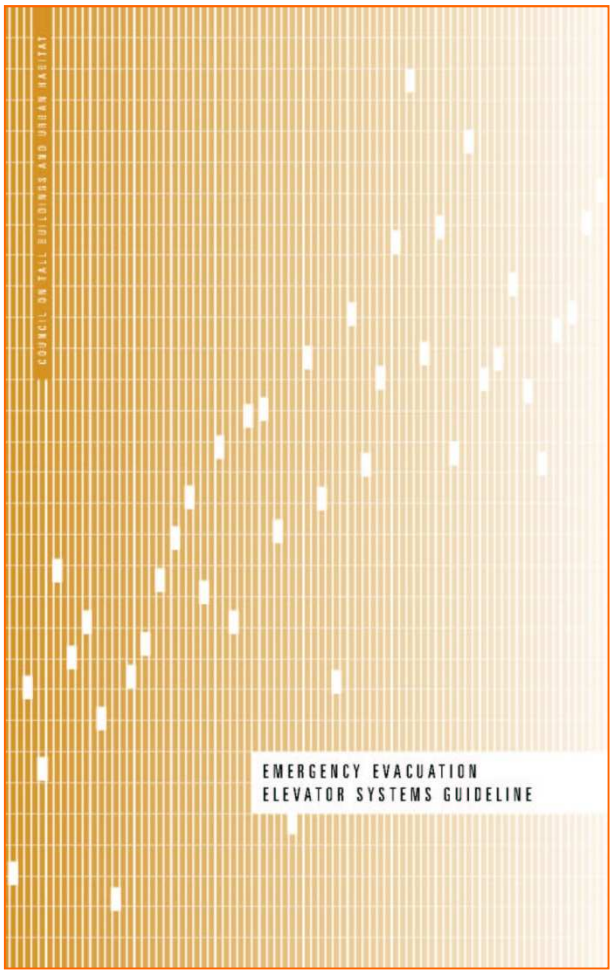
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KONE



Emergency evacuation elevator systems guideline

Johannes de Jong
Head of Technology

CTBUH taskforce publication

What is CTBUH?

CTBUH

- Council on Tall Buildings and Urban Habitat
- Non-Profit organization
- Cross-scientific
- Mission:
  - Disseminate information on tall building technology and healthy urban environments
  - Maximize international interaction of bldg pro’s
  - Communicate latest knowledge in useful form

Taskforce

- **Owner / Development**
  Tishman Speyer Properties (Charles Mattes, Edward Cardinale)
- **Architecture**
  SOM (Carl Galioto)
  Heller Manus Architects (Jeff Heller)
- **Structural Engineering**
  Halvorsen & Kaye Structural Engineers (Michael S. Fletcher)
- **Mechanical Engineering**
  Cosentini Associates (Bud Spiewak)
- **Electrical Engineering**
  Flack & Kurz (Randy Meyers)
- **Vertical transportation engineering and supply**
  KONE Corporation (Kim Bärlund (Chairman), Johannes de Jong, Marja-Liisa Siikonen)
  Jaros, Baum & Bolles Consulting Engineers (Steve Kinnaman)
  Edgett Williams Consulting (Steve Edgett)
- **Fire Protection Engineering**
  NFPA (Robert Solomon)
- **Life Safety Consulting**
  Rolf Jensen Associates (Jeff Harper)
- **Security Consulting**
  Sako & Associates (Lauris Freidenfelds, Walter 'Skip' Adams)

The guideline publication was made by the CTBUH on initiative of KONE and was chaired by KONE

Reasons for Evacuation











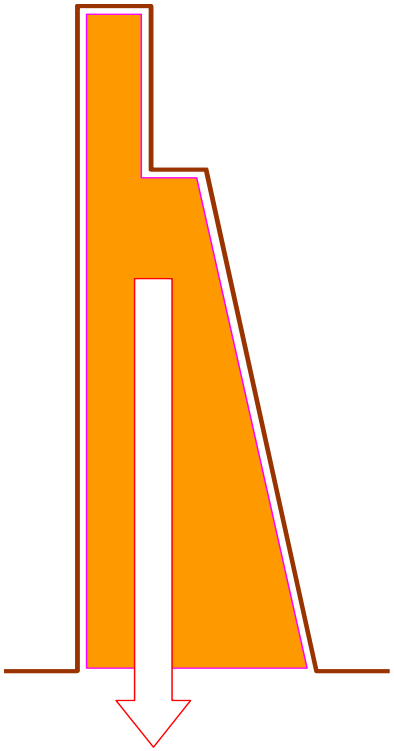
Reasons for Evacuation

- Power blackouts
- Terrorist acts
  - Bomb threat
  - Biological warfare
  - Gas attacks
  - Radiation attacks
- Natural disasters
  - Earthquakes
  - Floods
- Man made disasters
  - Nuclear accidents
  - Chemical accidents

There are many reasons requiring building evacuation

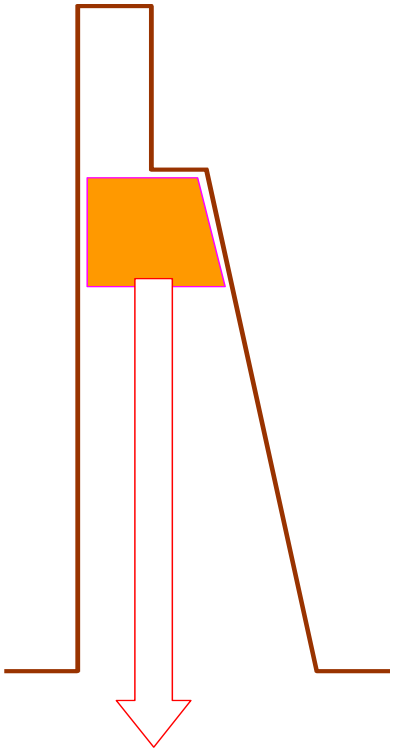
Generic evacuation types

Total



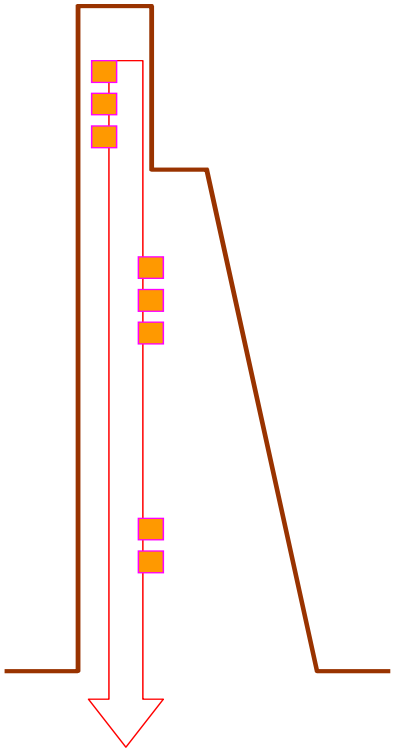
Total emergency evacuation means that the total building population is evacuated immediately.

Staged



Staged emergency evacuation means that a part of the building population is immediately evacuated.

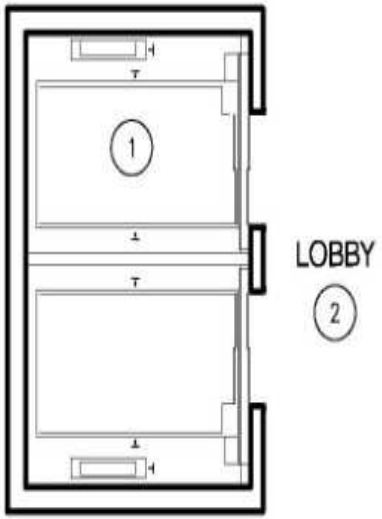
Fractional

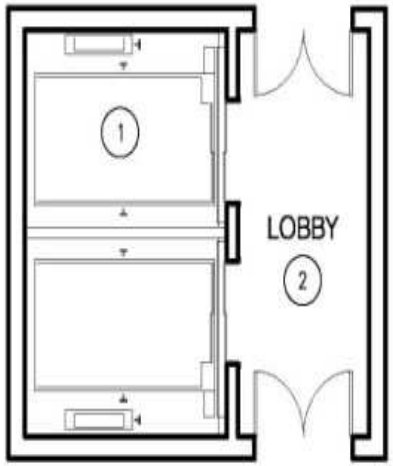


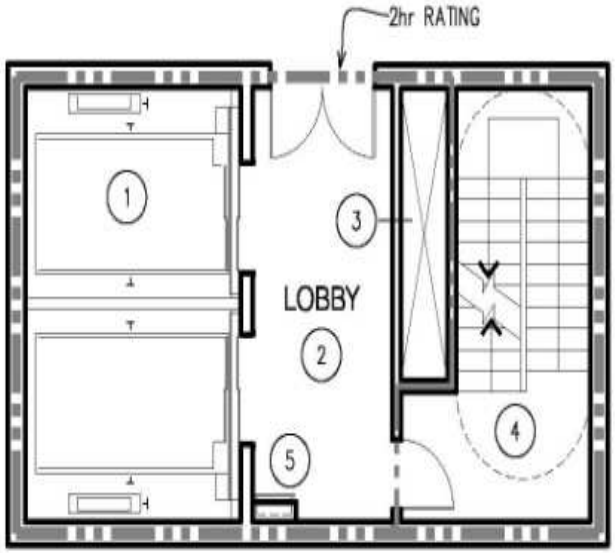
Fractional emergency evacuation means that only a very small group or fraction of the building population is evacuated/rescued.

- Different design for different capacity needs

Design approaches





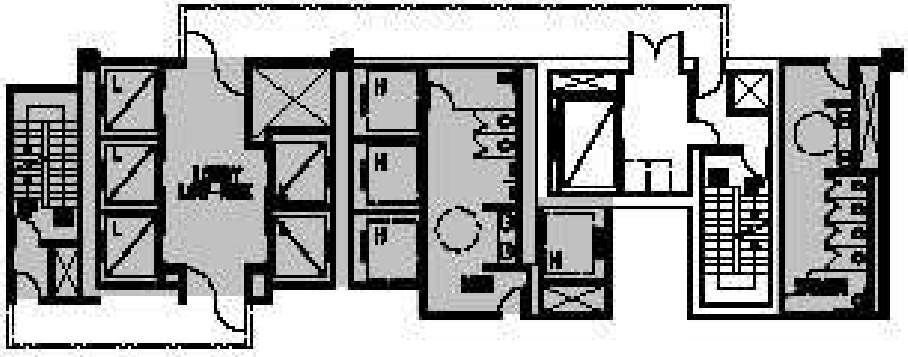


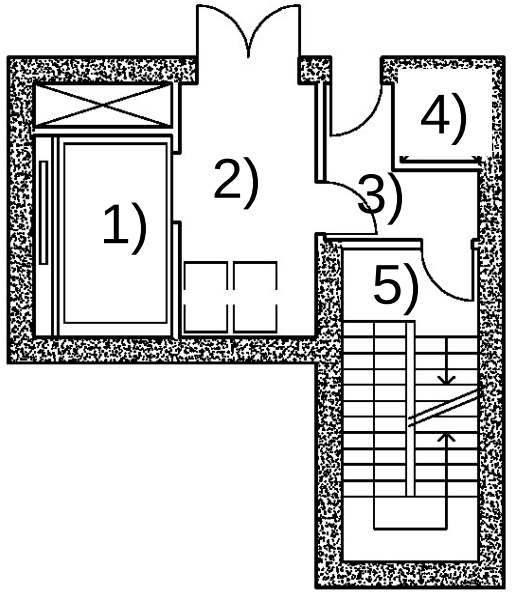
Standard elevator
1. Elevator car in standard hoistway
2. Unenclosed elevator lobby

Enhanced elevator
1. Hoistway improved with sensors, heat and water resistance of electrical components.
2. Lobby provided with smoke stop doors.

Protected elevator
1. Pressurized elevator car in a hoistway improved with sensors, heat and water resistant electrical components, pressurization and blast resistant walls.
2. Lobby provided with two-hour rated fire doors,
3. fire pressurization shaft and direct access to
4. emergency stairs within a separate fire and blast protected compartment.
5. Standpipe and hosracks would be in the lobby.

Typical protected elevator





Protected elevator

1) Protected emergency elevator car
2) Protected emergency elevator lobby
3) Emergency stairs vestibule (can be part of elevator lobby)
4) Pressurization shaft
5) Emergency stairs

Electrical systems requirements 1/3

General

- Elevator recall functionality
- Monitoring systems, also communications

Emergency Power System

- Standby power for 100% of the protected/enhanced/standard elevator(s)

Elevator Vestibules

- Heat detectors, smoke detectors,
- Permanent firefighters' communication system,
- Emergency supervised communication system for occupant's use
- CCTV camera connected to a video switch & monitor system in the Fire Control Center (FCC) should be provided.
- Dedicated smoke exhaust and/or pressurization systems

Electrical systems requirements 2/3

Elevator Machine Room

- Sprinkler systems are not advisable as elevator machine room equipment cannot be made fully water protected.
- Automatic smoke and heat detectors
- Ventilation and/or air-conditioning system installed within a hardened and fire protected enclosure.
- Room should be configured to prevent water intrusion.
- Dedicated smoke exhaust and/or pressurization systems should be provided.

Hoistways

- An automatic smoke detection system
- Hoistway should be configured to prevent water intrusion or provided with electrical systems that are listed for use in wet locations.
- Dedicated smoke exhaust and/or pressurization systems

Electrical systems requirements 3/3

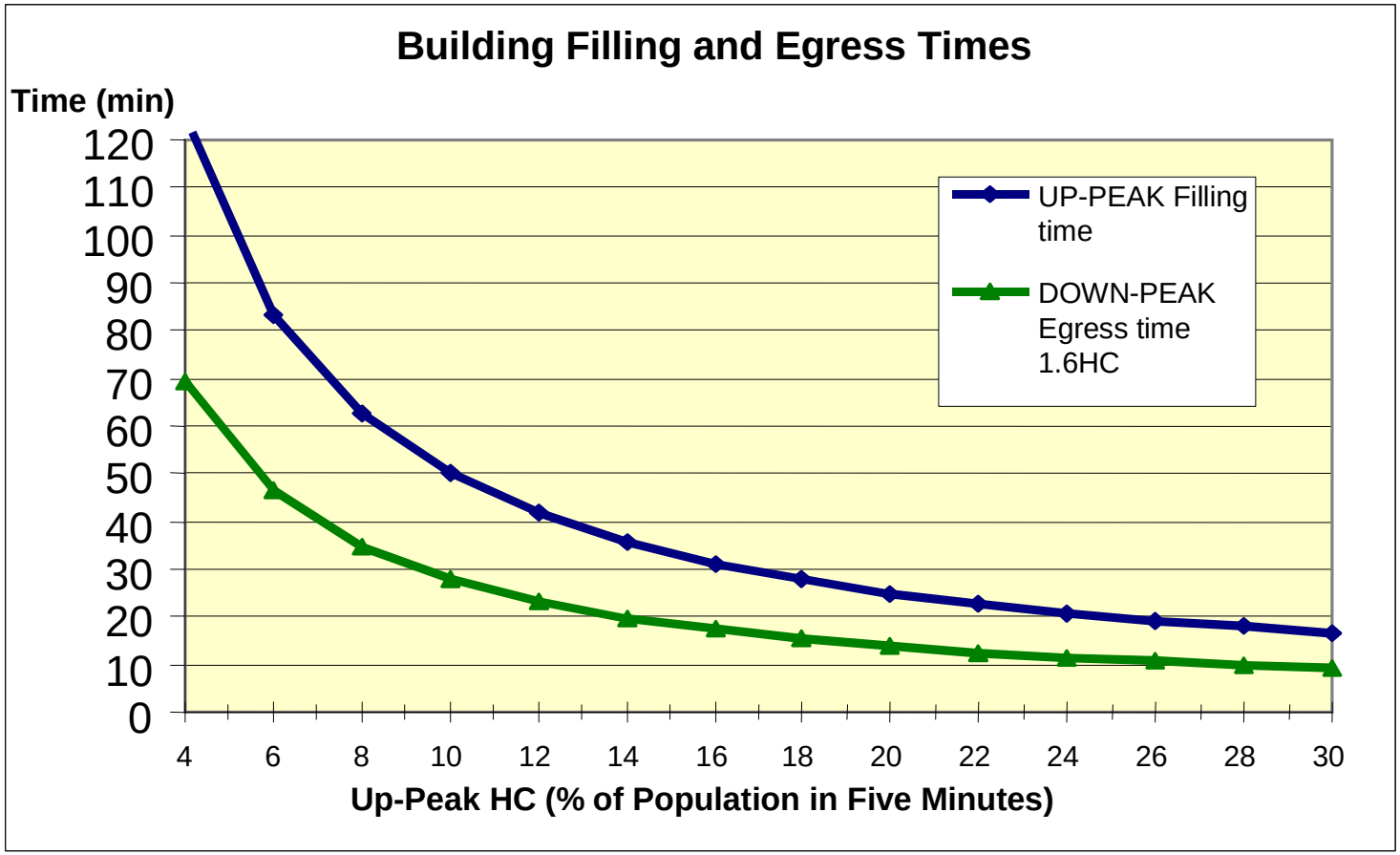
Elevator Car

- Permanent firefighters' communication system
- Supervised emergency communication system for occupant's use
- Lighting fixtures and exit signage that are provided with integral battery backup units and connected to the emergency power system.

Protected/Enhanced/Standard elevator vestibules

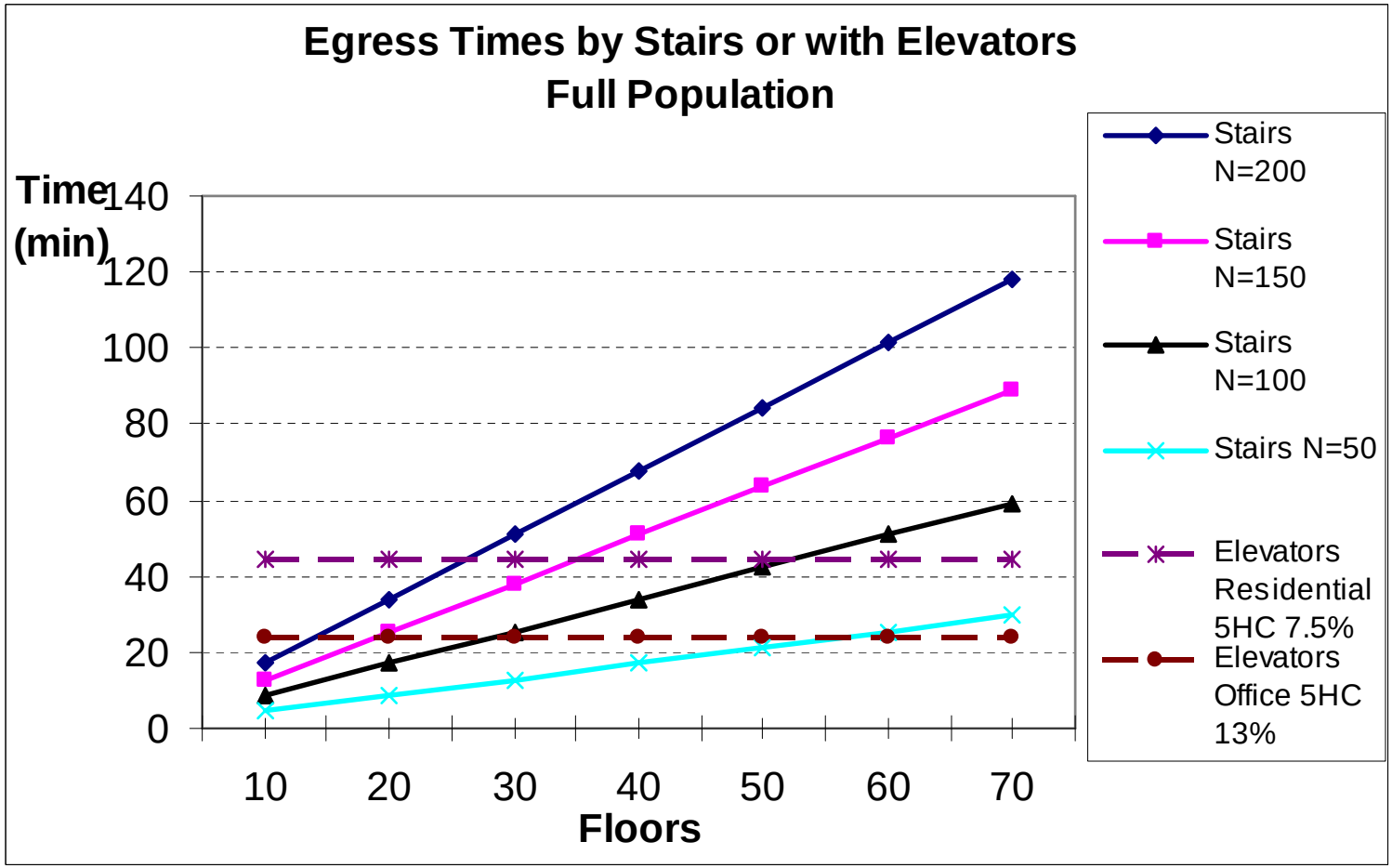
- Automatic smoke detectors
- Permanent firefighters' communication system
- Supervised emergency communication system for occupant's use,
- CCTV camera connected to video switch & monitor system in the Fire Control Center
- Dedicated smoke exhaust and/or pressurization systems should be provided.

Down-peak vs up-peak efficiency



- Elevator system has 1,6 times greater efficiency in down peak traffic

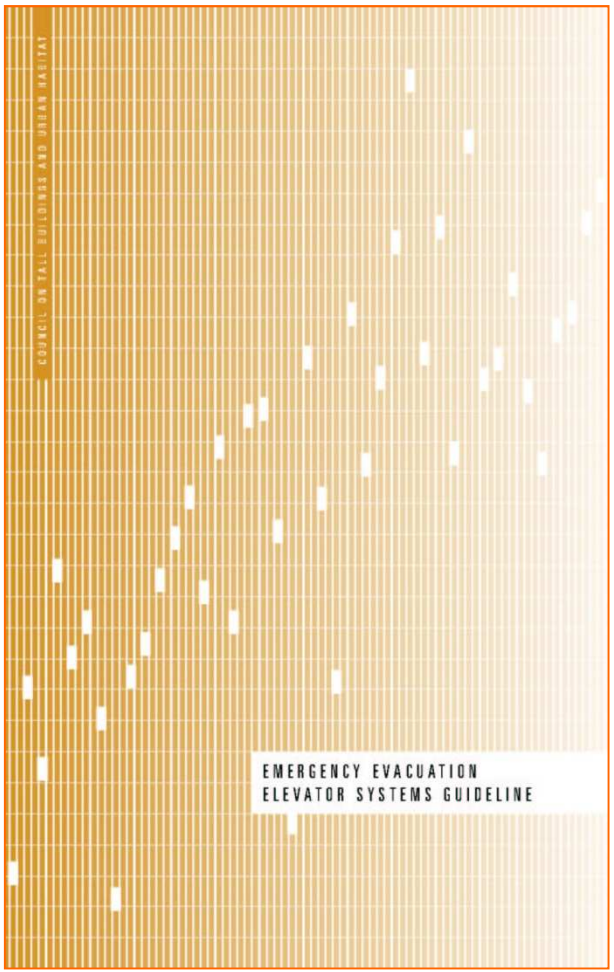
Total evacuation stairs vs elevators



- Total evacuation by elevators is faster when building height exceeds 20 floors
- Assumption: Stairs designed to same width throughout the building

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Thank you!

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