Forum on Standards

Adam J Scott

CIBSE Lifts Group | Codes & Standards Representative
Plea For The DPC

Part 20 & The Journey to 31st August 2017

Understanding a Standard
Plea For The DPC

Part 20/50 & The Journey to 31\textsuperscript{st} August 2017

Understanding a Standard
Draft for Public Comment

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www.bsigroup.com

Date: 03 November 2015
Origin: European

Latest date for receipt of comments: 29 December 2015

Project No. 2015/02106

Responsible committee: MHE/4 Lifts, hoists and escalators

Interested committees:

Title: Draft BS EN 81-70 Safety rules for the construction and installations of lifts

Particular applications for passenger and good passengers lifts - Part 70: Accessibility to lifts for persons including persons with disability
Dear CIBSE Lifts Group Members

Draft BS 9999 Fire safety in the design, management and use of buildings - Code of practice
draft here: https://www.dropbox.com/s/gco2tirne6ag3t/FSH_14_16_0003.pdf?dl=0

Draft BS 8899 Improvement of fire-fighting and evacuation provisions in existing lifts - Code of practice
draft here: https://www.dropbox.com/s/1tn3o0nmv12atke/MHE_4_15_0034.pdf?dl=0

Please be advised that this important draft standard has now been published for public comment and is attached. Please note this document has been made available to you as a registered member of the CIBSE Lifts Group for your personal review, please do not circulate further.

Members of the CIBSE Lifts Group are therefore invited to review the documents and submit comments.

This draft British Standard is available for review and comment online via the BSI British Standards Draft Review system (DRS) as http://drafts.bsigroup.com

Registration is free and takes less than a minute. Deadline for receipt of comments is 22nd May 2016.

Adam J Scott
CIBSE Lifts Group
BSI MHE/4 Codes & Standards Representative

Sent by Richard Peters
On behalf of the CIBSE Lifts Group

Peters Research Ltd.
Boundary House, Missenden Road, Great Kingshill, Bucks HP15 6EB, UK
tel +44 (0)1494 717821
www.peters-research.com
Dear CIBSE Lifts Group Members

Draft BS EN 81-58 Safety rules for the construction and installation of lifts - Examination and tests Part 58: Landing doors fire resistance test
https://www.dropbox.com/s/4v1cnm6a6161ccwMHE_4_16_0035.pdf?dl=0

Commenting template:
https://www.dropbox.com/s/yp8u1tsvobgnsrafSO_commenting_template.doc?dl=0

Please be advised that this important draft standard has now been published for public comment and is attached. Please note this document has been made available to you as a registered member of the CIBSE Lifts Group for your personal review, please do not circulate further.

Members of the CIBSE Lifts Group are therefore invited to review the documents and submit comments on the commenting template back to Adam Scott at adam.scott@sweco.co.uk by the 24th May 2016.

Adam J Scott
CIBSE Lifts Group
BSI MHE4 Codes & Standards representative

__________________________
Sent by Richard Peters
On behalf of the CIBSE Lifts Group

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Peters Research Ltd: Registered Office 7/8 Eghams Court, Boston Drive, Bourne End, Bucks SL8 5YS, UK. Registered No. 3435465 in England
Dear CIBSE Lifts Group Members

DPC BS EN 81-70 Safety rules for the construction and installation of lifts. Particular applications for passenger and good passengers lifts - Part 70: Accessibility to lifts for persons including persons with disability

Please be advised that this important draft standard has now been published for public comment and is attached. Also attached is a useful comparison document which highlights the changes being proposed in the new standard. Please note that these documents have been made available to you as a registered member of the CIBSE Lifts Group for your personal review, please do not circulate further.

Members of the CIBSE Lifts Group are therefore invited to review the documents and submit comments on the attached template back to Adam Scott at adam.scott@grontmij.co.uk by the 18th December 2015.

Regards,

Adam

Adam J Scott
CIBSE Lifts Group
BSI MHE/4 Codes & Standards Representative

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Sent by Richard Peters
On behalf of the CIBSE Lifts Group

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Plea For The DPC

Part 20/50 & The Journey to 31st August 2017

Understanding a Standard
Acknowledgements:

Thanks to CEN TC10 & LEIA
Current BS EN 81-1 and BS EN 81-2 since 1998

BS EN 81-1 and BS EN 81-2 have been merged and have become:

**BS EN 81-20**: Requirements for complete passenger or goods passenger lift installations independent of the driving system

**BS EN 81-50**: Description of the examinations, calculations and tests of lift components used in any type of lift (passenger, goods passenger, goods only lift, etc.)

EN 81-20 and EN 81-50 published 6 August 2014

EN 81-20 and EN 81-50 referenced in OJEU 12 Dec 2014 so now harmonized under Lifts Directive

EN 81-1 and EN 81-2 to be withdrawn **31 August 2017**
Thursday 31st August 2017

451 days / 65 weeks away
Passenger lifts placed into service after 31\textsuperscript{st} August 2017 cannot use BS EN81-1/2 as the harmonized standard affording presumption of conformity with the EHSR of the Lifts Directive
Where there are accessible spaces under the pit a safety gear must be provide on the counterweight.

No longer permissible to use a “solid pier” or other structural “solution”.

Headroom

One refuge space for each person on the car roof.

All refuge spaces must be of the same type.

Reduction allowed to the base of type two along one edge of 100 mm x 300 mm.

Sign on car roof stating how many refuge spaces and what type

Sign on CWT giving dimension to buffer under normal operation.
Headroom

A: Distance $\geq 0.50$ m
B: Distance $\geq 0.50$ m
C: Distance $\geq 0.50$ m
D: Distance $\geq 0.30$ m
E: Distance $\leq 0.40$ m

X: Height of refuge spaces

1 - Highest parts on the car roof
2 - Car
3 - Refuge space(s)

Height above any area considered as a standing area ($\geq 0.12$ m$^2$) must be the same as the refuge space height.
### Pit

One refuge space for each person in the pit.

All refuge spaces must be of the same type.

Sign in pit stating how many refuge spaces and what type

<table>
<thead>
<tr>
<th>Type</th>
<th>Posture</th>
<th>Pictogram</th>
<th>Horizontal dimensions of the refuge space</th>
<th>Height of the refuge space</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standing</td>
<td><img src="image" alt="Pictogram" /></td>
<td>0.40 x 0.50</td>
<td>2.00</td>
</tr>
<tr>
<td>2</td>
<td>Crouching</td>
<td><img src="image" alt="Pictogram" /></td>
<td>0.50 x 0.70</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>Laying</td>
<td><img src="image" alt="Pictogram" /></td>
<td>0.7 x 1.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Key for pictograms**

- ①: Black colour
- ②: Yellow colour
- ③: Black colour
Access to pits > 2.5m deep must be by stairs

New requirements for pit access ladders and to provide them with a safety contact where necessary.

Normative text in clause 5, combined with a new normative annex giving the possible ladder types.
All lift cars regardless of well clearances to have a “toe board” around the car roof edge.

Use of 1100 mm high balustrades when distance to well wall exceeds 500 mm.
Doors

All doors in future, including their frame, will be subject to pendulum impact testing at their weakest points.

The criteria for acceptance of the pendulum test is given in EN 81-20.
BS EN81-50

Applies to more than just EN 81-20 lifts

Type test of car door locking device added

Changes to the test requirements for safety gears, overspeed governors, buffers, PESSRAL, ACOP and UCMP devices

New guide rail formulas

Changes to traction and rope safety factor evaluations

Hydraulic calculations corrected

Pendulum shock test revised
What happens if an project overruns?
Review with Notified Body as early as possible
Plea For The DPC

Part 20/50 & The Journey to 31st August 2017

Understanding a Standard
Shall
Should
May
Can
Shall – a requirement

Should – a recommendation

May – expresses permission

Can – expresses physical possibilities
CEN TC10 interpretations website at:

Forum on Standards

Adam J Scott

CIBSE Lifts Group | Codes & Standards Representative
TOPICS

Road map to (heaven) BS EN ISO 8100-20: 2020 ???
Status of harmonised and supporting EN standards
Summary of the New Lift Directive
Road map to (heaven) BS EN ISO 8100-20: 2020
STATUS OF HARMONISED AND SUPPORTING EN STANDARDS
IAN JONES LETTER, DATED 4 FEBRUARY 2016

- Publication of EN81-20/50
- Transitory period 36 months
- EN 81-1&2 Withdrawal
CONCESSION TO 1 SEPTEMBER 2018

- There are a number of supplementary harmonised standards as listed below that support BS EN 81-1 and BS EN 81-2 and these are being progressively revised to support BS EN 81-20 and BS EN 81-50.

- These supplementary harmonised standards are to be published by 31 August 2018

- From 1 September 2018 manufacturers can only claim compliance with the revised supplementary harmonised standards.
<table>
<thead>
<tr>
<th>Standard: Year of last amendment</th>
<th>Short title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS EN 81-21:2009</td>
<td>Lifts in existing buildings</td>
</tr>
<tr>
<td>BS EN 81-28: 2003 Maybe 2016???</td>
<td>Remote alarms</td>
</tr>
<tr>
<td>BS EN 81-58: 2003</td>
<td>Fire rating of lift landing doors</td>
</tr>
<tr>
<td>BS EN 81-71: 2005</td>
<td>Vandal resistance</td>
</tr>
<tr>
<td>BS EN 81-70: 2003</td>
<td>Accessibility</td>
</tr>
<tr>
<td>BS EN 81-72: 2003*</td>
<td>Firefighting lifts</td>
</tr>
<tr>
<td>BS EN 81-73:2013  BS EN 81-73: 2016</td>
<td>Behaviour of lifts in the event of fire</td>
</tr>
<tr>
<td>BS EN 81-77: 2013</td>
<td>Lifts in seismic conditions</td>
</tr>
<tr>
<td>BS EN 12015:2014</td>
<td>EMC emission</td>
</tr>
<tr>
<td>BS EN 12016:2013</td>
<td>EMC immunity</td>
</tr>
<tr>
<td>BS EN 13015:2001</td>
<td>Maintenance instructions</td>
</tr>
</tbody>
</table>

* The supplementary standard BS EN81-72: 2015 is an exception and has been published and it replaces BS EN 81-72: 2003 from 1 September 2017.
Up to 31 August 2018 various combinations of base and supplementary standards may be applied to meet the requirements of the Lifts Regulations. The application of some standards may require the approval of a notified body and the issuance of a Design Examination Certificate. As an example, standards might be used as follows in support of the Lifts Directives:

- BS EN 81-73:2005 could be used with BS EN 81-1/2 up to 31 August 2017.
- BS EN 81-73:2016 could be used with BS EN 81-20.
- BS EN 81-73:2005 could be used with BS EN 81-20 with a Design Examination Certificate from a notified body.*
- BS EN 81-73:2016 could be used with BS EN 81-1/2 with a Design Examination Certificate from a notified body.*

* This is because BS EN 81-73:2005 does not contain reference to BS EN 81-20, and BS EN 81-73:2016 does not contain reference to BS EN 81-1/2.

The notified bodies for lifts are preparing guidance (RFU) on the process, which may be available in 2016.
SUPPORTING (UN-HARMONISED) STANDARDS

There are a number of supporting (un-harmonised) standards including:


**BS EN 81-82:2013 Safety** rules for the construction and installation of lifts — Existing lifts Part 82: Rules for the improvement of the accessibility of existing lifts for persons including persons with disability

**DD CEN/TS 81-83:2009** Safety rules for the construction and installation of lifts — Existing lifts Part 83: Rules for the improvement of the resistance against vandalism
Summary of the New Lift Directive
HISTORY

- EC new approach directives resulted in Lift Directive: 95/16/EC, published 29 June 1995
- UK Lifts Regulations 1997, 1 July 1999
- In 2006 Lift Directive amended by Machinery Directive to place boundary between Machinery Directive and Lift Directive products at 0.15 m/s and fully enclosed car, imperforate doors and walls
- Transposition by 20 April 2016 and fully enforced (no period of national transition)
- The Guide to the Lift Directive which will have to be certainly modified as the current one dates back to 2007 with a slight amendment work carried out in 2009.
DEFINITIONS (Article 2)

Improved and additional definitions

"Making available on the market",

"Placing on the market"

"Authorised representative"

"Importer"

"Distributor"

"Economic operators"

"Technical specification"

"Recall"

"Withdrawal"
"Recall" is a new definition is a whole new concept for lifts and safety components.

‘recall’ in relation to a lift means any measure aimed at achieving the dismantling and safe disposal of a lift, and in relation to a safety component for lifts means any measure aimed at achieving the return of a safety component for lifts that has already been made available to the installer or to the end-user;

The recall can lead to the dismantling of a non-complying lift installation, as for example in the case of a serious non-compliance which cannot be amended by the installer.

Is this feasible for fixed installation such as a lift installation?
OBLIGATIONS OF INSTALLERS (Article 7)

The Installers shall design, manufacture, install and test new lifts in accordance with the EHSRs.

If an installation involves a risk, the installer must investigate the causes and record the details of the complaints and non-compliance and inform distributors.

If the installer discovers in an installed lift(s) a non-compliance with the EHSR then they must immediately take the necessary corrective actions to remove it if such lifts pose a risk. The installer must immediately inform the national authorities about their location, giving details of non-compliance and corrective actions taken.

The installer's postal address must be indicated on the lift or be provided in the documentation or in the register available on site.
OBLIGATIONS OF MANUFACTURERS (Article 8) (Refers to safety components)

The manufacturers of safety components are responsible for the design and manufacture of safety components carry out tests on samples, record complaints and non-compliance and replace components already available on the market providing the necessary and timely information to distributors and installers.

For component traceability, the manufacturer shall indicate on the product (or label) the manufacturer's name, the registered trademark and the contact address.

If a non-compliance with the Directive is detected for products already made available to the market, the manufacturer must immediately adopt the corrective measures to make the component compliant or withdraw it.

If the safety component is potentially dangerous, the manufacturer shall immediately inform national authorities and give details of the non-compliance and of any corrective action taken.
EU DECLARATION OF CONFORMITY (Article 17)
Compliance of lifts and safety components to directive.

The importance of the European harmonized standards is the presumption of conformity with the requirements of the Lift Directive

A single EU Declaration (both for the lift and the individual safety components) must be provided.

The Declaration of Conformity must be continually updated

EU DECLARATION OF CONFORMITY FOR LIFTS AND SAFETY COMPONENTS
(Annex II)

EU declaration of conformity for safety components and the EU declaration of conformity for lifts

Prescribes a precise format of the declaration
NOTIFICATION OF CONFORMITY ASSESSMENT BODIES (Articles 20 -36)

In these articles, the organization and the operation of the Notified Bodies and the operating procedures and obligations of the bodies are regulated, with precise rules for subsidiaries and sub-contracting and procedures of notification, including the reference to the powers and reporting of notified bodies.

The procedures for the appeals against the decisions of the bodies are indicated as well as the topic of the decisions and obligations for the exchange of information between Notified Bodies, in particular in relation to any withdrawn certificates and certifications.

A body belonging to a business association or professional federation representing undertakings involved in the design, manufacturing, provision, assembly, use or maintenance of lifts or safety components for lifts which it assesses, may, on condition that its independence and the absence of any conflict of interest are demonstrated, be considered such a [Notified] body.
ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

EHSRs substantially unchanged

Points (again) to MD 2006/42/EC

The reference to the Construction Products Directive (CPD) 89/106/EEC has been deleted and also the Regulation CPR (Construction Products Regulation 305/2011/EU).

This stops Directives interfering with each other.

There is a new formulation of the EHSR 3.2:

_In the event of a power cut or failure of components the lift must have devices to prevent free fall or uncontrolled movements of the car._

The elimination of the previous term "upwards" obviously involves the need to prevent uncontrolled movements of the car in both directions. [EN 81-1/2, Amendment 3.]
In EHSR 5.1 the reference to the new Machinery Directive 2006 (2006/42/EC) has been updated.

In EHSR 6 the title was amended by replacing the word "Instructions for use" with "Instructions ".

The language requirements (old 6.2) have been moved to Article 7 and are defined as follows.

*Installers shall ensure that the lift is accompanied by the instructions referred to in point 6.2 of Annex I, in a language which can be easily understood by end-users, as determined by the Member State in which the lift is placed on the market. Such instructions, as well as any labelling, shall be clear, understandable and intelligible*
Annexes III (CE marking) gone to Article 18

Annex VII (Notification bodies) removed gone to Articles 20-36

{New} Annex III - Safety components at point 2, the words *falling or unchecked upward movements* has been removed and the new wording is *falling or uncontrolled movements*. [EN 81-1/ 2, Amendment 3 refers]

In point 6 the note *safety switches* was changed to *safety circuits*

Annex IV - EU type examination

Notified Bodies to keep documentation and certificates for 15 years (from 10 years).

The Notified Body to follow the evolution of the technological progress (state of the art) and assess whether the approved type may no longer fulfil the conditions of issue, whether such changes require further investigation and, if so, the notified body shall inform the manufacturer.
CONCLUSIONS

- Not greatly changed
- Formalisation of terms
- Editorial tidying up and new numbering (Annex XIV correlation table)
- Improved market surveillance (NBs)

ACKNOWLEDGEMENT

ISO X and ISO Y Roadmap - laying out the development phases and timing

For information

FOLLOW UP
Proposed Roadmap for Development of ISO X and ISO Y

Objective

One global standard for lifts (elevators), used as identical national standard worldwide, thus

1) Improving global harmonization of technical requirements

2) Improving the safety of lifts for the benefit of all stakeholders worldwide
Preparation

Main deliverables
a) Approval of the roadmap by all stakeholders
b) Related resolutions and decisions in CEN and ISO

Phase 1: Identical adoption of EN 81-20/50 as ISO X/Y and creation of a regional TS

Main deliverables
a) ISO X and ISO Y standards, identical to EN 81-20 and EN 81-50
b) Addressing the current regional differences in a separate document, ISO/TS Z

Phase 2: First amendment to ISO X/Y (CEN Lead) and creation of EN ISO X/Y

Main deliverables
a) Amended ISO X and ISO Y
b) European adoption of ISO standards as EN ISO X and EN ISO Y, and withdrawal of EN 81-20 and EN 81-50

Phase 3: Regular (every 3 years) revisions and incorporation of regional TS

Main deliverables
a) Revised (EN) ISO X and (EN) ISO Y
b) Reduction of the regional differences

Objective of the roadmap has been achieved

a) Revised (EN) ISO X and (EN) ISO Y
b) Regional differences are minimized
### Proposed roadmap and its deliverables for development of ISO X and ISO Y

#### Preparation
- **EN 81-20/50**
- **EN 81-20-50 agreed amendment items**
- **CEN/TR 81-12**
- **ISO/TS 22559-2**
- **ISO/TS 11071-1/2**

#### Phase 1: Identical adoption of EN 81-20/50 as ISO X/Y and creation of a regional TS Z
- **ISO X/Y (Identical EN81-20/50)**
- **ISO/TS Z North America and Japan**
- **CEN/TR 81-12**
- **A17.1/B44, JIS**

**Main Action(s) of phase 1:**
- a) CEN/TC 10 offers EN 81-20/50 to be adopted by ISO/TC 178
- b) ISO/TC 178 gets the copyright clearance from CEN
- c) ISO/TC 178 decides to develop regional TS to cover North America and Japan
- d) ISO/TC 178 to launch the FDIS for EN 81-20/50
- e) ISO/TC 178 to launch approval of regional TS to be published together with the ISO standards as one package

- **US TAG and Canadian CAC to consider equivalence of ISO X/Y and ISO/TS Z to A17.1/B44 for requirements where scopes overlap.**

#### Phase 2: First amendment to ISO X/Y (CEN Lead) and creation of EN ISO X/Y
- **ISO X/Y**
- **ISO/TS Z North America and Japan**
- **CEN/TR 81-12**
- **A17.1/B44, JIS**

**Main Action(s) of phase 2:**
- a) ISO/TC 178 to decide to amend the ISO standards
- b) ISO/TC 178 proposes VA, Parallel Approval Process, CEN/TC 10 lead
- c) CEN/TC 10 to accept ISO proposal
- d) CEN/TC 10 to invite ISO experts to join the work
- e) Amendment is limited to the list of “items” agreed in advance
- f) Basically, regional TS remains as it is
- g) CEN/TC 10 to adopt ISO as EN ISO standards and withdraw EN 81-20/50 (with a 2-year transition period)

- **Commence process of convergence of TS Z with main body of A17.1/B44 Code.**

- **First set of resolutions will be approved by ISO/TC178 national mirror committee before ISO/TC 178 plenary meeting (2014/10).**
- **To develop JIS XXX-X/Y (exclude hydraulic lift) based on the future ISO X/Y, and ISO/TS Z**
- **TS A0028-1 expires in August 2017**

- **Commence process of publishing JIS XXX-X/Y**
- **JIS XXX-X/Y will replace TS A0028-1**
- **Commence process of convergence of TS Z with ISO X/Y.**

#### Phase 3: Regular (every 3 years) revisions and incorporation of regional TS Z
- **ISO X/Y**
- **ISO/TS Z North America and Japan**
- **CEN/TR 81-12**
- **A17.1/B44, JIS**

**Main Action(s) of phase 3:**
- a) ISO TC 178 to decide to revise the ISO standards
- b) ISO/TC 178 to decide whether to request CEN/TC 10 to lead the revision
- c) Main objective of the revisions is to reduce regional differences through solutions that satisfy all parties involved

- **Continue convergence process**
- **A17.1/B44 = ISO X/Y**

#### Objective achieved
- **ISO X/Y**
- **ISO/TS Z North America and Japan (minimized content, e.g., regulatory constraints, scope differences, building code requirements, etc.)**
The trouble with mobility scooters (invalid carriages)

Presented by
Michael S Bottomley
Aug 2010 fatality in South Korea
Mobility Scooters in UK

- There are over 500,000 mobility Scooters in UK
- Low cost
- Aging population
- Obese Population
- More incidents are likely to occur.
How much force is applied to the doors

- Class iii invalid carriages are capable of 4.166 m/Sec and accelerate to this speed at an acceleration of 3.33m/sec².
- Class iii carriages can weigh no more than 150kg or 200kg with medical equipment and the design often allows the passenger to weigh no more than 150kg but under BSEN 12184 =300 is the max passenger weight =500kg.
- From BS EN 1991, assuming the scooter components do not deform (c) and the doors deform by 5mm (b).
- If \( F = 0.5MV^2 / (c + b) = 0.5 \times 500 \times 4.166^2 / 5 = 867\text{KN} \)
How much energy is transferred

- Kinetic Energy = $\frac{1}{2} MV^2$
- Kinetic Energy = $(500 \times 3.76^2) / 2$
- Kinetic Energy = 4.39 K Joules
- The trick is then the design of the doors and the design of the Mobility Scooter.
- We should also consider the design of the building.
EN81-20 what it requires

- 5.3.5.3 Mechanical strength
- 5.3.5.3.1 Complete landing doors, with their locks, and car doors shall have a mechanical strength such that in the locked position of landing doors and closed position of car doors:
  - a) when a static force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles to the panel/frame at any point on either face they shall resist without:
    - 1) permanent deformation greater than 1 mm;
    - 2) elastic deformation greater than 15 mm;
  - After such a test the safety function of the door shall not be affected.
  - b) when a static force of 1000 N, being evenly distributed over an area of 100 cm² in round or square section, is applied at right angles at any point of the panel or frame from the landing side for landing doors or from the inside of the car for car doors they shall resist without significant permanent deformation affecting functionality and safety (See 5.3.1.4 [max. clearance 10 mm] and 5.3.9.1).
- 800 mm drop of soft pendulum = Mgh = 45 X 9.81 X 0.8 = 353.16 Joules
EN81-71 lifts expected to be misused

- Category 1 309J
- Category 2 442J
- Retaining force 618J

- But remember the fully ladened scooter at full speed transfers over 4000J. Or does it?
EN81

• EN81 does not address or consider the scale of forces applied by mobility scooters or other causes of heavy impact in the way that BS EN 1991 does. This means that the glass balustrade adjacent to a lift in a shopping mall will be more likely to resist mobility scooter impact than the lift doors themselves.

• Mobility Scooters built to BS EN 12184 do not satisfy the requirements of UK law!
Time for a little pragmatism

• Most Class 3 mobility scooters currently sold in the UK have a maximum weight of 120kg and a maximum passenger load set by the designer of 220kg giving a total load of 340Kg. On low speed =1.79m/sec

• The maximum likely force using formula (3) is therefore 340 * 3.333 = 1132N this is only slightly greater than the static force required in EN81-20 1000N over 100cm2

• The maximum energy is therefore 0.5*340*1.79^2 = 545J which is slightly more than the force required under EN81-71 category 2 and less than the retaining force 618J.
Lift Design considerations

- Lift doors and lift cars have improved impact resistance under EN81-20 but as has been shown this is not quite enough to protect against low speed mobility scooter impact.
- There are some simple changes manufacturers could make which can improve the impact resistance:
  - a) Use of stainless steel or cast iron door sills.
  - b) Improved strength of door shoes and fixings to door shoes.
  - c) Retaining plates located in between the door shoes to prevent the door panel from cat flapping.
  - d) Use of 2 panel side opening door arrangements which provide greater impact resistance at the centre of the door entrance.
  - e) Use of spring fixings to allow temporary deflection of top tracks and sills to dissipate impact energy
- NB The rear walls of single and adjacent entry lift cars will also need to be suitably strengthened.
Mobility Scooter Design

Mobility scooters main braking is by the retardation provided by the motor when disconnected from the battery.

Operator error and unintended operation of controls (by shopping baskets etc.) are common and predictable events. It would be inexpensive and would greatly improve safety if proximity sensors were fitted as standard to all Class iii scooters and as an option on Class ii scooters.

The spirit of the UK legislation which requires a device to limit a Class iii scooter to 4 mph except when on the road is being flouted. All that is normally supplied by manufacturers is a separate switch for high speed operation which many scooter passengers use as their default speed.

A greater safeguard is required if further accidents including those not related to lifts are to be avoided.
Implications for Building designers and managers

• Can the building reasonably refuse access for mobility scooters? If so this is a simple building management solution.

• If not is the lay out of the lift such that it is possible to have a straight line journey greater than 2 metres and impact the landing door panel at any landing? This is likely to apply to most hospitals, shopping centres, supermarkets, large retail outlets, Airports etc. In these cases consideration should be given to either:-
  • a) Creating a lift lobby to reduce the risk of full speed impact or
  • b) Improving the resilience of any applicable landing doors to the parameters suggested in 3.1 above.

• NB in the buildings cited above other vehicles such as luggage carts, food trolleys, portable X ray machines, pallet trucks etc. may also present risks in the same environment.
Conclusions

• With the growth of mobility scooter usage inside buildings the risk of accidents increases albeit from a very low base.

• Usage of mobility scooters is not currently in the UK restricted by capability or improved by training and the registration system for Class iii scooters is ineffective. The UK government is not minded to tighten laws but to the contrary has recently relaxed them.

• The UK has an aging population and one which is becoming increasingly obese. All of this means that the frequency of risk is increasing and in the circumstances identified appropriate control measures are required for all lifts.

• Laws and Standards do not address the issue so it is for specifiers, designers and building managers to assess the risks on a site specific basis and adapt designs appropriately.

• In buildings where space does not permit mobility scooters to accelerate to an impact speed of more than 1.4m/sec (i.e. have more than a 2metre run up) doors manufactured to EN81-71 category 2 should be sufficiently robust to prevent door failure.

• In buildings where space permits mobility scooters to accelerate to an impact speed of more than 1.4m/sec additional measures are required to prevent further fatalities.