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I. Introduction

Fire safety in a building is determined by a number of factors, one of which is **adequate** means of escape.
Review on CoP for Means of Escape 1996

I. Introduction (Cont’d)
Building Authority’s Power

- Buildings Ordinance – s.16(1)(d)&(i)
  -B(P)R41(2): building with second staircase as MoE
- CoP for the Provision of Means of Escape In Case Of Fire 1996 -Guidelines
II. Background

Requirements had not much changes since its first publication in 1959

Code reprinted in 1986 only covered typos/mistakes and amendments in PNAPs

Review in 1989 was considered as parallel exercise with review of other regulations e.g. FRC and MoA, then came the current MOE 1996 Code

A comprehensive review on CoP for MOE; MOA & FRC has been completed, a new CoP (CoP for Fire Safety in Buildings) will be announced & issued within 2011. It is expected that a grace period of 6 months would be allowed for the building industry
III. Requirements of Means of Escape

1. Use of the Code
   - Provide *guidance* for compliance of Building Authority (BA)’s requirements

2. Objectives
   - Protect occupants from effects of fire by *adequate* means of escape

3. Two Approaches to Fire Safety
   - Prescriptive provisions (i.e. this CoP)
   - Alternative approach (e.g. Fire engineering approach)
Review on CoP for Means of Escape 1996

4. Interpretations – Some Key Items
   - “Basement” – below the lower or lowest ground storey with any required exit route in upward direction
   - “Direct distance” – notional path from any part of a room to center of exit door of room
   - “Exit route” – route or means of passage to a place of safety outside building except revolving door, lift and escalator
   - “Ground Storey”; “Maisonette” & “Usable Floor Area” etc

5. Application
   - The code applies to all buildings except domestic building of
     (i) \( \leq 3 \) main domestic storeys;
     (ii) \( \leq 13 \text{m in highest floor} \) level; and
     (iii) single-family occupancy
   - Provisions in CoP shall not overrule other regulations
6. Special Hazard Occupancy
   - Protected lobby is required if area of special hazard opens into any exit route of adjoining normal-hazard occupancy \(<\text{MoE 6.1}>\)

7. Assessment of Accommodation
   - 2 methods to assess the number of persons (i.e. total population) within a building: (a) by calculation \(<\text{Table 1, MoE 7}>\) or (b) by actual counting \(<\text{note (vi) of Table 1, MoE 7}>\)
   - Calculation of capacity depends on:
     - Usable floor area (UFA);
     - Intended use of premises; and
     - Prescribed factor for such use
       \(<\text{Table 1, MoE 7}>\)
   - Capacity of special premises (e.g. hospitals, hotels, places of public entertainment etc) may be assessed by BA on the basis of detailed layout plans \(<\text{note (ii) of Table 1, MoE 7}>\)
8. General Requirements of Exit Routes

- Each storey should be provided with such exits and exit routes as required by this Code <MoE 8.1>

- Every exit route at ground level should lead to:
  - Street; or
  - Open area

  with unobstructed access and door that can be readily opened from inside without the use of key(s) <MoE 8.2>
8. General Requirements of Exit Routes (Cont’d)

- MoE 8.2 may not be complied with if exit staircase leads to open area at upper floors (e.g. podium level) unless the staircase is leading to an exit route at such floor which should:
  - be adequately defined by permanent features;
  - lead to street or open area (place of ultimate safety);
  - have the same MoE and FRC requirements as the exit staircase

- Adequate artificial lighting of min 30 lux at floor level; and backed up by an emergency lighting system of min 2 lux
8. General Requirements of Exit Routes (Cont’d)

- No exit route should discharge into a **private lane** unless such lane is **<MoE 8.5>:** -
  - properly paved;
  - free from permanent obstruction; and
  - the Building Authority is satisfied with integrity of the lane as MoE (e.g. Right of Way)

- Final point of discharge should be separated from adjoining exit routes or other accommodations with **min. 450mm return along / projection from the frontage** **<MoE 8.6>**
8. General Requirements of Exit Routes (Cont’d)

- Clear height is of min. 2000mm with projection of sprinkler heads <MoE 8.7>:
  - Max. 90mm horizontally from side wall; and
  - Max. 105mm vertically under ceiling

- Door at final point of discharge should set back with a distance not less than the width of exit route if there is a drop in level. If the drop consists of a single step, it should be clearly visible. <MoE 8.8>
9. Buildings with a Single Staircase

- Single staircase may be permitted if:
  - Building is **not more than 6 storeys** <MoE 9.1>; (Dwg. 1)
  - Floor level of uppermost storey is **not more than 17m** from ground level <MoE 9.1>;
  - Only use as **domestic or office** (except ground storey may be used as shop or carparking) <MoE 9.2 (a)>;
  - Access for rescue ladder/appliance at ground level <MoE 9.2 (b)>; and
  - Comply with **usable floor area limitation** (highest floor ≤ 13m with UFA not exceeding 250m²; if >13m then 150m² max) <MoE 9.2 (c) & (d)>
  - If highest floor >13m, the staircase should be:
    - provided with a **protected lobby** at each floor;
    - **continued** to the roof; and
    - **adequate refuge area** should be provided at roof <MoE 9.2 (e)>
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Dwg.1 – Single staircase building

6 storeys max. or 17m max.

6 storeys max. or 17m max.
10. Exits from Rooms

- For room with **more than 3 persons**, following requirements should be complied with:
  
  <Table 2, MoE 10.1>:
  
  - Min. no. of exit doors (from room)/exit routes (from storey);
  - Min. total width of exit doors/routes; and
  - Min. width of each exit door/route (Dwg. 2 and 3)

- Every exit door → exit route which is **independent** of any other exit routes <MoE 10.2>
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Dwg.2 - Min. width of exit door (750)/exit route (1050)
Review on CoP for Means of Escape 1996

Dwg.3 – Min. width of exit route (1050)
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10. Exits from Rooms (Cont’d)

- For capacity **under 200 persons**, exit doors may give access to a **single** corridor or balcony approach having escape in **more than one** direction <MoE 10.2>

**e.g.** referring to Table 2 on the requirements of exits:

(a) room/storey with 31 - 200 persons => 2 exit doors/routes

(b) room/storey with 201 – 300 persons => 2 exit doors/routes

(c) room/storey with 301 – 500 persons => 2 exit doors/routes

*(In all these 3 cases, min no. of exit doors/routes is the same ‘2’. However, apart from the Min Total Width and Min Width of Each exit door/route are different, only exit doors in case (a) may give access to a single corridor or balcony approach having escape in more than one direction)*
10. Exits from Rooms (Cont’d)

- (If 2 or more doors are provided) For door of width over 1.5 times of width of the narrowest door, such surplus portion of width should be excluded in calculation of total door width <MoE 10.3>, e.g.:

<table>
<thead>
<tr>
<th>Door</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (mm)</td>
<td>750</td>
<td>850</td>
<td>1200</td>
</tr>
</tbody>
</table>

∴ Total width = D1 + D2 + 1.5 x D1 (as D3 > 1.5x D1)

= 750 + 850 + (750+375)

= 2725 mm

[Where D1 + D2 + D3 = 750 + 850 + 1200 = 2800 mm]
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11. Exits from Storeys

- Min. 2 exit routes should be provided for each storey of building except buildings permitted to have single staircase <MoE 11.1>. Provided that: (a) maisonette – should apply to only one of the storeys; (b) where 2 or more exit routes vary in width, width over 1.5 times of width of the narrowest exit route, such surplus portion of width should be excluded in calculation of min total width.

- People should be able to gain access to min. one of the other staircases (i.e. interchangeable) (if two or more exits are required) (Dwg.4) <MoE 11.2>: -
  - At each floor; or
  - At refuge floor and the roof (if provided)
  - Not applicable in Domestic or composite buildings not exceeding 15 storeys
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Dwg. 4 – Staircases not interchangeable
(OK if not exceeding 15 storeys)
12. Exits at Ground Storey

- Every staircase should be separated from remainder of the building with continuous enclosing walls at ground storey <MoE 12.1> provided that (a) when served by **2 or more staircases**, a cloakroom, lavatory, WC, caretaker's office, fire control room or caretaker's counter may open off; and (b) when served by **3 or more staircases**, one in every 3 such staircases may discharge through fire resisting doors to a hall or shopping arcade subject to compliance with MoE 8.2 & 8.4.

- If exit route from ground storey forms also that from a staircase <MoE 12.2>, the min. width of such exit route: -

  \[
  \text{Min. width} = \frac{1}{2} \text{the width required for exit from G/F} + \text{the width required for staircase from upper floors}; \text{ and that, if any, from the basements}
  \]
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13. Access to Staircase(s) within a Building

- Complied with min. FRC requirements for separation of every staircase <MoE 13.1>

- In case of Single-Staircase Building, MoE 9 applies <MoE 13.2>

- Different direction in approaching each staircase provided that deadends (Direct Distance + Travel Distance ≤ 18m) will be permitted under MoE 14.3(b) & Min. distance between 2 staircases is 6m (if 2 or more staircases are required) <MoE 13.3>

- Access to an alternative staircase should not pass through one staircase enclosure <MoE 13.4>
13. Access to Staircase(s) within a Building (Cont’d)

Where internal access is provided:-

- no door opening on to an internal common corridor should at any part of its swing reduce the min required width of such corridor \(<\text{MoE 13.5 (a)}>\)

- Protected lobby should be provided to each and every staircase unless \(<\text{MoE 13.5 (b)}>\): -
  - It is an open-sided staircase;
  - Highest floor of single staircase building is \(\leq 13m\); or
  - Highest floor of building with at least 2 staircases is \(\leq 20m\)

- Such protected lobby should be a \textit{common} area and an \textit{integral} part of the staircase
14. Direct Distance (DD) and Travel Distance (TD)

- Limitation of TD & Sum of TD + DD depends on:
  - Arrangement of exit routes; and
  - Use of premises

- Exit route is categorized into 3 major arrangements:
  - Balcony approach (Dwg. 5) or internal corridor with ventilation;
  - Internal corridor without ventilation
  - Storey partitioned into rooms but exit route is not along balcony approach or internal corridor
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Dwg.5 – Balcony approach

Balcony Approach

Staircase

Staircase
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14. Direct Distance (DD) and Travel Distance (TD) (Cont’d)

- Limitation of distance is imposed on 3 dimensions:
  - Max. DD (any part of room to exit door) (Dwg. 6);
  - Max. TD (exit door of room to a staircase or point of discharge to a place of ultimate safety); and
  - Max. sum of DD + TD

- Table 3 – for single-staircase buildings
- Table 4 – for buildings with 2 or more staircases
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Dwg.6 – Dead End Situation in a Room
(Max. DD is 15m if less than 30°; otherwise 18m)
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14. Direct Distance (DD) and Travel Distance (TD) (Cont’d)

- Max. distance between 2 staircases is 48m (if 2 or more staircases are required) <MoE 14.3 (c)> (MoE 13.3 refers)

- For open plan, Max DD ≤ 30m if 2 exit routes; ≤ 18m if only 1 exit route or 2 exit routes but forming angle less than 30° (i.e. deadend in storey) <MoE 14.4>

- For room with the only exit is through another room i.e. inner room <MoE 14.5> :-
  - Max. capacity is 30;
  - No access through special hazard area;
  - Vision panel should be provided except toilet

- Angle between 2 or more required exit doors should be of min. 30° <MoE 14.6>
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15. Discharge Value ($DV$) and Width of Staircase

- Assessment of discharge value ($DV$) of a staircase depends on 3 key factors <MoE 15.3 and 15.4>: -
  - Whether Building is non-sprinklered (Table 5) or sprinklered (Table 6);
  - No. of storeys served by such staircase; and
  - Width of the staircase

- **Table 5** – for non-sprinklered buildings
- **Table 6** – for sprinklered buildings
15. Discharge Value (DV) and Width of Staircase (Cont’d)

- The discharge value tables are formulated on the following basis:
  - Total evacuation concept
  - Evacuation time (from a storey to a protected area)
    - within 2.5 mins. for non-sprinklered buildings;
    - within 5.0 mins. for sprinklered buildings
  - Flow rate (descending): 80 persons/meter width/min.
  - Staircase capacity (temporarily housed in staircase during evacuation): 3.5 ~3.9 person/m²
15. Discharge Value (DV) and Width of Staircase (Cont’d)

- A defined reduction factor should be multiplied to the discharge value of staircase <MoE 15.5 and 15.6>:
  - Factor of 0.8 if exit is of upward direction; or
  - Factor of 0.7 if it is a scissors staircase

- For special buildings (e.g. sport arenas, stadia & convention centres etc) having a total capacity of 10,000 persons or more, the Total Width of staircases should be 1.2 times that required under Table 2 according to the capacity of the area concerned <MoE 15.8>.

- A building having a total capacity of not less than 10,000 persons may necessitate special consideration, e.g. Fire Engineering Approach may be the only viable means to a satisfactory standard of a fire safety. <MoE 15.9>
16. Doors in relation to Exits

- Exit door of a room with capacity **over 30** should open in the direction of exit; have **a vision panel** if opens both ways. <MoE 16.1>

- If it is needed to secure an exit door against entry from outside, locking device must be capable of being **readily opened from inside without a key**, also be capable of automatic release upon actuation of a sensor or power failure. <MoE 16.2>

- Every door opening onto landing of a staircase should **not reduce the effective radius** of such landing at any point of its swing <MoE 16.3> (Dwg. 7)

- Min. width of exit door from a room of capacity > 3 is 750mm <MoE 16.4>
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Dwg. 7 – Door opening onto landing of a staircase
17. Construction of Staircases

- Requirements of staircase <MoE 17.2> (Photo. 1, 2 and 3):
  - Min. 2 Risers and max. 16 Risers for each flight; and
  - Min. 225mm wide and max. 175mm high for treads
  - Requirements of school and place of public entertainment are much more stringent

- Clear height of staircase is of min. 2000mm <MoE 17.4>

- If width exceeds 1800mm, central handrail is required to separate it in sections, each section should not be less than 1050mm in width. <MoE 17.5>

- Handrail should be provided on each side of staircase at a height between 850mm and 1100mm <MoE 17.6>
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Photo.1 – Non-compliance of steps geometry in heritage building

Riser: 180mm ht (>175mm) and 200mm wide (<225mm) Not acceptable
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Photo.2 – MOE staircase with winders in heritage building

Not acceptable
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Photo.3 – MOE staircase with more than 16 steps in heritage building

Total: 21 steps (>16 steps)

Not acceptable
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18. Ramps

- Ramp forming part of an exit route should not be steeper than 1:12 <MoE 18>

19. Lift Lobbies

- Access to exit route should be provided to every lift lobby without any obstruction and lockable door.

<MoE 19>
20. Basements

- At least **2 exits** should be provided for every “genuine basement” <MoE 20.1>

- **No staircase** serving floors above ground storey should be continued to a basement <MoE 20.2>

- Sufficient **directional and exit signs** should be provided for indication of exit direction <MoE 20.3>

- **Min. one exit** should discharge **independently** from other exits to a place of ultimate safety <MoE 20.4>
21. Refuge Floors

- Refuge floor should be provided in **all buildings exceeding 25 storeys** in height above the lowest ground storey **<MoE 21.1>**, at a height:
  - Not more than **20 storeys** for industrial building; or
  - Not more than **25 storeys** for non-industrial building from other refuge floor or above street or open area (excluding mechanical floors)

- **MoE 21.1** is not applicable to **domestic or composite building** (not exceeding 40 storeys) **<MoE 21.5>**, but:
  - Main roof should be a refuge floor if such types of building is between 26-storey to 40-storey in height (inclusively)
21. Refuge Floors (Cont’d)

- Requirements are divided into 2 groups according to nature of such refuge floor:
  - Genuine refuge floor (not on roof) <MoE 21.2>; or
  - Main roof as refuge floor <MoE 21.3>

- General restrictions on refuge floors e.g.:
  - Net refuge area = \text{min. 50\%} \text{ of GFA of typical floor};
  - Min. dimension is of 50\% greater than width of widest staircase serving such floor; and
  - All staircases should be \text{discontinued} at refuge floor
  - Signs should be provided as per requirements <MoE 21.4>
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Places of Public Entertainment (PPE)

- Para. 22 ~ 34 are additional requirements on MoE provisions to all Places of Public Entertainment
  - Including permanent and temporary buildings having PPE
  - These requirements are transferred from the updated Places of Public Entertainment Regulations (formerly PNAP 194 / now PNAP APP-81 refers)
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Places of Public Entertainment (PPE)

- MoE for PPE are more stringent since:
  
  (a) Places of Public Entertainment → not familiar with the layout, don’t know where are the exits
  
  (b) Places of Public Entertainment → focus on the stage or the performance, less attentive to other signs, warnings, etc.
  
  (c) Large population → crowded & people tend to follow others
  
  (d) Very often, special lighting & sound effects → people become less cautious to the emergence of fire / smoke / flash / sparkle etc → belated reaction → higher risk

*(More detailed requirements not shown here, please refer to the MoE Code)*
## Review on CoP for Means of Escape 1996

### IV. Miscellaneous (Related CoPs and PNAPs)

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<td>Apr 10</td>
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<td>PNAP 117 (APP-43)</td>
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<td>Natural Lighting to Staircases – Building (Planning) Regulation 40</td>
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<td>Building (Planning) Regulations 41A, 41B and 41C – Means of Access for Firefighting and Rescue in Buildings</td>
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<td>PNAP 302</td>
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<td>Oct 07</td>
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IV. Miscellaneous

(Main Conceptual Objectives of the 3 Fire Safety CoP)

MoE

FRC

MoA
Thank You!

Thank you for your patience!

Q & A

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