

# Maze Fire Consulting

In the event of fire DO use this lift

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## Key Terms

### **Functional Limitations**

A functional limitation is defined by the reported level of difficulty (no difficulty, some difficulty, a lot of difficulty, or cannot do at all/unable to do) in six core functioning domains: seeing, hearing, mobility, communication, cognition, and self-care (CDC definition).

### **Egressibility**

Used within Human Behaviour in Fire (HBiF) literature to describe the accessibility of evacuation (egress) methods (Ronchi et al. 2022)

### **PRM**

Often used to refer to people with reduced mobility

### **Evacuation Lift**

A lift that has been specifically designed to be used in evacuation. They can operate as passenger lifts under everyday use, but have additional functions and protection to allow them to be used in an emergency.

## A few important notes



It is not just wheelchair users who may experience difficulty evacuating (e.g. older and younger, pregnancy, injury, people with sensory, cognitive disabilities, fatigue in tall buildings)

The social model of disability considers the disabling nature of barriers rather than considering disability only as a characteristic of the individual. Egressibility is about removing those barriers to enable evacuation;

We can change the environment, but not a person's functional limitations (Smedberg et al. 2023)



## Why it matters



- Disability prevalence is high and many societies have an aging population (Boyce, 2018). It is expected that the number of people with difficulty on stairs will increase over time;
- Long Covid c.2.3m in UK (800k left employment);
- Thompson, Galea and Hulse (2018) found that disabled people, under 5s and over 65s were over-represented in dwelling fire injury and fatalities;
- People often move as a group and help others, so impact of barriers extends beyond the disabled person (e.g. WTC).
- Taller buildings, the London Plan and BS 9991 draft mean more evacuation lifts are being installed and we need to think about how they work.



# Nothing about us without us

Accessible egress from flats (unpublished research by Button, 2020)

- 36 participants – 33% had difficulty using stairs;
- Experienced discomfort when using refuges;
- Most willing to use evacuation lifts, but wanted training/information and to understand waiting times (reflects findings of Ding et al., 2019);
- Participants ranked independence as the most important factor in evacuating, also valuing training, information and ability to communicate with fire and rescue services;
- Among those unable to use stairs, having their mobility aids and medical equipment taken outside was the most important consideration.



## Available guidance (non-exhaustive)

- Norway - Draft prNS 3807:2019  
The use of lifts for evacuation
- Draft BS EN 81-76 (currently CEN/TS 81-76:2012)
- Draft BS 9991
- SS 763510
- NFPA 101 and 5000
- International Code Council IBC
- BS 9999
- TGD B: Buildings other than dwellinghouses
- CIBSE Guide D
- SFPE Engineering Guide to Fire Safety for Very Tall Buildings
- FSR 8:2011 (Singapore)
- ISO/TR 25743:2010 (requirements and cause and effect)
- ISO TS 18870:2014
- Australia – Lifts Used During Evacuation handbook and Use of Lifts for Evacuation guide

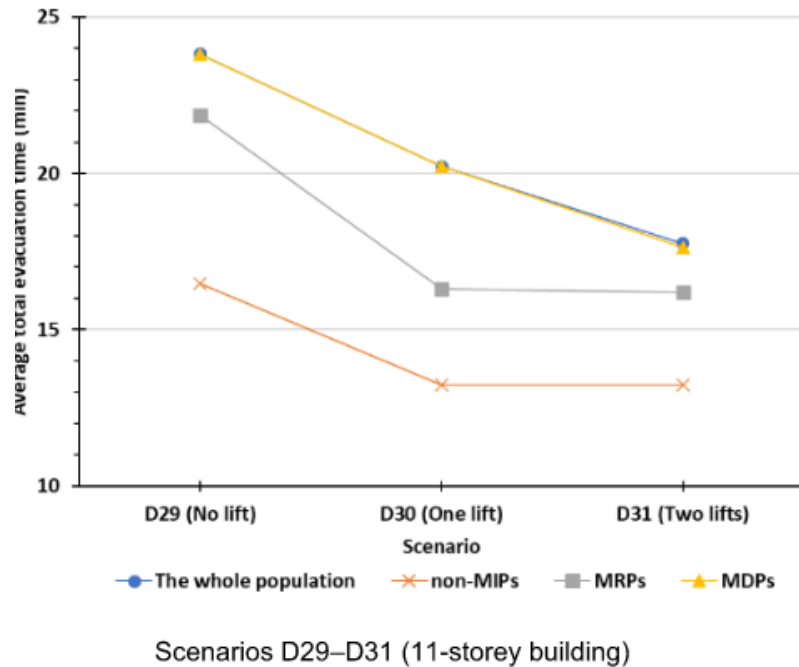


Image from SS 763510





# Benefits



Source: Spearpoint, Arnott, Gwynne, Xie and Templeton, 2024. CPD 004/121/103: Means of Escape in Residential Buildings. Objective B3: Guidance on evacuation strategies and final report. (MLCHG/DLUHC/HSE commissioned research)

## Additional Stairs

- Provides alternative if one route is blocked (subject to adequate separation)
- Residents prefer a second path
- Reduces time to enter stair and potential for congestion reduction where many enter simultaneously
- Reduces evacuation time where occupancy exceeds single stair storage capacity

## Lifts

- Reduction in preparatory time for mobility aid users (and reduced need to transfer to assistive devices)
- Reduces reliance on arrival of assistants
- Provides route for those unable to use stairs and more independence
- Reduces likelihood of those with reduced movement speed impeding others
- Reduces evacuation times for all



# Further lift benefits



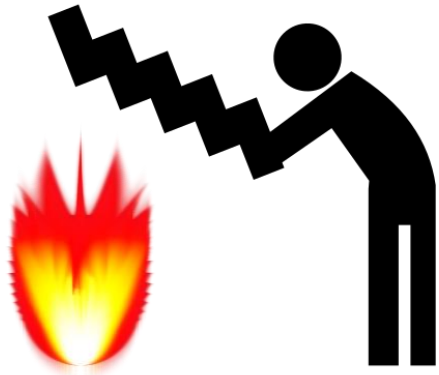
- Inherent trip hazard with stairs
- Reduces risks associated with assisted travel devices
- Lifts are typically faster
- Mobility aids and medical devices can be taken with the occupant for ongoing use
- Reduction in fatigue
- Provides an alternative if stairs compromised





# Costs and Challenges

## In Case Of Fire



**Use Stairs**

### Additional Stairs

- Relies on configuration and separation of stairs
- Occupies floorspace incurring cost
- Does not address PRM evacuation
- Without signage and familiarisation, may not be effective (e.g. balanced use)
- Occupants may delay evacuation knowing multiple routes are available

### Lift Provision

- Introduction, upgrading and maintenance costs
- Lift use protocols must be effective
- Prioritisation for PRMs
- Outreach and training required
- Limited practices and guidance
- Waiting time

Source: Spearpoint, Arnott, Gwynne, Xie and Templeton, 2024. CPD 004/121/103: Means of Escape in Residential Buildings. Objective B3: Guidance on evacuation strategies and final report. (MLCHG/DLUHC/HSE commissioned research)

## Safety Considerations

- Prevention of smoke spread between compartments (e.g. depressurization of lift shafts)
- Capacity and dimensions
- Evacuation strategy
- Control systems (function and maintenance)
- Back-up power supply
- Accessibility
- Prevention of water ingress into the lift shaft
- Protection against fire/fire gases throughout escape route (protected shaft, lobby, route to final exit)
- Communication





## Other considerations

- Travel distances
- Signage and information
- Capacity
- Waiting time
- Navigating doors and lobbies...
- Self driven vs assisted...
- Consultation with building users

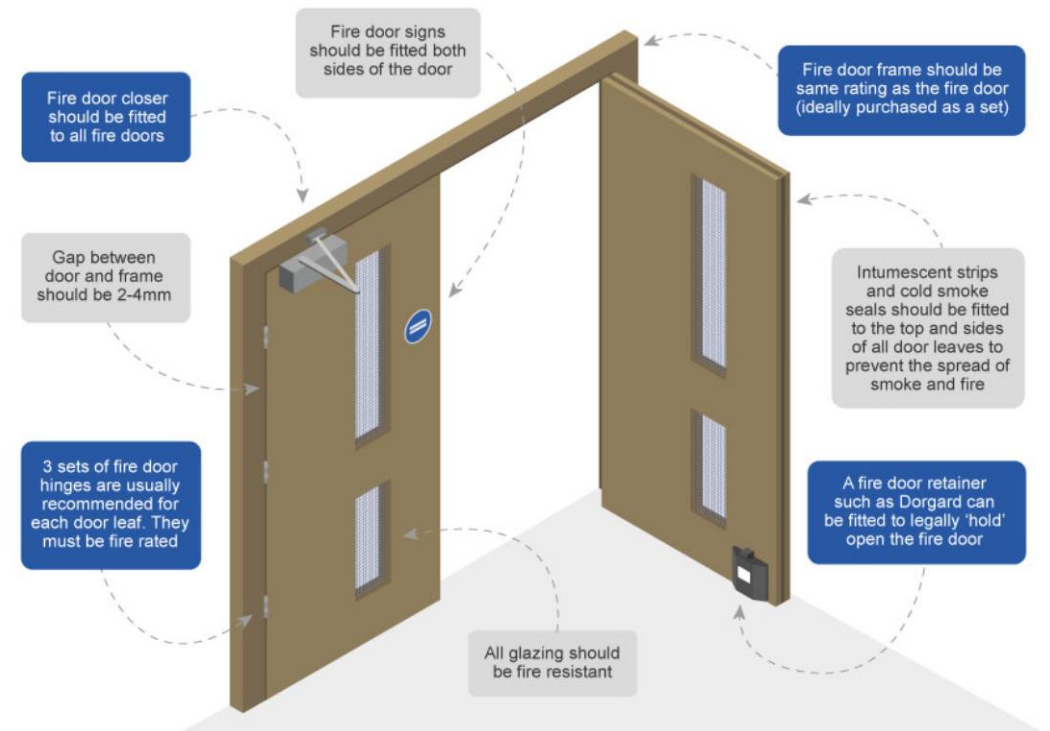


# Doors



- Self-closers and the ‘weight’ of the door
- This wheelchair is reversing!
- Exit widths based on people walking
- Multiple doors through a lobby

## Key Facts about Fire Doors



Safelincs (n.d.) <https://www.safelincs.co.uk/blog/2021/07/07/10-fire-door-questions-answered/>

## Self-driven vs assisted evacuation

- Much debated issue
- Self-driven lifts successfully installed in Sweden, less successful in UK
- Requirement for 'trained operative'
  - Relies on management
  - May result in delayed evacuation and people attempting to use stairs
  - Relies on additional technology and communication
  - Reduces independence
  - Inequitable
  - Ethical to send non-firefighters into a building with a fire?



# Capacity Assessment

## Physical Features

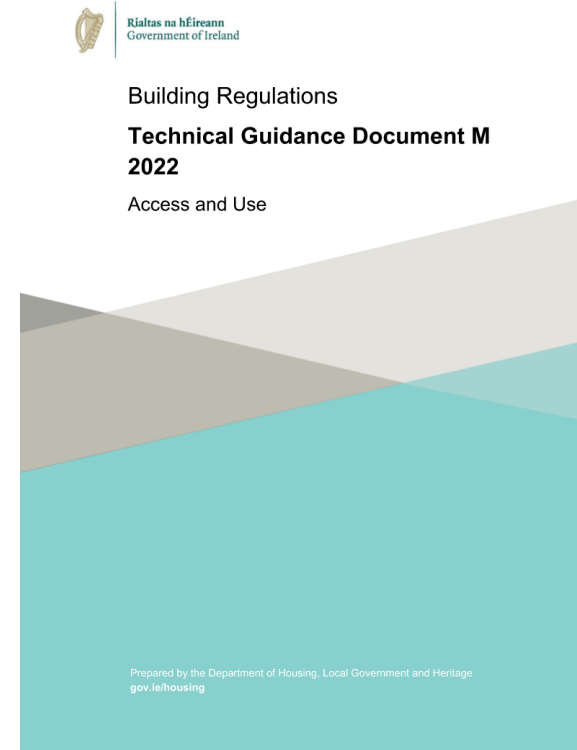
- Reach ranges
- Wheelchair (and attendant) dimensions
- Turning space requirements

## Demographics

- 2011 Census
- World Health Organisation
- Future needs (ageing population)

## Human Behaviour

- Coupled movement
- Waiting behaviour



### Design of an accessible and inclusive built environment

Part 2: Buildings — Code of practice



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# Universal Design

*‘The design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability’  
(The Centre for Excellence in Universal Design., n.d., p.66).*



- Mindset change
- ‘People friendly’
- Consider these examples...







# The Egress Enabler



## Personal component

*Description of functional capacity in terms of functional limitations.*

- A. Difficulty in interpreting information
- B1. Severe loss of sight
- B2. Complete loss of sight
- C. Severe loss of hearing
- D. Prevalence of poor balance
- E. Incoordination
- F. Limitations of stamina
- G. Difficulties in moving head
- H. Difficulty in reaching with arms
- I. Difficulty in handling and fingering
- J. Loss of upper extremity skills
- K. Difficulty in bending, kneeling, etc.
- L. Reliance on walking aids
- M. Wheelchair user

## Environmental component

*Description of environmental barriers through checklist items.*

### Sub-components

1. Notification systems  
*7 items. Systems in place to notify occupants of imminent threats.*
2. Signage  
*12 items. Wayfinding signage and systems to direct occupants to safety.*
3. Circulation spaces  
*22 items. Horizontal spaces in the building (rooms, corridors, etc.)*
4. Refuge area  
*13 items. Safe areas in the building where occupants can wait for further assistance.*
5. Occupant Evacuation Elevators (OEEs)  
*20 items. Elevators that are safe to use in case of emergency.*
6. Ramps  
*19 items. Sloping surfaces for vertical transportation.*
7. Stairs  
*25 items. Stairs that are meant to be used during egress.*
8. Doors  
*16 items. Exit doors that are meant to be used during egress.*
9. Outside environments  
*12 items. The route from the exit to the point of assembly.*

## Analysis

*Juxtaposition of the personal and environmental components. Quantification of severity and range of egressibility issues.*



# Further Reading



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