

Brief Notes on Lifts and Escalators Design

1. Design Guides

- Barney, G. C., 2003. *Elevator Traffic Handbook: Theory and Practice*, Spon Press, London & New York. [621.877 B261 e]
- CIBSE, 2005. *Transportation Systems in Buildings, CIBSE Guide D*, Chartered Institution of Building Services Engineers, London. [LB 690.183 T7]
- Strakosch, G. R. (ed.), 1998. *The Vertical Transportation Handbook*, 3rd ed., Wiley, New York. [621.877 V56 S89]

2. Regulations and Standards

- Buildings (Lifts) Regulations (Cap.123)
- Buildings (Escalators) Regulations (Cap.123)
- Lifts and Escalators (Safety) Ordinance (Cap. 327)
- Code of Practice on the Design and Construction of Lifts and Escalators (EMSD)
- British Standard BS 5655: Part 1 to 11 – Lifts and Services Lifts

3. Design Considerations

- intended usages of the building, height, storeys, etc.
- expected characteristics of “internal traffic” by occupants
 - domestic floors (less demand on lift service)
 - office floors (higher demand on lift service)
 - commercial floors e.g. shopping arcade (high population density & traffic)
 - restaurant or catering facilities (peak demand at lunch and dinner)
- level and quality of lift service required
- types of lift systems: (electric or hydraulic)
 - passenger lifts
 - service lifts
 - goods lifts
 - fireman’s lift
 - dumbwaiter (e.g. for restaurant)
- escalators & passenger conveyors (if needed)

4. Lift Traffic Analysis

- assumptions to be made:
 - assessment of building population & nos. of persons using the service
 - determine critical traffic period
 - occupancy loading of lift car
- basic design criteria for lift performance: (depends on the class of service)
 - five minutes handling capacity (HC)
 - average interval time or waiting time (AIT)
 - maximum passenger transit time

- calculation of lift performance
 - up-peak, down peak and two-way traffic
 - performed by manual calculation or by computer programs
 - determine nos. of lifts, lift capacity (rated load) and lift speed
- calculation of escalator performance is similar to lift but based on turnover rate
 - determine nos. of escalators, capacity, speed, inclined angle and width

5. Lift and Escalator Planning

- layout and grouping of lifts, zoning of the lift system, etc.
- lift core (service core) design to be coordinated with architectural layout
- design of lift lobby and entrance, proximity of staircases, etc.
- location and arrangements of escalators
 - effective for large shopping arcade with high turnover rate
 - may also serve as a focus point in atrium or mall
- modes of operation and control functions (e.g. collective, duplex & triplex control)
- contract arrangement for lifts & escalators installations
 - usually by nominated sub-contractors in HK (e.g. OTIS, Schindler, Fujitec)
 - coordinations with builder and other sub-contractors
 - must be installed by a “registered lift engineer/contractor” and submit for approval from the EMSD
- relationships with other Building Services systems
 - electrical services (normal power supply and emergency supply)
 - fire services (e.g. fireman’s lift)
 - HVAC (lift machine room ventilation, lift shaft venting, etc.)
 - others (e.g. intercom system and CCTV inside lift car)

6. Design and Planning Information Required

- a lift chart showing the concept of the vertical transportation system
- a clear and concise list of design criteria and assumptions
- a summary of lift performance (usually in table form) gives:
 - lift designated nos., grouping, floor served
 - lift capacity, speed, type of control
 - lift performance calculated: HC and AIT
- technical requirements:
 - electrical power supply, estimated power required
 - location and size of lift motor (or lift machine) room
 - lift pit size, overrun headroom above lift shaft
 - lighting and ventilation (or air conditioning) of lift car
 - safety and emergency devices
 - escalator dimensional requirement
 - fire safety aspects of lift & escalator system
 - maintenance and inspection
- estimated costs for lifts & escalators installations