人士維修自住物業津貼計劃 https://brplatform.org.hk/en/subsidy-and-assistance/integrated-building-rehabilitation-assistance-scheme/schemes-for-individual-owners/building-maintenance-grant-scheme

Documents to be provided in the submission under Cap 572

1. Consent/Employment Nomination letter(s) from the Incorporated Owners (I.O.) / Owner(s) of Non-domestic Purposes
2. Complete and accurate information on Form FSI/314C
3. Letter of consent/approval from Buildings Department (BD)
   - New FS water tank(s)
   - Conversion of existing water tank(s) to serve as FS water tank
   - Pump plinth and housing … etc
4. Confirm with Water Supplies Department (WSD) on "minimum water pressure" available from the water town mains
   - Improvised sprinkler installation & direct feed to FS water tank
5. Letter of consent from Incorporated Owners/Owner(s) on the location of FS equipment:- FS/sprinkler inlets, sprinkler control valve set, new FS water tank(s), new transfer/up-feed water tank, FS/sprinkler/booster/transfer water pump(s)
6. Letter of consent from I.O./Owner(s) for any additional/voluntary FS improvement work other than FSDn requirements
7. Electrical schematic diagram (copies with WR2)
8. Agreement from I.O./Owner(s) for connection to the main FS system
   - Piping connection to the main FS systems (i.e. FH/HR & sprinkler)
   - Fire signal connected to the existing MFA system

[Source: https://www.hkfsd.gov.hk/eng//source/safety/Cap_572_FSI_Drawings_Submission_PPT_eng.pdf]

Processing of FSI drawings under Cap 502 / Cap 572



(See also: Checklist for Major Defects of FSI Drawings Submission under Cap. 502 / Cap. 572 根據香港法例第 502 或 572 章消防裝置圖則審批核對表 https://www.hkfsd.gov.hk/eng/news/Checklist_BIFSI_01.pdf)

[Source: HKFSD]

Fire safety improvement

- FSI drawings vetting process
  - Adopt first-come-first-serve principle
    - (a) Initial checking process with checklist
    - (b) Detail checking process
  - Rejected cases
    - 1. Result would notify the RFSIC/consultant with comment sheet
    - 2. Separate notification to I.O./owner(s) without comment sheet
  - Accepted/Approved cases
    - 1. Minor corrections may be arranged with RFSIC/consultant
    - 2. Fire certificate (F.S. 161) on approval of FSI drawings to be issued to RFSIC/consultant
    - 3. Result would notify I.O./owner(s)