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BRE FIRE CONFERENCE 2015

11th June 2015



Part of the BRE Trust



Means of escape for disabled people

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Means of escape for disabled people

Objective

- To produce robust evidence and data to explore whether the guidance for means of escape for disabled people is sufficient to promote and support safe evacuation (unassisted where necessary) and is fit-for-purpose, along with the levels of compliance that are currently achieved to fully understand the implications

Work undertaken

- Definition of scope of building types to be covered
- Identification of trends/themes at SGC meeting
- Questionnaire to stakeholders
- Meeting with access consultants
- Meeting with access user group
- Review of mobility impairment, access aids, facilities and compliance with existing guidance
- Review of wheelchairs sizes, human data and properties
- Cost analysis

Scope

- Research considers AD B Volume 2 buildings where comprehensive guidance is given in AD B:
 - Common areas of blocks of flats
 - Residential Institutional (other)
 - Office
 - Shop and commercial
 - Assembly and recreational
 - Industrial
 - Storage and other non-residential
- Research does not consider buildings where other guidance documents (or fire precautions additional to AD B) are cited (generally 0.21 to 0.35 in Volume 2 of AD B):
 - Healthcare premises
 - Unsupervised group homes
 - Shopping complexes
 - Assembly buildings with fixed seating
 - Schools
 - Atria
 - Sheltered housing
 - Buildings of special architectural or historic interest

Interesting themes from access consultants and groups

- There is a significant lack of current ergonomic data on body shape and size, together with trends, previous data relates back to studies conducted on accessibility of cash points.
- Building designers (and design teams) do not generally fully consider the management implications for end users. Too much reliance is placed on the evacuation aid, such as “evac chair”, rather than providing a strategic approach to disabled (assisted or not) escape.
- Current guidance in AD B is very limited, no supportive information for designers to enable them to make informed decisions about the future impacts of providing different facilities to support the means of escape for disabled people.
- Guide dogs and hearing dogs should be considered as mobility aids, often overlooked.

Mobility access aids

- Sample of 130 wheelchairs: max dimensions 1150mm wide x 1900mm long (greater than refuge size). Typical size ~ 700mm wide x 1050mm long.
- Sample of 15 baby buggies (double width): median dimensions 750mm wide x 810mm long
- Sample of 15 mobility scooters (“pavement” style) had median length of 1200mm
- Compare these dimensions with those of a BS 5568:1978 type A folding wheelchair which has a width of 660mm and length 1065mm.
- BS 8300 also has a survey of mobility aid dimensions, turning circles etc. which is not consistent with other guidance.

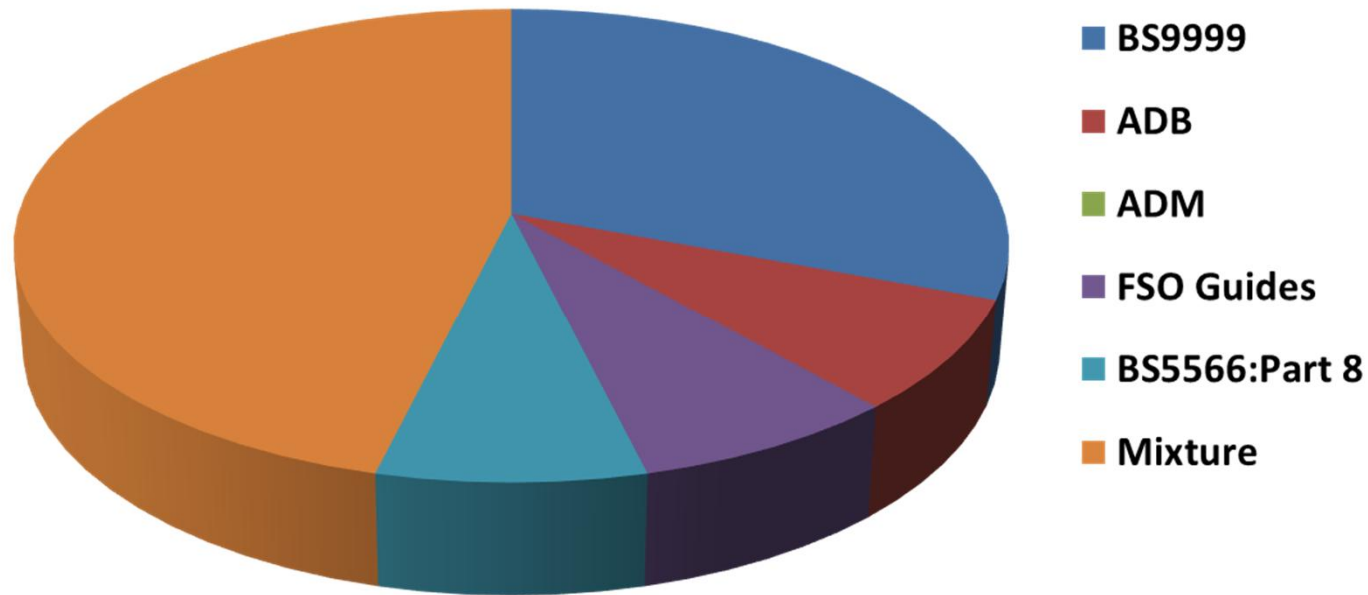
Egress recommendations

- Corridor widths – difference between AD M (minimum 1200mm, preferred 1800mm) and AD B (minimum 750mm with max 60 people, 850mm 110 people), BS 9999 (minimum 1200mm minimum),
- AD M recommends manually opened doors require a corridor 300mm wider than the door being accessed
- Minimum stair widths 1000mm in AD B, 1200mm in AD M (and upwards BS 9999)
- Evacuation lifts are fine to use, other types may also be used as well
- Standard refuge dimensions 900mm x 1400mm consistent (Not Scotland)

Questionnaire (1)

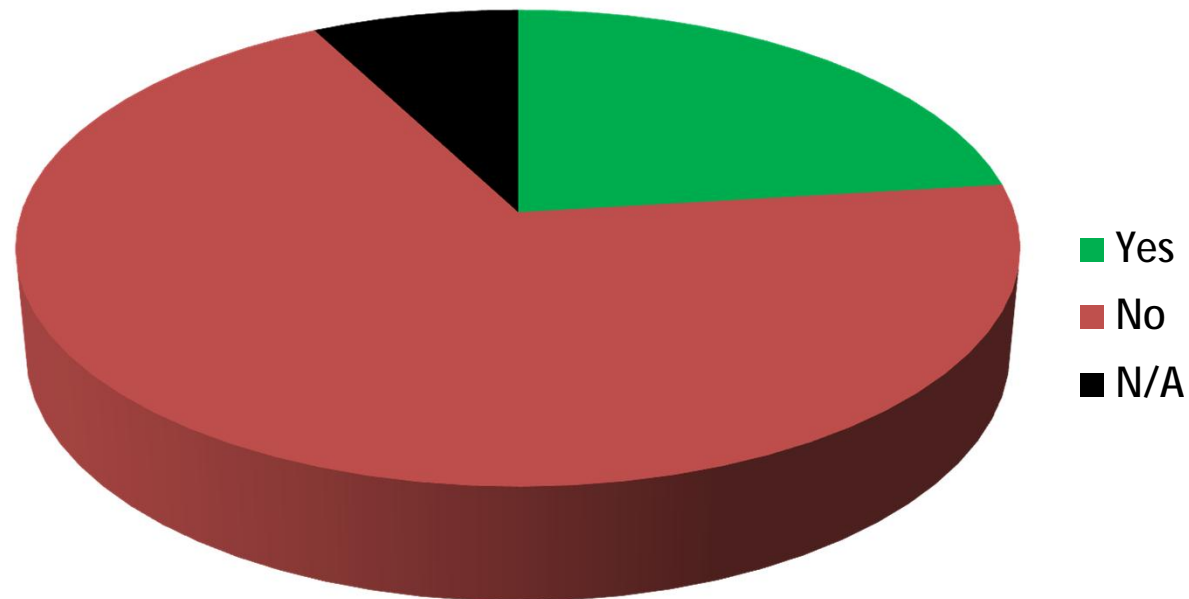
- Questionnaire issued to all members
 - Q1 - When considering means of escape for disabled people which guidance do you primarily follow?
 - Q5 - Is there sufficient supportive information associated with the design of facilities for means of escape for disabled people within ADB?
 - Q6 - Do you consider that the same provisions should be provided for downward vertical escape (from buildings above ground floor) as upward vertical escape (from basements)?
 - Q8 - Within existing buildings, where provided, are the means of escape provisions for disabled people suitable and sufficient for the building population?

Q1 - When considering means of escape for disabled people which guidance do you primarily follow?

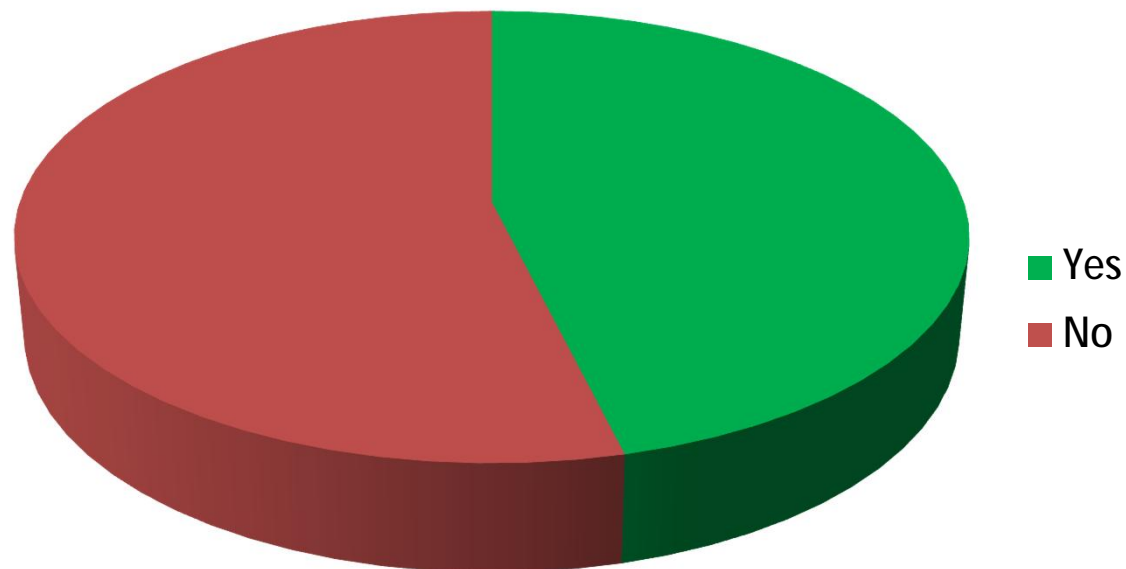


Guidance in BS 9999 is the prevalent **single** document followed, however using various documents is the most favourable approach.

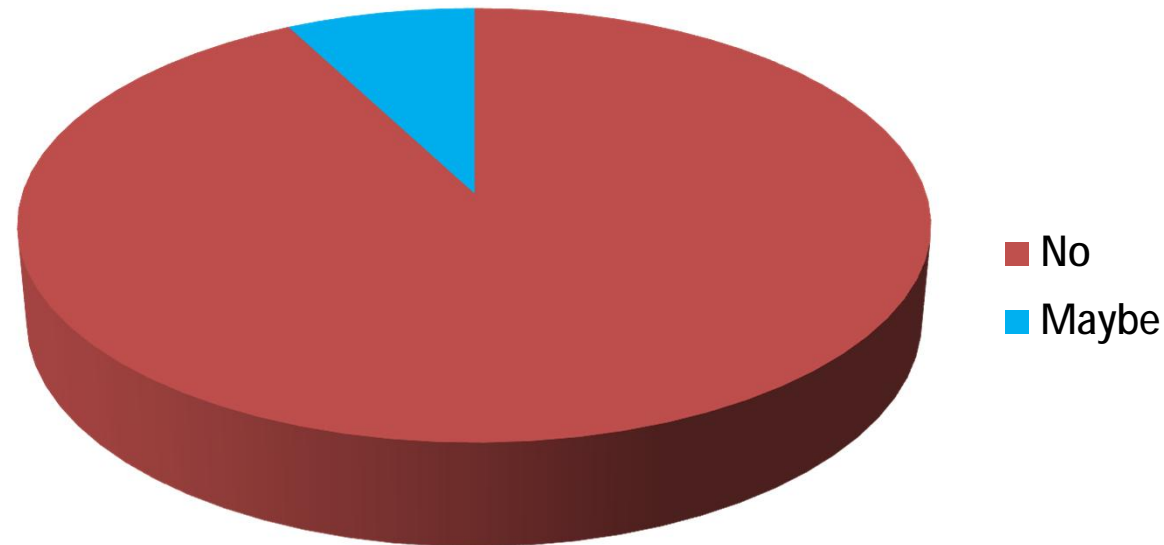
Q5 - Is there sufficient supportive information associated with the design of facilities for means of escape for disabled people within AD B?



Q6 - Do you consider that the same provisions should be provided for downward vertical escape (from buildings above ground floor) as upward vertical escape (from basements)?



Q8 - In occupied buildings has sufficient fire safety design information been provided relating to the facilities for means of escape for disabled people to enable robust fire safety management of the building?



Risk cost analysis of alternative solutions

Data:

- *Fire statistics (limited figures available in purpose groups 2 – 7)*
- *Costs of:*
 - *rentable space for various purpose groups*
 - *access aids and facilities*
 - *construction of stairs/ lobbies (m²)*
 - *alternative fire precautions (sprinklers, smoke control)*
 - *additional management and training*
 - *maintenance*

Outputs:

- *Benefits*
 - *(assumed all solutions equivalent to ADB)*
- *Risk of death or injury*
 - *(assumed all solutions equivalent to ADB)*
- *Impact of additional measures on rentable space for different size and purpose group of building*

Evacuation solutions

- Provision of:
 - Fully compliant evacuation lift, as per BS 5588 Part 8
 - Fire fighting lift, as per BS 5588 Part 5.
 - “Lift of beneficial use”. This lift arrangement will include:
 - Duplicate (resilient and redundant) power supply.
 - Additional lift controls to allow the use of a lift during a fire event within a building.
 - Standard passenger lift with fire resisting lobby provision at each floor.
- Three mobility aids (evacuation chair/sled) considered:
 - Two types of mobility aids will be for vertical downward escape;
 - One type of mobility aid will be for vertical downward and upward escape.

Assumptions

- Building:
 - New construction
 - Commercial in purpose; no specific purpose group will be assigned to the building.
 - Open to the public. However, no public access will be granted unless the building is staffed.
- Cost analyses consider:
 - Building life of 25 years (typical value for lift systems)
 - Initial capital investment cost and maintenance costs.
- Storey height will be between 3 ~ 3.4m

Building types/heights

- Two above ground storeys
- Five above ground storeys, circa 15m in height (Above 18m [6 storeys] AD B recommends that fire-fighting lifts are provided, these could [through suitable management] be used for disabled escape prior to fire service attendance)
- Two below ground storeys and three above ground storeys

Summary of cost analysis examples

Example	Facility	Two above ground storeys	Five above ground storeys	Two below ground and three above ground storeys
1	Evacuation lift	ü	ü	ü
2	Fire fighting lift	ü	ü	ü
3	Lift of beneficial use	ü	ü	ü
4	Standard passenger lift with fire resisting lobby on each floor	ü	ü	ü
5a	Mobility Aid 1	ü	ü	
5b	Mobility Aid 2	ü	ü	
5c	Mobility Aid 3	ü	ü	ü

Estimating costs for different lift systems

- The different specifications for the lift systems require different components
- Costs of each of these components is estimated and added to give total for overall lift system
- Monte Carlo techniques used to estimate the distribution of overall costs as many of the costs have uncertainty associated with them
- In the case of providing duplicate power supplies, uncertainty in this factor so large it would have dominated. Sensitivity analysis was used to account for uncertainty in this factor.

Costs of system components

- Spon's Architects and Builders Guide 2012, converted to 2013 prices
 - *Lift cars*
 - *Ventilation*
 - *Dry riser*
 - *Lobby*
 - *Enhanced resistance fire door*
 - *Communications system*
 - *Water drainage*
 - *Backup power supply*
 - *Separate and remote cabling*
 - *Lighting and signs*
 - *Control switches*
 - *Construction costs*

Estimating costs for different Mobility Aid

- Original purchase price
 - Powered and Non-powered aids
- Maintenance
- Depreciation and replacement
- Training
 - Including loss of revenue
 - Refresher courses

Results – Costs of lift installations in example buildings

Building example	Lift			
	Fire-fighting	Evacuation	“Beneficial”	Normal lift + lobby
Building 1 (2 storeys above ground)	£151k ± £7k	£138k ± £7k	£76k ± £6k	£90k ± £6k
	£265k ± £7k	£251k ± £7k		
Building 2 (5 storeys above ground)	£191k ± £10k	£169k ± £10k	£86k ± £6k	£122k ± £9k
	£304k ± £10k	£284k ± £10k		
Building 3 (2 below, 3 above ground)	£207k ± £12k	£169k ± £10k	£86k ± £6k	£122k ± £9k
	£322k ± £12k	£284k ± £10k		

Note 1. For the fire-fighting and evacuation lifts, sensitivity analysis has examined the effect of variation in the cost of providing a backup power supply. The two values shown represent the lower and upper bounds of the range.

Note 2. These costs do not include lift maintenance.

Results – Costs of evacuation chairs in example buildings

- Evacuation transit chair requiring two to three people to assist one wheelchair user downstairs: Present Value Whole Life Cost = £6,410 ± £1,477.
- Evacuation chair requiring one person to assist one wheelchair user downstairs: Present Value Whole Life Cost = £5,014 ± £811.
- Powered evacuation chair requiring one person to assist one wheelchair user either up or down stairs: Present Value Whole Life Cost = £20,221 ± £5,652.
 - The uncertainty is quoted as ± one standard deviation.

Conclusions

- In the opinion of users, information provided in current guidance, AD B, is not considered to be incorrect. However, there is a general consensus that additional supporting information on the objectives behind the provision of disabled egress facilities and equipment would be considered beneficial to designers and users.
- Different guidance documents provide varying dimensions etc. for access and egress provisions. Designers and building users should make themselves aware of these differences and ensure that any building work undertaken satisfies all the relevant requirements of the Building Regulations.
- In the opinion of stakeholders, building designers (and design teams) do not generally fully consider the management implications for end users.
- In the opinion of stakeholders, Regulation 38 is not always fully complied with; Thereby, strategic fire safety design information is not readily available for building and facilities managers.
- The cost analysis has produced a table of estimated costs to enable cost comparisons to be made to inform decisions on the provision of different evacuation solutions (different types of lifts or evacuation mobility aids) for new construction commercial buildings for three different building heights. These costs include appropriate capital and on-going maintenance and training costs.

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Thank you

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