

# Our Accessible World & The New Part 70

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**Abstract.** Advances in education, diet and medicine have brought wonderful benefits to us all over recent decades, not least of which is the potential to live longer. Average age is on an upward trend creating a growing need for us to influence our built environment in such a way as to maintain and improve accessibility for all.

Since its first publication in 2003, EN 81-70 [1] has provided us with the framework for the design of safe, accessible passenger lifts for all. As a harmonized standard it is a key document referenced in both The Building Regulations Approved Document M and British Standard 8300, and has established itself as the *de facto* standard on the subject throughout Europe and beyond. Recent developments suggest the standard may indeed have the potential to become an ISO with global reach.

This year should see the publication of the first revision to EN81-70 [2] since its original publication nearly fifteen years ago. It is the result of three years of work and much heated debate, consultation and comment. The presenter represented the British Standards Institution (BSi) on the CEN TC10/WG7 European drafting committee and therefore has insight into the new standard.

This paper will present the key changes we will see in the new document, and the thinking behind them.

## 1 BACKGROUND

It is a statistical fact that humans are living longer. Advances in education, medicine and diet are the primary enablers for this trend at a global scale, and for most of us it is likely to be a welcome feature of a developing society. But such evolution presents society with challenges as well as opportunities, and to benefit from extended lives we need to maintain our health, both physical and mental.

The news and political agenda here in the UK regularly highlights the extent to which poor mental health, in the form of dementia and other associated debilitating conditions, appears to be afflicting a greater and greater number of people. Also, for many, our physical health is also under pressure from the new world of instant convenience within which we now reside. As Dr. James Levine, director of the Mayo Clinic-Arizona State University Obesity Solutions Initiative has recently gone on record saying, “Sitting is the new smoking”, and for many the pervasive sedentary lifestyle, both at work and at home, is significantly increasing the likelihood of disability affecting our lives.

These trends allied to the prevalence of other disabilities in society, suggest that now more than ever disability needs to be a concern for us all. Consider these statistics:

- There are 39 million disabled people in Europe [3].
- There are 11.6 million disabled people in Britain [4].
- Around 16% (5.7 million people) of the working-age population in Britain [4].
- One in six people aged between 16 and 64 in Europe has either a long standing health problem or a disability [5].
- Only 8% of disabled people in the UK use a wheelchair [3].

Lifts clearly have an important part to play in providing an accessible environment, a fact that was recognized more than fifteen years ago with the publication of the first standard for accessible lifts EN81-70. Adopted presciently and enthusiastically by many countries, the standard has delivered a very real improvement in the quantity of lifts designed for accessibility by all. However unchanged for fifteen years, the time for revision was well overdue, and the need for such a review never more relevant.

I was therefore delighted to be asked to represent the United Kingdom on the CEN TC10/WG7 committee to work on drafting the new standard. Our work commenced on 27<sup>th</sup> May 2014 with a committee comprising 12 regular members from Germany, Switzerland, Finland, Belgium, Austria, Spain & France. Members represented user groups, manufacturers and consultants.

## 2 THE NEW STANDARD

The first point to note about the new standard BS EN81-70 (2017) is that it is a full revision that replaces the old BS EN81-70 (2003). There is a two year adoption period during which time both standards will remain valid and installers may select which standard their equipment is designed to and record the same on the relevant Declaration of Conformity issued at the time the lift is placed into service for the first time. It should however be noted that where an installer elects to use the old BS EN81-70 (2003) standard with a new lift installed to BS EN81-20, some form of Notified Body agreement will be required.

The new standard has removed all content that is otherwise covered in other associated standards, e.g. requirements in relation to alarms (covered by BS EN81-28), or requirements in relation to door protection devices (covered by BS EN81-20).

### 2.1 Introduction

Like most standards there is some important information in the Introduction which informs the reader on scope and assumptions. Key points to note are:

- It is assumed that national building regulations specify in which buildings accessible lifts, according to the standard, should be installed.
- It is assumed that national building regulations will not conflict with the provisions of this standard.
- It is assumed that obstacle-free access is provided on all relevant floors and that visual and tactile guidance systems for finding lifts and their controls have been considered by building designers and adopted as appropriate.
- It is assumed that appropriate negotiations have taken place between the supplier and the owner to agree the intended usage of the lift and any implications such usage may have for the lift's specification.

It is also assumed that the reader of the standard is competent. Standards are typically drafted with great care and prompt much debate, some of it heated. The selection of auxiliary verbs for clauses is of particular importance and the reader's attention is drawn to the following when reading any standard:

- *Shall* – a requirement of the standard. Compliance with the standard cannot be claimed unless all such clauses (including normative annexes) are complied with.
- *Should* – a recommendation of the standard. Compliance with these clauses is not required in order to claim compliance with the standard.
- *May* – provides permission for options.

- *Can* –provides options for compliance with a requirement or adoption of a recommendation

Content within a *Normative* annex contains “shall” clauses and is therefore a requirement of the standard, content contained within an *Informative* annex contains “should” clauses and is therefore a recommendation of the standard.

Where the normative clauses of the standard have not been followed, approval from a Notified Body would be needed to demonstrate conformity to the EHSRs of the Lifts Regulations.

## 2.2 Contrast

Key to providing an accessible environment is the ability to visually distinguish one’s surroundings. The old Part 70 standard required many elements of the lift to be “suitably contrasted” from their surroundings but did not define what was suitable and what was not.

The new Part 70 standard addresses this issue with what has proved to be the most contentious content of the revision. Contrast is a complex and often subjective phenomenon, and there is so much debate ensued on methods of measurement, the need to provide a set of requirements that could be easily understood, designed to, and where required measured on site. The committee decided to adopt measurement of light reflectance value (LRV) to assess the level of luminance contrast. This is an established measurement criterion referenced in a number of other complementary standards on accessibility.

The table below defines the new contrast requirements:

**Table 1 Minimum difference of light reflectance value (LRV)**

Clause	Item	At landings		In the car	
		Minimum LRV point difference	Viewing angle	Minimum LRV point difference	Viewing angle
Table 4, item c)	Active part of push buttons to their surrounding	30	45° above horizontal	30	45° above horizontal
Table 4, item d)	Face plate to its surrounding	30	Perpendicular	30	Perpendicular
Table 4, item j)	Symbols on push buttons to active areas	30 (60 recommended)	45° above horizontal	30 (60 recommended)	45° above horizontal
5.4.3.3.1 c)	Lift identification to background	30 (60 recommended)	Perpendicular	-	-

LRV may be determined by a black and white photograph of a sample with an adjacent LRV scale and comparing the surfaces of the sample with the LRV scale. Alternatively, by placing a LRV scale against the surface of interest a reasonable match can be identified.

It was recognized that these new requirements could have significant implications for the design of current and future fixtures, and as such an incremental approach is intended. Certain elements have a minimum LRV point difference of 30 with 60 recommended. This is intentional and seeks to

establish a new benchmark of 30 points whilst encouraging the market to move towards an enhanced level of 60 points.

The standard also contains some additional guidance on material selection to enhance luminance contrast through the use of diffuse reflective materials.

### 2.3 Car Types

The old Part 70 standard defined three types of car of varying size. The new standard broadens the range of car sizes to five, and provides some additional requirements in terms of the building types within which each type of car shall be used. The new requirements are as set out in the table below:

**Table 2 Minimum car dimensions for cars with a single entrance or two entrances**

Type of car	Minimum car dimensions <sup>a</sup>	Accessibility level	Building types, usage	Remarks
1	Car width: 1 000 mm Car depth: 1 300 mm (450 kg)	This car accommodates one wheelchair user without an accompanying person.	Shall only be used in existing buildings where building constraints do not permit the installation of a type 2 car.	Type 1 provides only limited accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A described in EN 12184:2014.  This type also provides accessibility for persons using walking aids (e.g. a walking stick) and for persons with sensory and intellectual disabilities.
2	Car width: 1 100 mm Car depth: 1 400 mm (630 kg)	This car accommodates one wheelchair user and an accompanying person.	Shall be the minimum size for new buildings.	Type 2 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A or B as described in EN 12184:2014.  This type also provides accessibility for persons using walking aids (e.g. walking sticks, crutches or rollators).  Passengers with wheelchairs or walking aids are unlikely to be able to turn around in this type of car and have to leave the car backwards.

3	Car width: 1100 mm Car depth: 2100 mm (1 000 kg)	This car accommodates one user with a wheelchair of class C and some other passengers. It also allows transport of stretchers.	Recommended size for cars in public areas (e.g. outdoor facilities, stations, etc.) and for cars where transport of wheelchairs of class C shall be provided	Type 3 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A, B or C described in EN 2184:2014.  It also provides accessibility for persons using a manual wheelchair with tractor unit (propulsion attachment).  When cars of this type are configured with two opposite entrances this can provide straight through circulation from the main entrance to different floor levels.
4	Car width: 1 600 mm Car depth: 1 400 mm or Car width: 1 400 mm Car depth: 1 600 mm (1 000 kg)	This car accommodates one wheelchair user and a few other passengers. It also allows a wheelchair to be rotated within the car.	Shall be the minimum size for cars with doors on adjacent walls <sup>b</sup> .	Type 4 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A or B as described in EN 12184:2014.  Type 4 provides sufficient space for most wheelchairs users and for passengers with walking aids.
5	Car width: 2 000 mm Car depth: 1 400 mm or Car width: 1 400 mm Car depth: 2 000 mm (1 275 kg)	This car accommodates one wheelchair user and several other passengers. It also allows a wheelchair to be rotated within the car.		Type 5 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A, B or C as described in EN 12184:2014.  Type 5 provides sufficient turning space for persons using wheelchairs of class A or B and for persons using walking aids (e.g. walking frames, rollators, etc.)
<p><sup>a</sup> The car width is defined as the horizontal distance between the inner surface of the structural walls of the car, measured parallel to the front entrance. The car depth is defined as the horizontal distance between the inner surfaces of the structural walls of the car, measured perpendicular to the width.</p> <p><sup>b</sup> The distances between doors and adjacent car walls as shown in Figure 1 should be as large as possible.</p>				

Key changes are:

- Type 1 cars have an increased minimum depth of 1300 mm (previously 1250 mm). This increase is in response to a review of current wheelchair dimensions.
- Type 1 cars shall only be used in existing buildings where it is not possible to install a Type 2 car.
- Type 2 cars shall be the minimum size for new buildings.
- The old Type 3 car is now referenced as a Type 5 car and has vice-versa dimensions allowed in terms of car width and depth.

- Type 3 is now a new car size with minimum dimensions of 1100 mm (w) x 2100 mm (d) and is recommended as a minimum size for cars in public areas such as railway stations, and/or where the transport of class C wheelchairs is required.
- Type 4 is now a new size for cars with adjacent door configuration. Type 4 cars shall have a minimum size of 1600 mm (w) x 1400 mm (d) or vice-versa.

As before clear internal dimensions are permitted to be reduced by finishes by up to 15 mm on each wall whilst still maintaining compliance with the required car type.

## 2.4 Doors

The new standard now requires Type 2 cars to have a clear door opening width of at least 900 mm. In the UK this is typical but now it becomes a requirement of the harmonized standard, and an enhancement over the requirements of The Building Regulations as defined by Approved Document M2 (2015).

The new standard also recommends that door dwell time is set to at least 6 s for persons with reduced mobility.

## 2.5 Handrails

The new standard provides more comprehensive requirements for handrails, in part to clarify the confusion created by the old standard and the recurrent “is the rear wall a side wall” question.

The new standard requires the following:

- A handrail shall be installed on the side wall where the car operating panel is located.
- The handrail shall be interrupted where the car operating panel is located in order to avoid obstruction of the control devices.
- The handrail may be installed on only one side of the car operating panel if the shorter side would not accommodate a handrail with an overall length of at least 400 mm.
- For car types 4 and 5, a second handrail shall be installed on the opposite side wall or on the rear wall.

The location of the handrail relative to the floor level of the lift car and the size of the handrail itself remain unchanged from the old standard. The new standard now also provides a drawing illustrating the dimensional constraints in cross section.

The ends of handrails still need to be closed but they only need to be turned towards the wall where there is a risk of collision with the otherwise projecting end.

For car types 1, 2 or 3, if the handrail would restrict the car entrance width, the handrail may be moved to the opposite side from that where the car operating panel is located.

## 2.6 Tip-Up Seat

Whilst not a common provision, the new standard enhances the load carrying capacity of any tip-up seat from 100 kg to 120 kg and loosens slightly the positional tolerance above the floor of the lift car from 500 mm  $\pm 20$  mm to 500 mm  $\pm 25$  mm.

## 2.7 Control Devices

This part of the new standard required the most work and in respect of requirements for destination control (particularly with touchscreens) was most in need of revision. Consequentially and for clarity

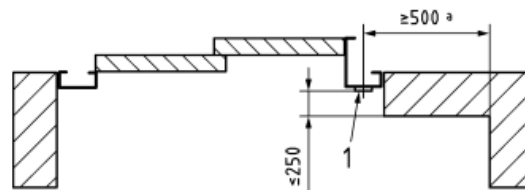
the new standard separates requirements for collective control systems (conventional control) from those for destination control systems.

## 2.8 Collective Control

The new standard retains the summary table of requirements for landing and car controls, albeit now offers two separate tables, one for design and one for arrangement.

Most requirements remain unchanged, however a few have been enhanced including, *inter alia*, the following:

- The height of relief required remains unchanged at 0.8 mm, though the standard now recommends an enhancement to 1.0 mm. (Again this is intended to start to move the industry towards more accepted design benchmarks in other areas of accessible design.)
- The minimum distance between the floor level and the centerline of any button has been reduced from 900 mm to 850 mm.
- The minimum lateral distance between the centerline of any control button to any corner of adjacent walls remains at 500 mm, but now has an enhanced recommended dimension on 700 mm. There is also now an additional diagram illustrating the principle applied with a recess and as shown below:



**Key**  
 1 landing button  
 a preferably 700

**Figure 1 Arrangement of landing buttons**

- The nomenclature for floors has been clarified with the new standard highlighting that the symbols associated with car buttons should be consistent with the building's floor nomenclature, and preferably (but not necessarily) -2, -1, 0, 1, 2.
- A car operating panel shall now be provided on both sides of the car when the car width exceeds 1600 mm.
- Two car operating panels shall be provided in the case of adjacent entry cars.
- Landing signals shall be visible with an angle of view as before of at least 140° in the horizontal plane but now also at least 70° in the vertical down plane.
- The provision of an induction loop (to EN 60118-4) is now a recommendation, subject to negotiations on likely car usage.

It should be noted that this section references keypads and accessibility buttons in recognition of the fact that such systems may be used in conjunction with conventional control, even though they are more typically seen as part of destination control systems.

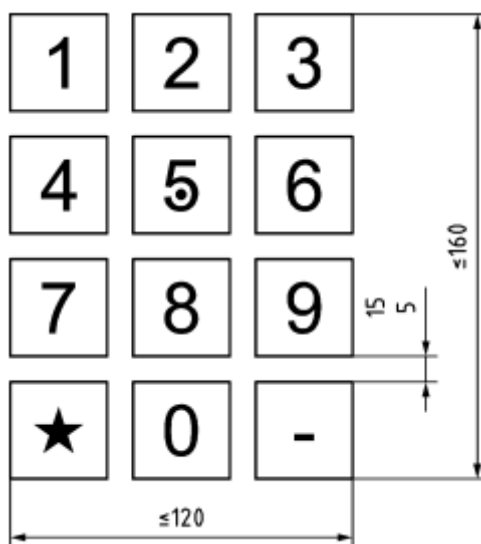
## 2.9 Destination Control

With the prevalence of destination control, especially in the commercial sector, it was felt that separate sections were required in the new standard to deal with the particular issues such control presents for accessibility.

The new standard provides clearer and more specific requirements for the design of landing keypads and moves these requirements from the normative annex in the old standard into the main body text of the new standard. Keypads shall meet the requirements of the general design and arrangement tables with the following exceptions and additional requirements:

- not exceed 120 mm in overall width
- not exceed 160 mm in overall height
- the distance between the pushbuttons shall be between 5 mm and 15 mm (previously 10 mm and 15mm)
- have numbers on the active part of the button but the numbers shall not be in relief
- have the star and the minus symbol in relief
- have the single dot on the number 5 in relief
- Braille shall not be used

The requirements are also illustrated in a more detailed figure than that that appeared in the old standard. This figure is as shown below:



**Figure 2 Illustration of keypad**

The new standard now formalizes the requirement for an accessibility button which shall be provided adjacent to all keypads, preferably below the keypad.

The accessibility button shall initiate additional audible guidance to facilitate the use of the control device. Pushing the button shall allocate a car adjacent to the relevant control device or alternatively extend the door dwell time of the allocated car. It may also activate additional features such as extended time to place a call, assignment to a larger car, enhanced contrast, etc.

The selected floor and allocated lift shall (as before) be confirmed with a visible signal, though the need for an associated audible signal is now linked to activation of the accessibility button, i.e. audible signals are not required unless the accessibility button is activated.

Lift assignment characters on screen shall be at least 25 mm high and, if displayed in response to the use of the accessibility button, shall remain displayed for the duration of the associated audible signal.

Lift markings (e.g. A, B, C, D, etc.), may now be placed adjacent to the landing door as well as above, and between 1800 mm and 2500 mm above the FFL as before. The height of the markings shall be at least 40 mm as before however they now also need to meet the contrast requirements to their



surrounding in terms of minimum LRV point difference.

### **Touch screens**

The subject of touch screens was one of the most vociferously debated during the evolution of the new standard. Some views considered the technology as inherently inaccessible and therefore never suitable, other views maintained such technology has been in the market for some time and indeed in some circumstances can offer enhanced levels of accessibility.

A consensus view was eventually reached that the new standard had to recognize the prevalence of such technology in the market and respond with suitable guidance.

The new standard therefore contains a normative annex covering the use and design of touch screens. Touch screens shall provide the following:

- A display screen providing a luminance of at least 300 cd/m<sup>2</sup>.
- Active areas and symbols shall be contrasted with their immediate surroundings.
- Background areas shall be solid and static.

The design of the buttons shall meet the requirements of the general design and arrangement tables with the following exceptions and additional requirements:

- Items c), d), e), g), h), i), j), k) and l) do not apply.
- The exit button shall be preferable green or have a green frame;
- The symbols shall be on the active area;
- The symbol height shall be between 15 mm and 40 mm;
- The distance between the active parts of buttons shall comply with Table 5 except c).

Lift assignment symbols shall be at least 25 mm high and displayed for the duration of the associated audible announcement, if activated.

An accessibility button shall be placed adjacent to the touch screen, preferably below, for activation the verbal announcements and floor selection. Upon activation of the accessibility button, the following sequence shall be followed:

A sequential announcement of available destinations (e.g. at the entrance level counting from the lowest to the highest floor or at an upper floor starting with the entrance floor then counting from the highest to the lowest floor.

The required destination shall be selected by a subsequent operation of the accessibility button or by operation of the relevant touch button

In a building with many floors, first a zone of destinations may be selected before the final destination.

### **3 ADDITIONAL COMMENTS**

The new standard contains an expanded normative annex dealing with extra large control buttons designed to provide further enhanced accessibility. The content of the annex builds on the previous standard's guidance, the key difference being that the new standard's content is in a normative annex whereas the old standard's advice was informative only.

Annex D of the new standard is an informative annex providing further guidance for enhanced accessibility, noting that this may be particularly important in public facilities such as train stations, hospitals, nursing homes, etc., where a higher proportion of users may be less abled. Amongst this annex's recommendations are the following:

- The height of landing and car doors and the clear height of the car should be at least 2100 mm.

- Handrails should be installed on all car walls without doors.
- If braille is provided, then the characters should comply with ISO 17049 and have a minimum distance of 5 mm to their associated symbols.
- Glass landing doors should be marked to avoid confusion caused by transparent materials. Transparent elements in the walls of the car, well, and/or doors may reduce the risk of panic, and in the case of trapped passengers, assist in communication.

#### 4 CONCLUSION

Whilst naturally a little biased, I strongly recommend the new standard to the reader.

The new standard is not perfect (few if any are) but does take a significant step forward in defining suitable levels of accessibility for current designs. Its content represents a reasonable and balanced set of requirements and is a very significant improvement that is applicable to a very large number of lifts.

The subject of contrast and LRV points difference remains one of ongoing debate and a formal review is likely next year to assess the market's reaction to the new standard and to identify what opportunities may exist to enhance further the contrast requirement.

#### REFERENCES

- [1] BS EN 81-70:2003 Incorporating Corrigenda Nos. 1 and 2, *Safety rules for the construction and installation of lifts – Particular applications for passenger and goods (sic) passenger lifts – Part 70: Accessibility to lifts for persons including persons with disability*, BSi, (2003).
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- [5] Business Disability Forum (previously Employers' Forum on Disability)

#### BIOGRAPHICAL DETAILS

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Adam started his career in the lift industry 26 years ago with Otis in London, UK. After twelve years working in construction, service, modernization and new equipment sales, he moved into the world of consultancy with Sweco (formerly Grontmij and before that Roger Preston & Partners) and has subsequently worked on the design of vertical transportation systems for many landmark buildings around the world.

Adam is a Fellow of the Chartered Institution of Building Services Engineers (CIBSE), and a past Chairman of both the CIBSE Lifts Group and the CIBSE Guide D Executive Committee. He is the current codes and standards representative for the CIBSE Lifts Groups and sits on the British Standards Institution's MHE4 technical committee. He is also a member of the BCO vertical transportation technical review committee and currently the UK nominated expert for WG7, working on the revision of EN81-70.