SAFed

SAFETY ASSESSMENT FEDERATION

Guidelines

For the safe operation of escalators and moving walks

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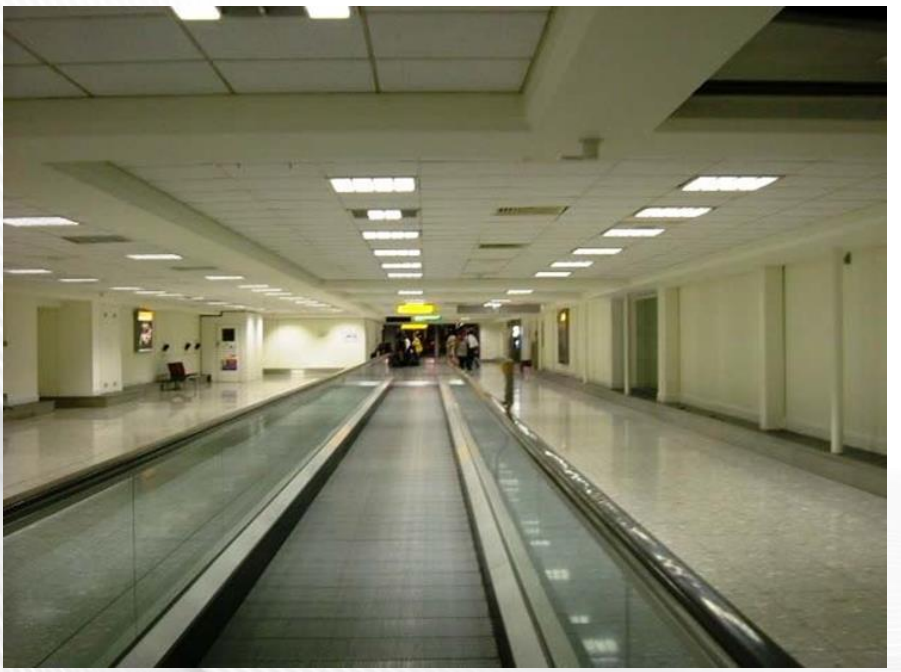
FOREWORD

These guidelines have been prepared by the Safety Assessment Federation in consultation with the Health and Safety Executive, and other interested parties within the escalator and moving walk industry. This publication should not be regarded as an authoritative interpretation of the law. However, if the guidance provided is followed, it will normally be regarded as sufficient to comply with the relevant health and safety duties.

Photograph 1 — Escalator (Courtesy London Underground)



Photograph 2 — Moving Walk (Courtesy BAA)

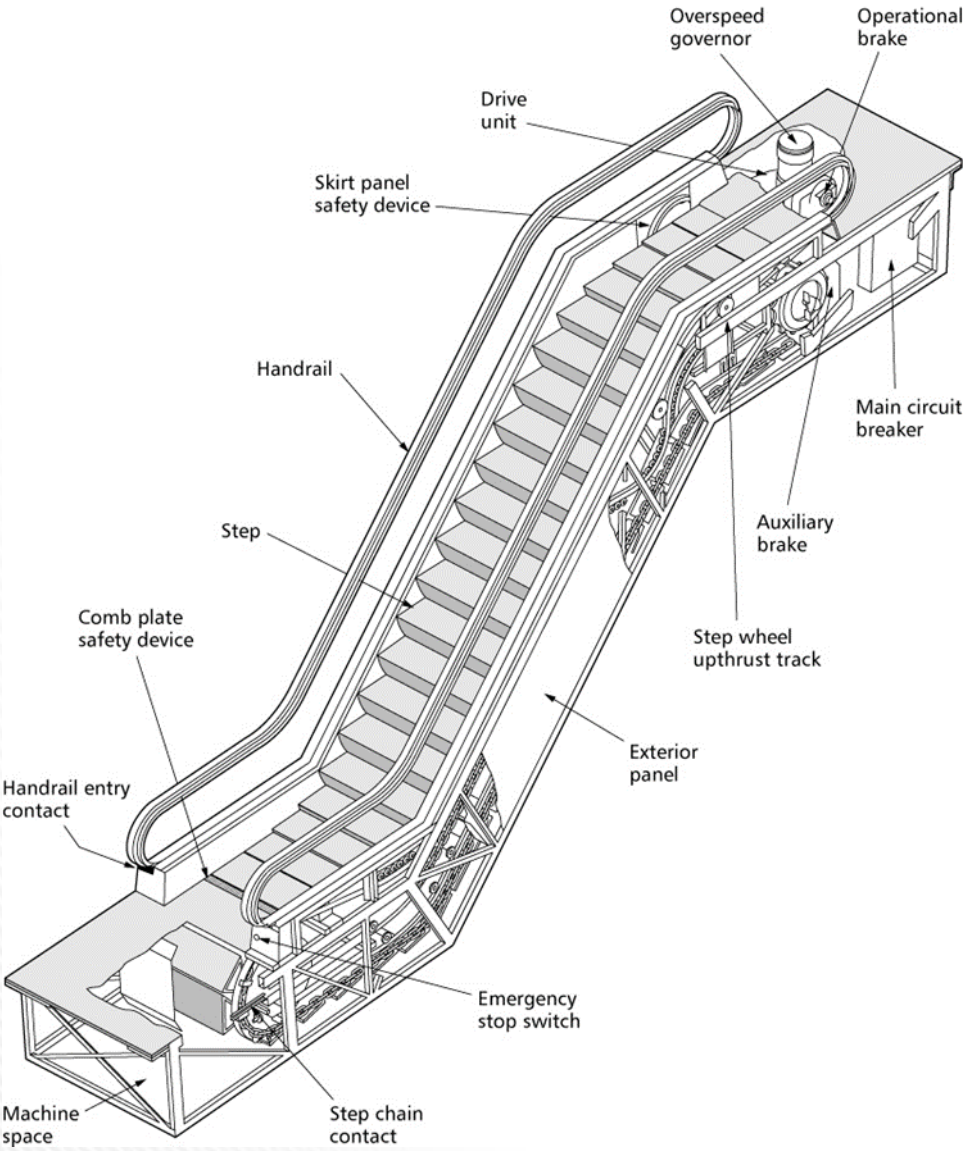


Figure 1 — General arrangement of an escalator (Acknowledgement: CIBSE Guide D: 2015)

INTRODUCTION

The guidelines are considered good practice and, if followed, would normally be regarded as sufficient to comply with health and safety duties. They support the legislation and replace the HSE Plant and Machinery guidance notes PM34: Safety in the use of escalators, and PM45: Escalators: periodic thorough examination, which are now withdrawn. They also consider other relevant European and national standards and documents relating to the safe use of escalators and moving walks.

The guidelines are considered necessary for a number of reasons:

- escalators pose a risk to users, as supported by statistics of accidents and incidents, which require adequate management;
- escalators and moving walks are becoming more prevalent, more complex (inclined, curved etc), longer, higher and with increasingly exposed voids;
- escalators are increasingly subject to abuse, misuse and negligence;
- the integration of escalators and moving walks within buildings as a means of moving large numbers of people require a wider range of competence than merely architectural design considerations;
- in some cases, escalators and moving walks are the primary escape route/emergency exit, e.g. the London Underground;
- incidents such as the Kings Cross Fire (1987), in which 31 people died and 60 were injured, have demonstrated the need for guidance on escalators and notably maintenance regimes, cleaning, communication and public safety.

1. SCOPE

These guidelines are for the selection and design considerations, safe operation, maintenance, management, thorough examination and supplementary testing of all escalators and moving walks in service, irrespective of age or location.

1.1. Status

The original issue 1 of these guidelines were formulated by a Review Committee comprising a number of stakeholders, including the Safety Assessment Federation (SAFed) and the Independent National Inspection and Testing Association (INITA), representing the independent inspection industry, the Lift and Escalator Industry Association (LEIA), representing the manufacturers and service industry, London Underground, British Airports Authority and the British Retail Consortium, representing users, the HSE (chair) and Local Authority representing the enforcing authority, with other stakeholders (e.g. disabled access, architects, etc) co-opted as necessary and the Chartered Institution of Building Service Engineers representing the consultants.

The document was comprehensively drafted by two working groups (user and technical), coordinated by the Main Review Committee and chaired by an HSE engineering specialist inspector. It has been subjected to a wide distribution to external stakeholders for comment and some 350 comments have been considered and included where appropriate. It original issue 1 was extensively reviewed by the HSE legal department and all subsequent comments included.

This current issue 3 of these guidelines has been updated with only minor reference changes to bring the document in line with current standards and regulations, this was carried out by two stakeholders, the Safety Assessment Federation (SAFed) and the Lift and Escalator Industry Association (LEIA).

1.2. Aims

The overall aim is to provide guidelines for owners and other duty holders so that they can understand and discharge their responsibilities and duties in a safe, cost-effective and consistent manner. The guidelines provide recommendations on risk control and reduction to help prevent accidents as well as technical advice on testing and examination, reporting formats and suitable periodicities between examinations and tests.

1.3. General assessment

In general, escalators and moving walks are a relatively safe way of transporting people. However, there are a number of potential hazards, both from escalators and moving walks themselves and also those hazards that users may bring with them, which include loose clothing, type of footwear, carried goods and trolleys. These hazards can also be exacerbated when used by vulnerable groups of people, such as the old, very young and those with impaired mobility, and any foreseeable misuse such as “surfing”, running, use as a goods conveyor etc.

The proper design, commissioning, risk assessment and control, preventive maintenance, testing, inspection and thorough examination of escalators and moving walks are all critical to ensure longevity, reliability and, above all, safety.

1.4. Terms and definitions

Terms and definitions are given at Annex F.

1.5. Relationship between the thorough examination and maintenance requirements

A thorough examination should not be confused with checks carried out during maintenance activities and does not replace any aspect of the maintenance requirements for escalators and moving walks. The two activities are complementary and essential to the safe operation of escalators and moving walks and associated equipment.

1.6. Development of new test technologies and techniques

Manufacturers and their agents may from time to time introduce new test technologies and techniques appropriate to escalators and moving walks. These new test technologies and techniques may at the discretion of the competent person be used to support the thorough examination.

1.7. Application and age of equipment

This guidance applies to all escalators and moving walks in service, irrespective of age or location.

Modern escalator and moving walk design standards require a number of safety features that may not be found on older installations. Where these safety features are not present, a risk assessment should be carried out to consider what control measures or upgrading of the equipment can be undertaken in order to enhance safety as far as is reasonably practicable (See 2.6).

2. LEGAL COMMENTARY

2.1. All escalators and moving walks

The primary legislation for health and safety purposes is the Health and Safety at Work etc. Act 1974. This places a duty on employers to ensure the health and safety of employees and others who may be affected by their activities.

The main duties under the Act are imposed on a "so far as is reasonably practicable" basis. They do not prescribe how this can be achieved or demonstrated. Regulations do provide a more prescriptive approach and complying with them would probably be enough for satisfying the general duties under the Act. As such these guidelines follow the legal obligations outlined in the regulations and, where followed, would normally demonstrate compliance with the law.

Duty holders may be required to explain and demonstrate how they have met their obligations.

2.2. Selecting and supplying escalators and moving walks – All applications

The ***Supply of Machinery (Safety) Regulations 2008 & Supply of Machinery (Safety) (Amendment) Regulations 2011*** make provision as to the supply of machines, including escalators and moving walks, and, in particular, contain a number of Essential Health and Safety Requirements. Guidance on this is given in the HSE INDG 271(rev1) Buying New Machinery, which is available from the HSE or can be downloaded from www.hse.gov.uk and also the Department of Business, Energy & Industrial Strategy (BEIS) website at the following link http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31815/11-1407. Manufacturers (or their authorized representatives) are responsible for ensuring the requirements are met, which for escalators and moving walks includes affixing the CE mark (in accordance with the Machinery Directive) and issuing a 'Declaration of Conformity'. Owners are advised to check that this is completed and that the type of escalator or moving walk purchased is safe and suitable for the purpose intended.

2.3. Installing escalators and moving walks – Complying with the Construction (Design & Management) Regulations 2015

The installation, commissioning, maintenance, repair or removal of mechanical and electrical services which are normally fixed within or to a structure come under the above regulations. This would include personnel transportation services such as lifts, escalators and moving walks.

Designers (which in this context includes any person who in the course or furtherance of a business prepares or modifies a design or arranges for or instructs any person under his control to do so) must ensure, so far as is reasonably practicable, that such services are safe for use, maintenance (cleaning, servicing and repair) and inspection and in particular to eliminate hazards which may give rise to risks and reduce risks from any remaining hazards. This would include, inter alia, that:

- There is safe access to the machine and its components
- The entry and exit areas are sufficient in area for safe use considering the expected volume of people
- There is sufficient and effective lighting
- The location of the machine and its surrounding are designed to prevent falls from voids
- The installed machine meets the essential health & safety requirements
- The installed machine is affixed with the appropriate CE mark
- Any signs or instructions for use are provided and clear
- All relevant regulations are complied with
- All relevant standards are considered

2.4. Reporting incidents — All applications

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) make provision as to incidents which must be reported to the enforcing authorities and procedures required for this. This extends to certain incidents including those to people who are not at work. Advice is available from the HSE website: www.hse.gov.uk/riddor which also lists the types of accident that need to be reported and how they can be reported.

2.5. Escalators and moving walks in the workplace

Escalators and moving walks provided for use in the workplace are also covered by specific regulations (as amended) as follows:

- Management of Health & Safety at Work Regulations 1999 – SI 1999/3242
- Workplace (Health, Safety & Welfare) Regulations 1992 – SI 1992/3004
- Provision & Use of Work Equipment Regulations 1998/2008 – SI 1998/2306
- Supply of Machinery (Safety) Regulations 2008 SI 2008/1597
- Supply of Machinery (Safety) (Amendment) Regulations 2011 SI 2011/2157
- Work at Height Regulations 2005 SI 2005/735
- Health & Safety (Safety Signs and Signals) Regulations1996 SI 1996/341

2.6. Standards

There are a number of British and European Harmonised Standards (BS 5656-2, BS 5656-3, BS 7801, BS EN 115-1:2017, BS ES 115-2:2010 etc), which have been written by experts and accepted by the authorities as meeting the required standards of suitability and safety. With few exceptions, new escalators and moving walks are installed in compliance with the European Harmonised Standard, BS EN 115-1:2017 “Safety of escalators and moving walks, Part 1 construction and installation” This is consistent with and supports the legislation above. Although such standards do not normally apply retrospectively, it remains a legal duty to consider incorporating new standards to old equipment if the risk assessment suggests it is appropriate for the continued safety of the equipment. In addition, manufacturers and their agents, servicing companies and inspection companies may recommend such modifications.

2.7. Guidance

This guidance is purely advisory and recommended practice, it is not mandatory. However, in the absence of more specific legal direction the Courts may consider such guidance on the basis that duty holders should either follow such guidance and industry best practice or carry out such procedures and practices which they are able to justify would achieve a similar standard of safety.

3. DUTIES AND RESPONSIBILITIES

3.1. Duties on people responsible for facility design

Owners, or their designated representatives (e.g. architects, developers, specifiers, designers), have a responsibility when designing the location and surroundings of a new escalator or moving walk to take into account the following:

- the number of people likely to use the facility and hence the number of escalators or moving walks that are required. This may be stated as a 'busy hour rate', or be broken down into peaks flow rates for shorter time periods (5, 10 or 15 minutes) if more detailed information is available;
- the flow of users on to and off of the equipment;
- queue depths and free space for users to circulate at entry and exit points;
- any specific attributes of the population who will use the equipment, if different from the statistical norm (e.g. will there be higher numbers of elderly or infirm users, or will users be carrying baggage);
- provision of alternate means of vertical and/or horizontal circulation (i.e. lifts, stairs or ramps);
- provision of signs to enable way-finding;
- consideration of the recommendations of BS 5656-2: 2004, Code of practice for the selection, installation and location of new escalators and moving walks, in particular clause 7.3 (risks associated with location);
- consideration of the recommendations of BS 7801: 2011, Code of practice for safe working on escalators and moving walks;
- compliance with the Construction (Design and Management) Regulations: 2015.

Hazards identified during this design process (such as the presence of voids or atria) should be subject to risk assessment. The design should be amended to eradicate the risk or mitigate it as far as is reasonably practicable, e.g.: provision of fixed rail or other fall protection external to the escalator balustrade, over voids.

Features required to prevent foreseeable misuse should be considered and included in the design where necessary (e.g. anti-climb barriers, anti-slide devices).

Consideration must be given to maintenance and cleaning processes so that provision is made for safe access especially to the outside and underside of escalators and moving walks. Scaffolding temporarily erected for access must not impose loading on any escalator or moving walk but should be supported by the building structure.

3.2. Duties on owners, managers, etc. who control premises

Duties in relation to escalators and moving walks include ensuring that:

- all escalators and moving walks newly supplied and provided for use bear the CE marking and have a Declaration of Conformity. This is to be retained for as long as the escalator and moving walk is in-service;
- the premises, as well as all means of access, egress, working environment and any plant or substances provided for use there, are safe and without risk to health;
- escalators and moving walks are properly maintained1 by those competent to do so to ensure efficient and safe operation;
- although escalators and moving walks do not come under LOLER they should be periodically thoroughly examined to ensure they are safe for continued use and free of defects likely to harm people;
- any reports of safety defects, should be actioned as appropriate;
- any supplementary tests notified on the report of a thorough examination are carried out, either by the date specified by the competent person, or before the next examination date if no date is specified;
- recommendations noted on the report of thorough examination are attended to as soon as reasonably practicable;
- risk assessments are suitable and sufficient and actions taken to manage risks properly and reduce risks that are unacceptably high;
- a sufficient number of people are adequately trained, instructed and informed about the use of escalators and moving walks, hazards arising from their use, to note defects and report accordingly where appropriate, record keeping and emergency procedures;
- all accidents should be recorded and used as appropriate to provide statistical evidence on which to base further risk assessments;
- records and documentation are kept to demonstrate that the duties listed above have been performed notably:
    - user information and documentation;
    - risk assessments;
    - staff training;
    - periodic thorough examinations;

- supplementary tests;
- maintenance records;
- daily/weekly/monthly user checks;
- accident reports/record;
- action taken in the event of a defect being reported.

Chapter 4 of these guidelines informs duty holders having control of escalators and moving walks on their safe operation and use.

3.3. Duties of competent persons carrying out thorough examinations

The competent person carrying out the thorough examination of an escalator and/or moving walk is responsible for carrying out an examination which is sufficiently thorough to assess the condition of the equipment and detect any defects which may pose a risk to people's health and safety. A report should be prepared to notify the duty holder of any defects. Where any existing or imminent defects are found that are likely to affect people's safety, the competent person should advise the urgency of action to the defects and any temporary arrangements, which the duty holder should consider, e.g.: to prohibit the use of the equipment.

The competent person should also identify any supplementary tests that are necessary in order to ensure the escalator or moving walk is safe. The justification for such tests should be clearly documented on the report and the nature, test method and witnessing may also be stipulated.

Chapter 5 of these Guidelines informs competent persons undertaking thorough examinations of the practical considerations, which should be included in the thorough examination and an example report is shown in Annex D.

[1] An escalator or passenger conveyor, should as a minimum, be maintained to BS EN13015 + A1 "Maintenance for lifts and escalators – Rules for maintenance instructions".

3.4. Duties of manufacturers, suppliers, and installers of escalators and moving walks

Manufacturers, suppliers, and installers of escalators and moving walks are required to ensure the equipment provided and installed is safe and suitable for the purpose intended, properly marked with a compliance mark to all the relevant and required European directives, having been properly tested for safety, and provide sufficient and adequate instructions for safe operation and use. In the UK, this duty requires compliance with, amongst other things, the Supply of Machinery (Safety) Regulations 2008 and the Supply of Machinery (Safety) (Amendment) Regulations 2011. The harmonised standard BS EN115-1:2017 provides a presumption of conformity to these regulations. A list of other relevant standards at the time of publication is given at the end of this guidance.

The escalator or moving walk should be supplied with a Declaration of Conformity by the manufacturer (supplier) and be retained by the manufacturer for at least 10 years after the last model is manufactured.

4. GUIDANCE TO OWNERS AND OTHER PEOPLE HAVING CONTROL OF ESCALATORS AND MOVING WALKS ON THEIR OPERATION AND USE.

4.1. Special conditions

Management measures may be required within the building and the escalator and moving walk operation to reduce risks.

At design stage of the building, the design team should determine, by a risk assessment, if an escalator or moving walk is a suitable solution, when taking into account environmental conditions that may exist. The designer of the escalator or moving walk should determine by risk assessment what design features may be required to address the environmental conditions anticipated by the design team. Prior to installation the design stage risk assessment should have included the installation environment and considered, if relevant, the following:

- low temperatures;
- high temperatures;
- wet conditions, e.g. for slip resistance;
- hosing-down, e.g. for hygiene or decontamination;
- corrosive atmosphere;
- dusty atmospheres;
- vandal-prone installations;
- extreme variations in humidity;
- use for emergency evacuation;
- external environments

Where the above conditions are not satisfied by BS EN115-1:2017 specialist advice should be sought at the design stage. Installation of equipment in these environments should be avoided as far as possible owing to the increased complications involved

It is expected that the recommendations given in BS5656-2 will be considered, particularly those in Section 10 relating to usage by people with disabilities.

4.2. Potential hazards in use

4.2.1. General

Duty holders responsible for the operation of escalators and moving walks should carry out risk assessments and review them periodically, or after an incident, or following advice given in a report by a competent person. This might affect their safe use and operation to identify what hazards are present, including foreseeable misuse, who is likely to be affected and which control measures need to be implemented to eliminate the hazard or reduce the risk to the lowest practicable level.

4.2.2. Voids

A void in the context of escalators and moving walks is considered to be an exposed area into which people could fall.

Duty holders responsible for the operation of escalators and moving walks should periodically carry out risk assessments to identify what falls into voids hazards are present, including foreseeable misuse and take the appropriate preventative measures required to eliminate the hazard or reduce the risk to the lowest level.

Where escalators or moving walks are not bounded totally by adjacent walls or partitions and are therefore exposed over a void on one or both sides, people are at risk of falling a substantial distance. For example, where it is possible for people to come into contact with the outer edge of a handrail at a landing and can be drawn into a hazardous situation, such as toppling over a balustrade, appropriate preventative measures should be taken (an example, BS EN115-1:2017, A.2.7, Figure A.2 and BS5656-2: 2004, (7.3).

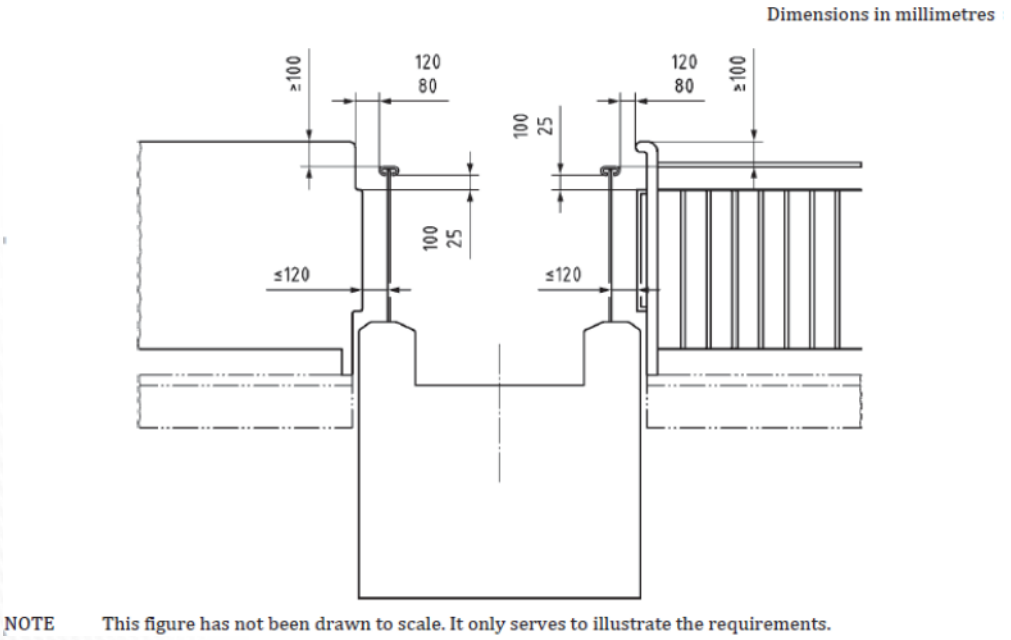


Figure 2 — Example of barriers at landings (Acknowledgement: BS EN 115-1:2017)

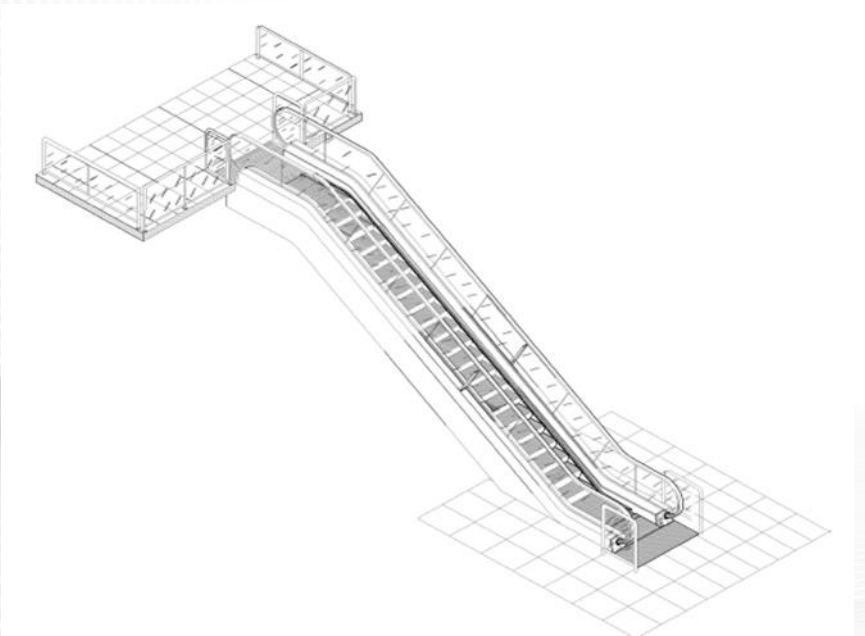
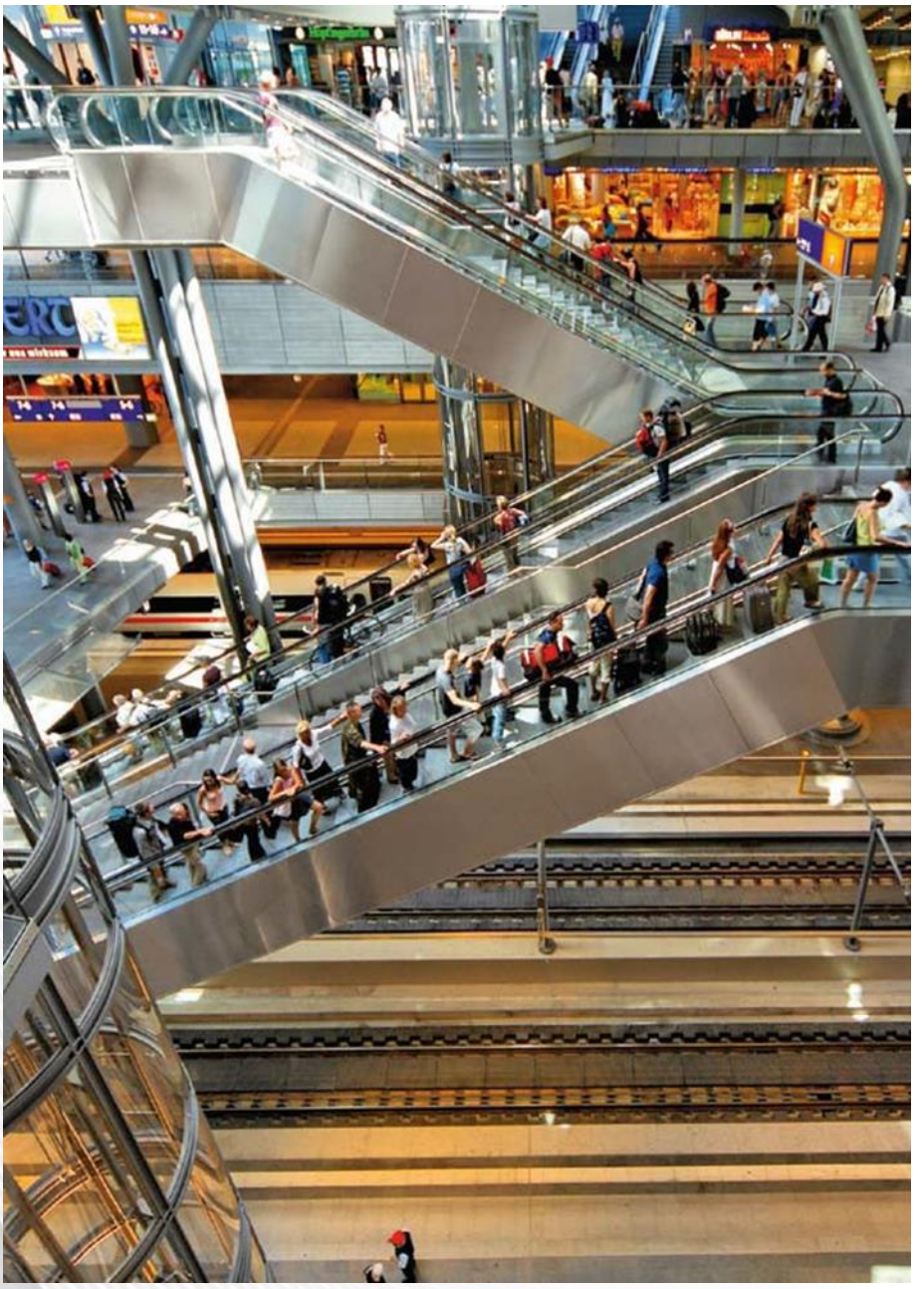


Figure 3 — An example of barriers at landing (Acknowledgement: prBS EN115 dated 2005)



Photograph 3 — Escalator handrail height (Courtesy KONE™)

It should be noted that the height of an escalator handrail is normally lower (900 - 1000 mm) than that for other handrails (1,100 mm) in buildings. This is because its prime purpose is not fall protection. However, 1,100 mm high balustrades are permitted by BS EN 115-1:2017 and may be considered as a suitable means of fall protection for voids. Other additional means may also be considered, such as the provision of an additional rail or guard on the incline section outboard of the escalator handrail.

Accidents can be reduced by a number of means including: greater parental control; education (signs etc), guarding handrail from newel entry to handrail height, etc.

4.2.3.Intersections

Where there is an intersection between the escalator, building, adjacent escalator or other obstruction, the intersection should be guarded particularly where the escalator is reversible and capable of being operated in the upward direction.

In particular, at floor intersections and on criss-cross escalators or moving walks, a vertical deflector of appropriate dimensions, not presenting any sharp cutting edges should be placed above the handrail level, e.g.; as an imperforate triangle (see BS EN115-1:2017, A.2.4).

4.2.4.Step/Skirt

Where there is a step to skirt gap there is a risk of drawing in or entrapment and a deflector device is essential. Where this is provided it should conform to BS EN115-1:2017, 5.5.3.4 c. These devices can take various forms, but the type most frequently found in the UK is a brush deflector. This consists of stiff bristles mounted in an aluminum or plastic holder that is mounted close to the nose of the step and extends the length of the escalator. It is important that these devices are examined at each starting and that they are properly secured.

Photograph 4 — Brush deflector between step and skirt (Courtesy KONE ™)

4.2.5. Pedestrian flow

Escalators and moving walks are part of a pedestrian flow system. Many people, when boarding an escalator or moving walk, hesitate as they board. This can cause congestion at the boarding points. Sufficient area needs to be available at the boarding landing, especially if it is shared with a disembarking landing. When passengers reach the end of an escalator or moving walk they are mechanically fed off. There is no option - they must leave regardless of the space available to accommodate them. If the circulation space is restricted, conflicts may occur.

It is foreseeable to expect people to make mistakes or behave irresponsibly whilst using an escalator or moving walk. Duty holders have responsibility for the safe use of escalators and moving walks and, as required should carry out risk assessments.

BS EN115-1:2017, A.2.5 specifies the minimum unrestricted area or reserved space required at the exit landing, assuming that this area is not affected by other passenger flows within the building. Should the unrestricted area be too small and it becomes crowded, then passengers currently on the escalator or moving walk will be unable to leave. Consideration should be made to increase the minimum unrestricted area to ensure the exit is not blocked.

Note: If the escalator is reversible a suitably sized unrestricted area is required at both landings.

Part of the pedestrian flow system may involve reversing the direction of escalators and moving walks. The reversal of an escalator/moving walk, which has regularly operated in one direction for a significant time may result in serious damage to the equipment. In this case the maintainer should be consulted for advice. Where an escalator, with a circulating area, is followed by another escalator travelling in the same direction, then if one stops, the other must also stop, to prevent a build-up of people in the circulating area.

4.2.1 Carts and trolleys

There are many serious risks associated with the use of carts and trolleys on escalators and moving walks. The risks include overloading, carriage of children, runaway and other foreseeable misuse.

Baggage carts, baby buggies, wheelchairs and shopping trolleys should not be permitted on escalators.

Where it is felt that the use of trolleys or carts is unavoidable on inclined moving walks it is vital they are designed specifically for the purpose in accordance with BS EN1929-2 or BS EN1929-4 and incorporate some form of brake or locking mechanism to lock them to the pallet.

Braking and locking mechanisms should be properly maintained and it is important that the duty holder has in place a rigorous and frequent maintenance routine to check on the condition of such equipment. Any trolleys found to be defective, difficult to steer, will not lock onto the pallets, or fail to disengage properly should be removed from service. A record of such inspections and defects should be retained.

If carts and trolleys are provided in the vicinity of escalators or moving walks, where their use is not permitted, control measures should be in place to prevent such use, as far as is reasonably practicable, together with appropriate warning signs. Control measures can include barriers or trolley immobilising/cart containment systems or other equally effective provisions. Any such control measures should not impede use of the unrestricted area at the point of entry onto the machine.

4.3. Signage and guarding

4.3.1. Warning/advisory signs

Safety signs should be used wherever there is a significant risk which cannot be avoided or controlled in any other way. This does not mean that a sign is required to cover every possible risk or hazard, but only where the risk is considered significant. In addition displaying too many signs should be avoided as this can potentially confuse or distract users rather than warn them.

Where safety signs are used they should comply with the Health and Safety (Safety Signs and Signals) Regulations 1996 [HSSSS].

In general the potential hazard and risks in the use of escalators and moving walks are the same as that for all moving machinery and include potential/foreseeable inappropriate activity or items/ clothing which could become trapped and cause injury to users. In the case of escalators or moving walks, signs should be posted in a conspicuous manner at the upper and lower approaches to each escalator or moving walk. Audible warning could be considered at the start or finish of the escalator or moving walk particularly where it is designed to start when the user approaches or is of significant length of travel so that users may require reminding of the exit areas.

Where there is a change of slope on some moving walks, consideration should be given to providing a warning sign.

Safety signs should comply with the recommendations of BS 5499-1 “Graphical symbols and signs – Safety signs, including fire safety signs” series of standards in respect to the graphical symbols, shapes and colours. Examples of signs for escalators and moving walks are given in BS EN115-1: 2017 and additionally at Annex E of these guidelines.

Where safety signs are displayed they should be properly maintained so that they are capable of performing the function for which they are intended. This can range from the routine cleaning of signboards to regular checks of illuminated signs and acoustic signals to ensure that they work correctly.

4.3.2. Access to machinery rooms/spaces, barriers and guarding

Access ways should be safe, free from tripping hazards, obstructions, be suitably and sufficiently illuminated, provide appropriate hand holds, stepping points etc, be in good condition and free from spillages and debris. Duty holders should periodically inspect these areas and when defects are found these should be remedied as soon as possible.

Those with duties under HSW Act, s4 should ensure, so far as is reasonably practicable, the safety of people using their premises. They should ensure that appropriate and effective barriers are provided to guard areas, where work is being carried out on the equipment. In particular a safety barrier to BS7801:2011, Annex E should be provided, by the duty holder, to guard the entry and exit points of an escalator or moving walk whenever it is removed from service. The duty holder should ensure that adequate and suitable guards are in place within machine rooms/spaces and return stations.

4.4. Human error, human behavior

Whilst it may be considered impracticable to supervise use of escalators and moving walks on a continuous basis, appropriate control measures should be in place, especially when changes have been made.

Those with duties should anticipate that people with permanent or temporary mobility impairment may wish to use escalators and moving walks. Alternative facilities (lifts and fixed ramps) should be provided and clearly signed from the escalator, to reduce the risk to them and other users (Building Regulations 2010 Part M 2015 edition incorporating 2016 amendments)

People may be temporarily impaired by carrying bulky objects, or wearing clothing that can become trapped, or the use of drugs or alcohol, etc. An emergency routine to react quickly to incidents should be in place with trained staff and regularly practiced.

All users of escalators and moving walks have a duty to behave reasonably, safely and with regard to the safety of others. Whoever is a duty holder has a general responsibility to reduce the opportunity for vandalism, damage and misuse where it is foreseeable, reasonable and practical to do so. Policies should be in place for this purpose.

Premises used by the public can be designed to reduce the potential of crime and misuse by encouraging proper use through environment factors such as visibility, lighting, surroundings, CCTV, etc. and this can also help reduce the burden of security and maintenance.

Misuse is the use of equipment for a purpose for which it was not primarily designed or intended. Misuse is normally obvious and should be prevented by simple and sensible consideration by users. However, this is not always the case and it can result in damage, disruption and danger to other users. An example would be a user carrying a large, awkward or heavy object on an escalator or moving walk as there is a potential danger of causing an obstruction or falling.

Photograph 5 — Anti-climb device (Courtesy KONE ™)

Photograph 6 — Anti–slide cones (Courtesy KONE ™)

It is accepted that vandalism and misuse can never be prevented absolutely. However, duty holders should monitor and remedy any damage, in order to provide a safe environment as this is likely to reduce the risk of further damage and misuse.

4.5. Emergency stop buttons

Emergency stop buttons should be sited in positions so that they are visible and accessible to people using the escalator or moving walk and people in the vicinity. For new escalators these buttons should be in accordance with BS EN115-1: 2017, which describes where emergency stop buttons should be fitted at entry and exit points and at intervals along escalator and moving walks. For older escalators, stop switches for emergency situations should be provided in accordance with BS EN115-2: 2010.

Emergency stop buttons should be coloured red, of adequate dimensions and marked stop and may be shrouded to prevent inadvertent operation.

Emergency stop buttons can be subject to nuisance usage, which can have the consequence of increasing risks, which will need to be managed by the owners and duty holders responsible for safe operation of the escalators and moving walks.

Note: The siting of emergency stop buttons above the handrail level would be considered a conspicuous position and would help reduce inappropriate use by young children.

4.6. Advertising and other distractions

Any form of distraction to the user has the potential to affect the safe use of escalators and moving walks. Advertising or other distractions should not be placed on or in the vicinity of the entry and exit transition points of the escalator or moving walk. This area should be specifically reserved for instructions relating to the safe use of the escalator or moving walk.

Any modification of the equipment to incorporate advertising must be referred to the original equipment manufacturer for approval. Examples include: step, handrail and balustrade advertising and the attachment of adhesive labels, etc.

4.7. Slips, trips and falls

Slips trips and falls are the most common incidents on escalators and moving walks and should be a prime consideration in any risk assessment. There are a number of reasons why they occur, which include: poor lighting, location of the installation, crowding, distraction, inappropriate footwear, poor judgment by users, horseplay, use of alcohol and drugs, loss of balance, spillages, debris, environmental conditions, use as a static staircase, or by unsupervised minors. These matters should be fully considered at the design stage or after a major alteration.

Where escalators or moving walks are installed in exposed positions they should have been designed for the purpose. Control measures should be provided to prevent water causing a slipping hazard on the surface of steps or pallets such as:

- regular inspections, cleaning and maintenance of such flooring/mats and of the surrounding area;

Note: If water etc gets into an escalator it can cause damage, or electrical safety issues, this should be checked after any spillage etc.

- consider issues such as water ponding adjacent to any lobby area in which footwear can pick up additional water;
- where equipment starts in car parks, oil, dust and debris should be removed;
- prevailing weather should be considered in the design and setup of the equipment to prevent the weather not only affecting the equipment but also the flooring.

The frictional properties of steps or pallets are of prime importance in exposed locations. Where concern exists regarding the frictional properties the duty holder should seek advice from the original equipment manufacturer or maintainer.

Trips when stepping off the moving steps/pallets can be reduced by the use of yellow comb demarcation. Step edge demarcation encourages users to stand correctly on the step. These measures should be adequately maintained to ensure their effectiveness.

4.8. Lighting

It is important to remember that ambient lighting is not the responsibility of the escalator manufacturer or installer and that it is important to achieve co-ordination of the various building services professionals that will be involved in such an installation.

Ambient lighting should always be available whilst escalators and moving walks are in operation.

Note: There is an increasing trend to install energy efficiency measures, e.g.: movement detectors, which may result in low or no lighting adjacent to escalators and moving walks. Such measures are not recommended.

Lighting levels in the vicinity of an escalator or moving walk are extremely important and need to be effective and properly maintained. Duty holders should ensure that objects installed or placed in the vicinity of the escalator or moving walk do not adversely affect the lighting levels

e.g. shadows, reflections etc. This also applies to changes in the environment near escalators or moving walks.

The risk of tripping has been associated with poor levels of lighting, conversely, excessive levels of lighting can cause glare and present similar risks.

It is important to consider lighting in the higher risk areas of step transition and comb area access/egress. BS EN115-1:2017 gives guidance on the minimum light levels at comb intersection line i.e. 50 lux.

Under step lighting/comb plate lighting improves the visibility of demarcation in the transition areas and can be effective in preventing accidents, particularly in areas with high ambient noise where audio warnings may not be heard.

Consideration should also be given to ensuring that essential safety devices such as signage and emergency stop facilities are adequately illuminated.

4.9. Routine procedures for starting and stopping

Start-up instructions for escalators and moving walks should include the following in addition to other instructions identified by the controller of the premises and/or employer and also as provided by the manufacturer. People should be formally trained in these procedures.

- Check all warning and safety notices are in place.
- Check that there are no objects or people on or approaching the escalator or moving walk and measures are taken to prevent access.
- Check unrestricted area at landings is clear of obstructions.
- Perform a visual check of the condition of the general lighting of the steps/pallets and all emergency stop buttons.
- Start the escalator or moving walk and observe and listen (e.g. if the steps are scraping the skirt) during at least one circuit of the steps/pallets.
- Perform a visual check of operation of handrail/skirting/comb/under-step lighting.
- If the above is satisfactory and the escalator or moving walk is considered safe for use start the escalator or moving walk and place into service.
- Log and report all observations and checks.

Before stopping an escalator and moving walk i.e. removing from service, the following procedure should be included:

- Check that there are no objects or people on or approaching the escalator or moving walk and measures are taken to prevent access.
- Measures should be in place to prevent people from entering the area e.g. barriers.
- The escalator or moving walk should be out of service and stopped.

4.10. Operational daily safety checks

Duty holders should carry out simple visual checks periodically during the day and at start up to confirm continued safe operation, and keep records of such checks, including any defects reported and action taken. Note should be taken of the manufacturer's instructions or recommendations concerning any specific instructions. Suggested areas to be checked include: pallet/step, balustrades, handrails, skirting and landing areas, in order to identify obvious damage, build-up of debris and other hazards. Staff undertaking this task should be properly trained.

4.11. Cleaning and preventative maintenance

Cleaning is considered an essential part of preventative maintenance and all parts of the interior of escalators and moving walks (e.g. pit, truss and underside of steps) shall be checked, and cleaned as appropriate, at regular intervals to the manufacturer's recommendations. If this action is not undertaken then debris and rubbish can accumulate, which will constitute a significant fire hazard putting people and property at risk. Duty holders are responsible for arranging this activity and should note that this may not be included in a standard maintenance contract.

Duty holders of escalators and moving walks should consider a programme of cleaning which includes immediate action, routine and deep cleaning. All cleaning should be carried out whilst the escalator or moving walk is stationary and out of service and includes:

A. **Immediate action** will deal with spillages and the accumulation of debris, etc. as these significantly increase the risk of slips and falls. These should be cleaned up/removed, as soon as possible.

B. **Routine cleaning** will ensure that all surfaces including balustrades, handrails, panels, step or pallet or landing treads are free from debris, litter or spills which may increase the fire, slip, trip or breakdown risk of the equipment. Cleaning should take place after the equipment has been taken out of use at a frequency defined by a risk assessment.

C. **Deep cleaning (internal)** should be carried out by specialist contractors at a frequency determined by a risk assessment and dependent upon the design, use and environment in which it is situated.

Duty holders should ensure a safe system of work is applied when any cleaning activity is undertaken.

Duty holders are also responsible for ensuring that the escalator or moving walk is maintained so that its performance does not deteriorate to the extent that it puts people at risk.

Competent maintenance organisations should be selected to carry out such work and they should carry out a suitable and sufficient risk assessment and use the appropriate techniques to assess the maintenance requirements. This would normally be by formal contract based on BS EN13015+A1.

4.12. Actions following an incident

Duty holders in relation to escalators and moving walks should ensure that a sufficient number of people are adequately trained, instructed and informed about the use of escalators and moving walks, hazards arising from their use, record keeping and emergency procedures.

Records of the details should be kept of any incidents involving escalators or moving walks for which they are responsible.

It is recommended that the following actions should be undertaken in the event of an incident:

- Take the details of the incident from the injured person/witnesses.
- If the incident is reportable under RIDDOR (see section 2.4 of this document), the appropriate enforcement authority should be informed and if necessary advice sought.
- If the equipment appears to be operating correctly and there is no obvious damage and information suggests that the incident was not as a result of an equipment fault the decision may be taken by an authorised person, and where appropriate, in consultation with the enforcement authority to allow the equipment to remain in service, but after the procedures of
- 4.9 and 4.10 of this document are applied. Where appropriate, such as following a serious RIDDOR reportable accident, there should be consultation with the enforcement authority on the actions taken or to be taken.
- If there is reason to suspect that the equipment may either have contributed to the incident, or it is not operating correctly, or there is obvious damage, then it should be taken out of service.

4.13. The use of escalators and moving walks as static staircase and in an emergency (fire)

4.13.1. Use of stationary escalators as staircases

BS EN115-1:2017 recommends that escalators should not be used as regular staircases.

This is particularly the case for vulnerable groups of people, where the use of stationary escalators should be avoided and other alternatives, e.g.: lifts or regular stairs would clearly be safer.

4.13.2. Use of escalators in an emergency

BS EN115-1:2017 recommends that escalators should not be used in an emergency.

Escalators should not be included when calculating the requirements for means of escape in an emergency situation.

Escalators may continue in service, where they are not affected by the emergency, according to a predetermined emergency strategy.

There may be special cases where this does not apply, such as metro environments, subject to special regulations. Reference may be made to BD 2466: *Guidance on the emergency use of lifts or escalators for evacuation and fire and rescue service operations*, published by CLG in March 2009 and ACOP to Approved Document Part B: "Fire safety".

4.13.3. Use of moving walks in an emergency

Moving walks may have been included as a foreseeable means of escape, during the design of the building, and may be used, whilst stationary, according to a predetermined emergency strategy.

Moving walks may continue in service, where they are not affected by the emergency, according to a predetermined emergency strategy.

4.13.4. Staff training

Companies and organisations responsible for the safe use of escalator and moving walks should ensure that their employees are adequately instructed and informed about the safe use of the escalator or moving walk and the hazards arising from their unsafe use and are familiar with emergency procedures.

Line managers and other relevant staff should be adequately trained and given sufficient instruction and information on the need to:

- Discourage children and young people playing on or near an escalator or moving walk.
- Warn people who are using an escalator or moving walk in an unsafe manner.
- Direct people to others means of access, e.g.: lifts or stairs, where these would clearly be safer in a given circumstance.
- React promptly and sensibly in the event of an emergency to stop an escalator or moving walk and to give or to summon any immediate assistance which may be needed.
- To be familiar with the location and operation of emergency devices.

It may also be prudent for people (companies and organisations) having control of escalators and moving walks to provide additional supervision at the time new, modified or re-located equipment is installed to "greet" users and assist in their safe use.

4.14. Selecting a competent person

You should ensure that the person carrying out a thorough examination has such appropriate practical and theoretical knowledge and experience of the escalators and moving walks to be thoroughly examined as will enable them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the escalators and moving walks.

It is also important that the competent person is sufficiently independent and impartial to allow them to make an objective assessment. For this reason, it is not advisable for the same person who performs routine maintenance to carry out the thorough examination, as they are then responsible for assessing their own work.

You can use someone from an external company or someone from within your own organisation to act as the competent person as long as they meet the above criteria. However, few owners or operators have the necessary competence in-house. If you intend to use an external person, you should ensure that they understand what is meant by a 'thorough examination' as referred to in this guidance, and what the law requires.

Accreditation by the United Kingdom Accreditation Service to the relevant standard (BS EN ISO 17020) is an indication of the competence of an inspection body. www.ukas.com

5. GUIDANCE ON CARRYING OUT THOROUGH EXAMINATIONS

5.1. Introduction

These Guidelines do not define the scope of a thorough examination. That is the responsibility of the competent person undertaking the thorough examination.

A periodic thorough examination by a competent person should normally take place at six monthly intervals or at a suitable period determined by the competent person.

An assessment by a competent person, based on reasoned engineering judgment together with the potential hazards and risks, should establish the type and extent of the thorough examination and any supplementary tests, which may be necessary.

The process of assessment leading to the engineering judgement should be justified and recorded. The process of assessment includes consideration of:

- age, type, features
- condition of the installation
- usage of the escalator or moving walk
- known problems with the particular equipment
- relevant component manufacturers' recommendations
- integrity of the supporting structure
- the extent to which steps/pallets require removal

Annexes A to D support this chapter.

5.2. Access to machinery rooms/spaces, guarding and barriers

The condition of access ways and stairs leading to machinery rooms/spaces should be inspected whenever examinations of equipment are undertaken. Access ways should be safe, free from tripping hazards, obstructions, be suitably and sufficiently illuminated, provide appropriate hand holds, stepping points, etc. and be in good condition. Where defects are found these should be reported in writing to the duty holder of the premises.

Any thorough examination should ensure that adequate and suitable guards are in place within machine rooms/spaces and return stations. All exposed rotating shafts sprockets and chains should be guarded as should exposed electrical equipment. Where guards are not in place this serious condition should be reported to the duty holder for immediate attention.

People having control of premises have duties, in the circumstances set out in s4 HSW Act, to ensure, so far as is reasonably practicable, the safety of people, who are not their employees who use their premises. They should ensure that appropriate and effective barriers are provided to guard areas where work is being carried out on the equipment. In particular a safety barrier compliant with BS7801:2011, Annex D should be provided, by the duty holder, to guard the entry and exit points of an escalator or moving walk whenever it is removed from service.

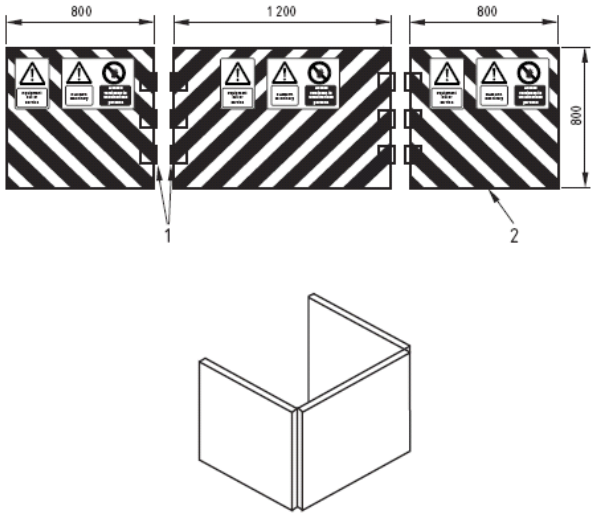


Figure 4 — An example of a safety barrier (Acknowledgement: BS7801:2011)

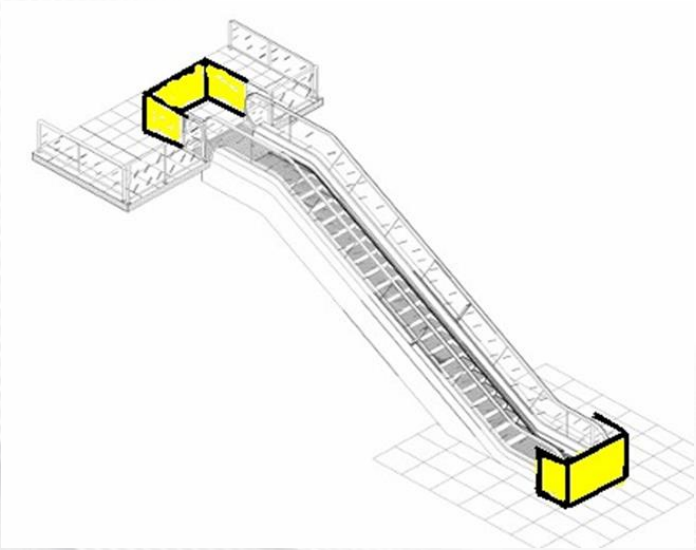


Figure 5 — An example of a maintenance safety barrier (Acknowledgement: prBS EN115:2005 modified by SAFed)

5.3. Preliminary examination

A thorough examination should include checks with the escalator and moving walk running and stationary. Before detailed dimensional checks are made, the competent person may gain useful information by making an initial assessment of the escalator and moving walk as it completes several round trips. Listening for unusual noises may also indicate the need to pay particular attention to certain components or areas.

Note: Care must be taken when thoroughly examining a reversible escalator or moving walk that has run predominately in one direction. The unit is likely to have developed wear that may prevent it from operating properly in the opposite direction. Reverse running may result in serious damage to the equipment.

The competent person should ascertain if any obstructions such as: information signs, shop fittings, balustrades/hand rails, etc. impede people's access or egress to/from the escalator or moving walk and the lighting levels in these areas are adequate.

5.4. Electrical safety devices

In order to verify that electrical safety devices are in efficient working order, a functional test of each of these devices should be undertaken at every thorough examination by the competent person.

Where a functional check cannot be completed at the thorough examination then a supplementary test should be called for by the competent person.

See Annex B for list of conditions required to be detected by electrical safety devices.

5.5. Earthing continuity

Effective earthing is a fundamental safety requirement of any electrical installation and the escalator/moving walk is no exception. An earthing continuity test should be carried out on the escalator/moving walk installation at intervals not exceeding five years.

It should be established that adequate earthing and bonding of all metal work, such as truss, controller, balustrade and decking is provided. Where it is not possible to visually verify the earth continuity of the installation during a thorough examination, consideration should be given by the competent person to call for a supplementary test.

It should be verified that the earthing of all metal work enclosing electrical conductors is continuous with a maximum earth continuity resistance equal to or less than 0.5 Ω. Electronic circuits may need to be disconnected for this test.

Electrostatic discharge problems on an escalator or moving walk may be due to inadequate earthing. However, in most cases electrostatic problems are caused by the carpeting/flooring material and appropriate solutions should be sought from a specialist flooring company.The competent person may require evidence that the building electrical installation has been examined and found to be satisfactory in accordance with BS7671 "IET Wiring Regulations and IET Guidance Note 3 "Inspection and testing".

5.6. Braking system

A. Operational brake

In order to verify that the operational brake is in satisfactory working order, a functional test should be undertaken at every thorough examination.

This test should be used to check the operation of the braking system by comparing the actual stopping distance with the distance(s) specified in the relevant manufacturing standards, or to a safer standard, specified by the manufacturer.

The test should be performed with the escalator and moving walk unit under no load conditions when normal operating temperature has been achieved. Three measurements of the stopping distance should be made and an average stopping distance obtained. Tests should be made in both directions of travel, but only if reversible. The stopping distances should conform to the requirements of the design standard used at the time of installation, and ensure any deceleration and jerk is not too severe.

B. Auxiliary brake

In order to verify that the auxiliary brake, where provided, is in satisfactory working order, a functional test should be undertaken at every thorough examination. This test should be used to check the operation of the braking system specified in the relevant manufacturing standards, or to a safer standard specified by the manufacturer.

The test should be performed with the escalator and moving walk unit under no load conditions, when operating temperature has been achieved. A test should be made in both directions of travel, but only if reversible.

A supplementary test should be called for by the competent person where it is not possible for the competent person to carry out these tests.

Note: For units fitted with an auxiliary brake it may be necessary to test the operational brake and the auxiliary brake separately. As the auxiliary brake test is carried out with no load the unit will come to a stop of its own accord and this may give misleading results.

5.7. Treadway (steps and pallets)

The checks elaborated in Annex A.1 should be carried out as part of the thorough examination. A record of all checks should be made. In particular the clearances measured should be entered on a report and compared with measurements at subsequent examinations. This information should be passed to those responsible for maintenance of the machine by the duty holder.

A visual examination of the step/pallet cleats should be undertaken for localised breakage of cleats, wear due to abrasion from normal passenger usage and 'planning' of treads caused by metallic objects (typically screws) getting caught in the combs. A judgement shall be made as to whether localised breakage or edges of cleats is likely to cause injury to passengers

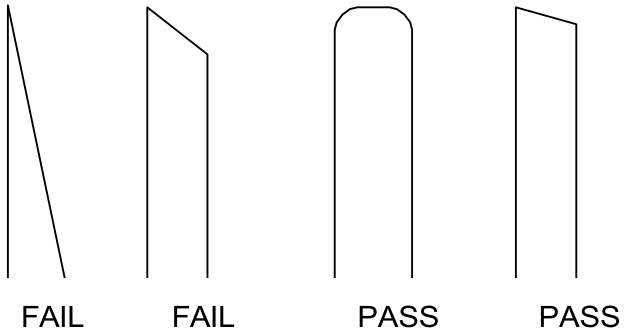


Figure 6 — Examples of planed tread cleat upper edges (Acknowledgement: London Underground Limited)

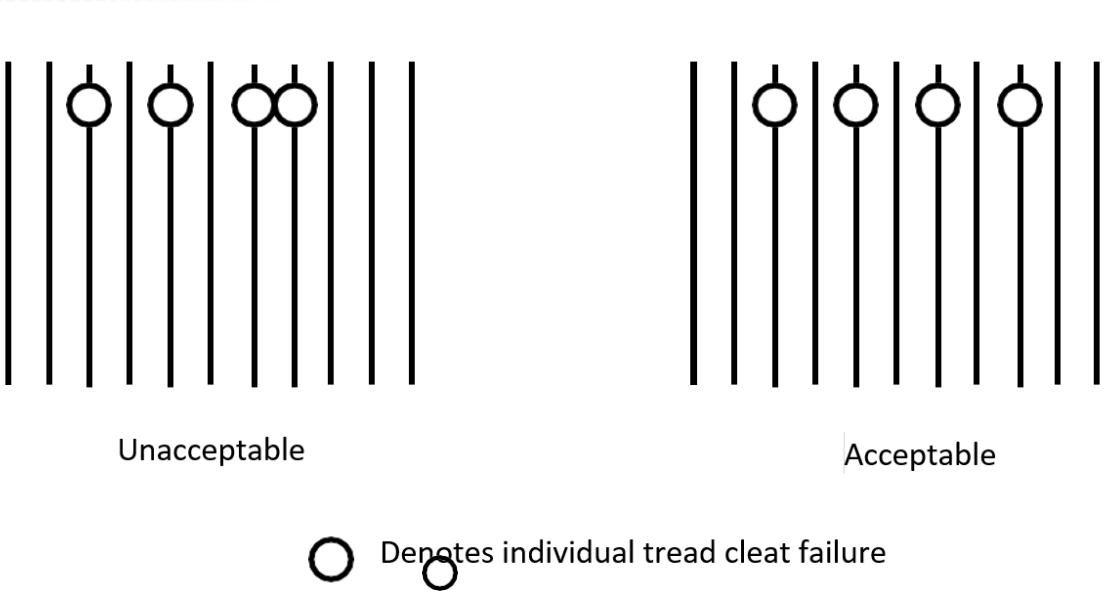


Figure 7 — Examples of group failure of the tread cleat (4 or more in any 6) (Acknowledgement: London Underground Limited)

5.8. Comb plate condition

A visual inspection of the comb plate condition, mesh depth and comb clearance should be undertaken at every thorough examination. The visual inspection should first be carried out with the unit stationary. A further inspection should be carried out with the unit running and observing several cycles of the unit. The clearances and alignments should conform to the design standard applicable at the time of installation. Each comb-plate should be inspected for damage.

Where comb teeth have fractured and are missing, shortened, and/or badly worn such that the comb engagement clearance exceeds the maximum acceptable, then replacement of the comb should be considered as an immediate action.

Where the condition exists at the “exit landing” the comb must be replaced immediately. If a replacement comb is not immediately available, it is acceptable to swap an undamaged comb from the "entry landing" as a temporary measure.

Where the condition exists at the "entry landing" the comb must be replaced as soon as possible and not later than at the next service visit. If the unit is reversible this operational option will not be available.

Where two or more adjacent teeth or three or more individual teeth are missing or damaged the duty holder should be advised to take the unit immediately out of service, until the comb plate has been replaced.

5.9. Balustrades, decking and skirt

A visual inspection of the condition of the balustrade paneling and skirting should be undertaken at every thorough examination

A check should be made that the balustrade panels are smooth and that butt joints and other joints do not present sharp edges or create trapping hazards.

Particular attention should be paid to the balustrade skirting and scuff marks, scratching, indentations, permanent deflections, etc. should be investigated. A check should be made that the skirting is vertical and smooth, and that butt joints and other joints do not present sharp edges or create trapping hazards. Visual examination should check total coverage of any low-friction coatings, and skirting coated in this way should also be free from contamination.

Over the years many types of skirt materials have been used, in order to minimize the friction between skirt and footwear. Any such material should be in good condition and if not the duty holder should be advised.

Decking should be inspected for signs of damage especially that which results in protruding edges likely to cause clothing to be caught. In cases of severe damage it is recommended that the duty holder be advised that the unit should be removed from service whilst waiting repair.

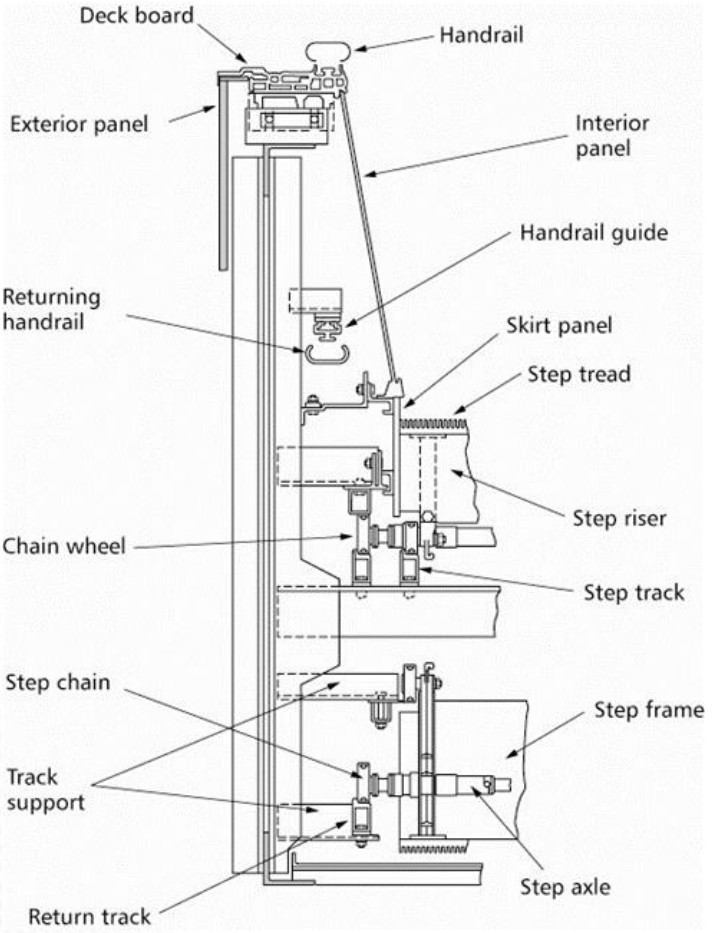


Figure 8 — Detail of balustrade (Acknowledgement: OTIS 506)

5.10. Handrails

A visual inspection of the handrails should be undertaken at every thorough examination. The handrail inspection should include checks for tension, slipping, cracking, buildup of particles, speed synchronisation with pallets/steps and smooth operation; damaged and loose or worn beading; checked for finger traps between rail and guide moulding and worn newel panel edges.

Entry guards, where fitted, should be inspected for correctness of position and overall integrity. The operational clearances and distances should be as small as reasonably practicable without causing spurious activation of the device, in order to prevent the injury.

It is recommended where entry guards are not fitted one should be fitted with an electrical safety device (switch) or an equally effective device.

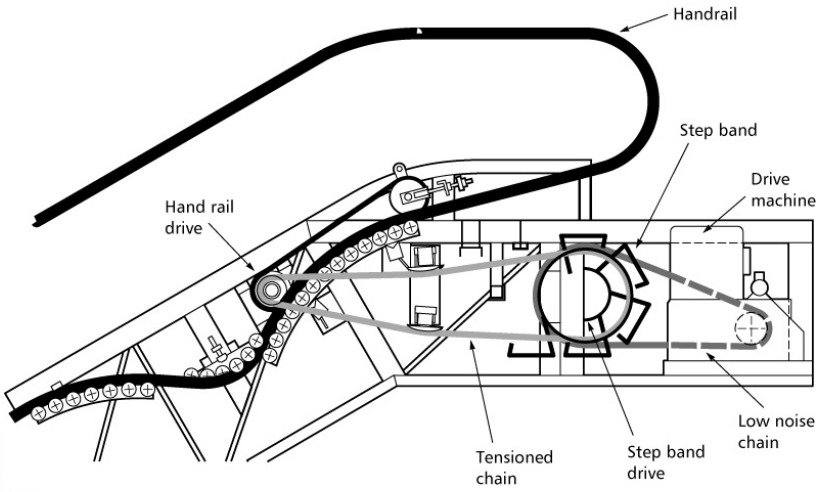


Figure 9 — Principal components of an escalator handrail drive system (Acknowledgement: OTIS 506)

5.11. Escalator skirt deflector devices

Where a deflector device is not fitted, the duty holder should be advised in writing in the report submitted that its provision should be seriously considered as part of a continuing risk assessment.

Where deflector devices are fitted their condition should be assessed. They should be securely fixed with chamfered ends to minimise the risk to users being caught on them. The chamfered ends should be examined to ensure sufficient clearance is maintained and a trapping hazard does not exist.

Bristles, where provided, should be intact along the entire length of the device. Damaged or missing parts are a serious hazard and should be rectified immediately or the duty holder advised that the unit should be taken out of service, until repairs can be carried out.

5.12. Surrounds, lighting and warning/advisory signs

The landing areas should be checked for obstructions and that the unrestricted space is maintained. Where floor intersections occur, the preventative measures (intersection guards) should be checked for condition and effectiveness. The lighting should be checked for adequacy.

The floor plates to the machinery spaces should be checked for condition, tripping hazards, securely mounted, etc. Where floor plates are inlaid with stone the weight can be significant. Where this is the case, consideration should be given to the need for a lifting device to be provided. Such recommendations should be made to the duty holder in writing.

A check should be made that the warning/advisory signs for people using escalators and moving walks are permanently fixed in conspicuous positions and are adequately lit.

5.13. Drive system

Checks should be made on the condition and security of the tracks and their associated brackets. Tracks and truss work should be inspected for loose fastenings, broken welds, excessive wear and/or flexing, deterioration and cleanliness. Chains should be examined for signs of wear.

Worn chains may be indicated by excessive clearances between pallet/steps.

The tension carriage position should be checked, and any indication of chain stretch or wear should be closely investigated. It is particularly important that stretching of one chain relative to its counterpart chain should be detected and closely investigated. 'Crabbing' of moving pallets/steps may give early indication of such stretching and static measurement of the distance between each side of the leading edge of a comb and the nose of a pallet/step some way down the treadway may also provide evidence. Stretching or wear may occur over short sections of chain, and may be discerned on escalators by checking whether the gap between a step riser and adjacent step tread remains parallel.

If any of the checks indicate defects then the competent person should call for the chains or portions of chains to be removed, thoroughly cleaned, and examined and, if unsatisfactory, replaced.

If as a result of the thorough examination there is reason to believe there may be a problem with the drive system, or if due to the design of the unit, it is not possible to make a reasonable engineering judgement as to the integrity of the critical components, the competent person should consider if a more detailed investigation is required. See A.2 for details of the tests.

The driving machine should be checked for backlash, end float, gear noise, etc. and it may be possible to do this without dismantling. If there is evidence of excessive wear it may be necessary to remove the gear case covers or otherwise expose the working parts to permit further examination. Where this is necessary the competent person should call for a supplementary test and any corrective actions to be made, see Annex A.2 for details.

5.14. Controller

Checks should be made to identify any defects. The internal parts should be reasonably free of dust and the enclosure cabinet should be complete with doors or covers in place. Fuses should be of the correct type and rating and the cabinet and any doors or covers should be suitably earthed. A check should be made that all shrouds and covers to electrical hazards are complete, undamaged and in place.

Where people are exposed to direct contact (basic protection) to dangerous conductive parts inside a control cabinet, the condition should be reported to the duty holder. As a short term solution the duty holder should arrange for suitable warning signs to be installed on the cabinet. As a long term solution suitable guards and shrouds or finger proof equipment should be installed.

Checks should be carried out to ensure the correct operation of the starting control devices (e.g. key switches, pressure mats, etc.) and test control panels. Where escalators and moving walks are arranged as sequential units a check should be made that the upstream unit is shut down when the downstream unit shuts down.

Where control equipment remains live when doors are removed, basic non-flammable protection should be provided against direct contact.

ANNEX A — TECHNICAL INFORMATION

A.1 TREADWAY

The following checks and examinations should be carried out.

A.1.1 Clearances between moving pallets/steps and balustrade skirting

A visual check should indicate the consistency of clearances between moving pallets/steps and balustrade skirting, and whether the pallets/steps remain parallel with each other and with the comb-plates. At the same time, each escalator step tread riser and comb-plate should be inspected for damage. e.g. broken cleats or teeth, indentations in risers.

A.1.2 Pallet/step float

This check should usually be made with pallets/steps unloaded. It should be determined whether side clearances are maintained within the tolerances specified in the relevant manufacturing standards when an attempt is made to move the pallets/steps towards the skirting at either side.

A.1.3 Pallet/step tipping

Excessive pallet/step tipping may be detected when the weight of a standing person is purposely shifted from the front to back and vice versa.

A.1.4 Pallet/step skirt clearance

Templates or gap gauges should be used to check the clearances are maintained within the tolerances specified in the relevant manufacturing standards. This check should usually be made with pallets/steps unloaded.

A.1.5 Records

A record of the clearances measured should be entered on the report and compared with measurements at subsequent examinations. This should also be of assistance to the employer or person responsible for the maintenance of the escalator or moving walk.

A.1.6 Guidance system

The guidance system for pallet/step should be inspected, particularly facilities for sideways restraint. A thorough examination may necessitate the removal of one or more pallets/steps.

A.1.7 Meshing of pallet/step

Meshing of pallet/step tread ends with adjacent pallet ends/step riser cleats, where provided should be checked.

A.1.8 Meshing of comb-teeth

Meshing of comb-teeth with step tread grooves should be checked. Whilst measurement to the relevant manufacturing standards is advisable where applicable, it is more important to ascertain, for example, that the ends of comb-teeth are always lying below the upper surfaces of the pallet/step treads, and at approximately the mid-point between adjacent tread cleats.

A.1.9 Clearances between pallet/step tread ends and pallet ends/step risers

Clearances between smooth (uncleated) pallet/step tread ends with adjacent pallet ends/step risers should be checked so that clearances are maintained at a minimum practicable level. Any damage to smooth risers should be investigated.

A.2 MACHINE

The level of detail of this assessment will be based on several key considerations, including:

1. The initial specification the equipment has been manufactured to
2. The requirements imposed by internal / company specifications
3. The recommendations given by the manufacturer of the equipment that can be found in the Operations and Maintenance manual
4. The performance and past history of the machine

The adopted inspection procedure should consider the drive system as a whole and the individual parts it should take into account at least some or all of the following:

5. The age of the components and the service that they have seen
6. The results and recommendations of any previous inspection work
7. Accessibility of hidden critical components
8. Known problems associated with that particular type of machine
9. The ratio of the maximum allowable duty to the actual duty rating
10. Indication of poor performance:
    - A. Signs of unusual or excessive vibration
    - B. Presence of unusual noise
    - C. Excessive backlash or thrust float
    - D. Condition of the lubricant (metal particles in the oil)
    - E. Excessive temperature or hot spots
    - F. Evidence of excessive wear with major load path components
    - G. Condition and security of visible shaft keys

As a result of carrying out the above assessment, a test (type 'A' or type 'B') may be required. The thorough examination report should indicate which, if any, type of test is required, type A (investigatory) or type B

(comprehensive). The results of the type A test may indicate a need to carry out further investigation this will result in the need to perform the type B test as well.

Note: Some designs of gearbox may require external checking and measurement of certain key parameters or return to the manufacturer e.g. measurement of backlash before the gearbox is dismantled.

The results of any investigatory test or comprehensive test should be documented. The report should also advise if and when a similar investigatory examination should be repeated or and the reasons for it. Where necessary the report should justify the continuation of running the present component part and its proposed life.

A.2.1 Type A: Investigatory test

An investigatory test can be called for where it is not possible to make a reasonable assessment of condition at the time of the thorough examination and where the assessment indicates that a supplementary test is advisable. This may be the case in certain designs of machine where critical components such as load nuts, load chains, anchor pins, worm-wheel teeth and rim bolts cannot be seen for example.

The machine should be free of excessive or unusual noise, vibration, excessive temperature or hot spots.

The machine should operate throughout its travel cycle without excessive thrust float or backlash.

Gear wheel teeth marking should be even and approximately central of the teeth. The teeth should be free of steps, pitting or ridges (smooth faced) and oil should appear clean and most importantly, show no sign of metal particles. Worm wheel rim/bolts should be secure. Shafts and bearings should not run hot or show signs of vibration or noise.

A.2.1.1 Main drive shafts and bearings

The objective to be met when inspecting plain shafts and bearings of any age is to determine if a critical failure is likely to occur in the foreseeable future.

The dismantling of shafts and bearings is not to be undertaken lightly as such intrusive inspections can create more problems and risks than they resolve. It may however be necessary in cases where other less intrusive inspections indicate there is cause for concern. In such cases a more detailed inspection is essential.

A.2.1.2 Roller, ball and needle bearings

Exposure of these types of bearing for examination should be undertaken only when evidence obtained from other methods of examination indicates that a more detailed assessment is required.

If the above examinations indicate problems may exist a furthermore detailed examination should be carried out by a specialist.

A.2.1.3 Other general areas

Tensioning carriage shafts and bearings should be subjected to the same type of examination described above for main shafts. In addition it should be determined that the carriage is free to move forward and back and that any small movement is detected by a switch that will cause the unit to stop.

Any flexible drive couplings should be checked for wear. This may in some instances require a degree of dismantling.

A.2.2 Type B: Comprehensive Test

A detailed examination and possible testing is called for where the initial (and possible interim) examination indicates concerns around the future performance of the drive system. These concerns represent detailed issues in very specific areas and there examination should therefore be carried out by a specialist, these areas include, for example:

1. The drive system shows excessive or unusual noise (gearbox, bearings shaft bearings etc)
2. The drive system shows excessive vibration
3. High temperatures or hot spots are present in areas of the drive system (gearbox shafts bearings etc).
4. Excessive thrust float or backlash, where the immediate cause is not evident
5. On inspection gear wheel teeth show unusual marking, steps are worn in them, pitting or ridges are evident.
6. The oil is dirty and / or show signs of metal particles.
7. Worm wheel rim/bolts should be secure.
8. 8) Tension carriage indicates excessive wear, or lack of freedom to move where the immediate cause is not evident.

The format of this examination will be dependent upon the problems observed and suspected. The examination that is developed should be one that covers several objectives; these should include some or all of the following:

1. The assessment of the actual condition of the drive system and its components
2. The effect these conditions have on the future running of the machine. This will include safety issues as well as machine life etc.
3. The derivation of the route causes of any problems found or at least obtain all the information to enable this to be done by those receiving the report.
4. Recommendations for actions to be taken both short term and long term

ANNEX B — LIST OF CONDITIONS TO BE MONITORED OR DETECTED BY ELECTRICAL SAFETY DEVICES (As appropriate see BS EN115-1 & 2)

Description
Safety contact function on access doors/traps
Floor plate switch
Emergency stop switches
Stop switches in drive, return stations and on inspection control
Fault to earth
No control voltage
Earth fault in electrical safety device circuit
Motor overload
Motor windings over temperature
Overspeed
Unintentional reversal of direction
Operation of auxiliary brake
Operation of main operational brake
Breakage or excessive elongation of step chain, etc.
Reduction of distance between stations
Entrapment of foreign bodies at comb
Stopping of succeeding escalator
Operation of handrail entry guard
Operation of sagging step detector
Missing step/pallet detection
Broken handrail detection
Handrail speed deviation
Removable hand-winding wheel presence detection
Removable shopping trolley/baggage cart barrier absence/presence detection

ANNEX C — Summary of elements from chapter 5 — Informative guide to carrying out a thorough examination

Item (where applicable)
Comb teeth
Comb with one or more adjacent teeth broken opposing the direction of running (i.e. top of an up escalator or bottom of a down escalator)
Comb with one or more adjacent teeth broken in same direction as that of running of escalator (i.e. bottom of an up escalator or top of a down escalator)
Insecure, cracked or missing comb section
Comb plate clearance
Either or both Comb-plates set too high (measured between top of Step Tread Cleat and underside of Root Comb Section)
Interference between the comb and the moving steps likely to cause a collision
Floor plate
Floor plate at top or bottom landing damaged and liable to cause a tripping hazard
Key switch
Inoperative
Handrail condition
Handrail condition/split likely to cause damage/injury
Handrail condition not immediately likely to cause damage/injury
Handrail entry guards
One or more handrail entry guards missing or damaged sufficiently to render it ineffective, in the direction of travel (handrail entry, i.e.: exit landing)
One or more handrail entry guards missing or damaged sufficiently to render it ineffective, opposite the direction of travel (handrail exit, i.e.: entrance landing).
Handrail tension
Handrails must be tested to ensure that they cannot be readily stalled when pulled using one hand against the direction of motion.
If handrail can be stalled: with no handrail sensor fitted.
If handrail can be stalled: with handrail sensors fitted & operating
Safety devices
Any Safety Device or switch designed to stop machine fails to operate correctly, has been removed or made inoperative.
Earth leakage detection or residual current device
Earth Leakage Detection Device or Residual Current Device inoperative.
Under speed governor
Under speed (stationary or non-reversing) governors inoperative, provided that the main drive chain is in good condition

Item (where applicable)
Overspeed governors/ encoder
If the Overspeed Governor is not operational
Stopping device (Stop button)
Stopping device damaged or inoperative
Broken handrail detection switch
Switch inoperative.
Handrail switches/sensors
Handrail sensor not operational.
Missing step/Low step detectors
Detectors not operational where fitted
Carriage switches
Carriage switch not operational
Passenger barriers
Passenger barriers in an unsatisfactory condition or missing.
Step side clearance (Step to skirt not applicable to some models of passenger conveyor)
Maximum distance on any one side, Combined clearance of both sides
Brush guard:
Brush guard assembly missing, damaged or insecure.
Top decking panels
Any gap between adjacent panels or between a panel and its adjacent moulding
Gap or loose panel with no gap showing
Finger traps between handrail and handrail moulding
< 8 mm overall
Newel covers
Newel cover worn with either gap at top of Newel Wheel or a sharp edge.
Balustrade side panels
Gaps between adjacent panels or between a panel and its adjacent moulding or loose panel with no gap showing.
Anti-fall barriers
Anti-fall barriers loose or ill-fitting Immediate danger to Passengers
Balustrade or decking panel cover mouldings
Cover mouldings on side panels loose, or ill fitting.
Skirt panels
Skirt panel thickness at any point

Item (where applicable)
Kick plates
Kick Plates missing, exposing gap
Skirting to comb plate gap
Gap between edge of comb plate and skirting panels
Light fittings
Broken, missing, cracked or insecure lens
Step to step gap
Between any two steps
Tread cleats
Any tread cleat damaged liable to cause injury — See Figs 6 & 7 Either 3 or more adjacent tread cleats, or 4 or more tread cleats in any adjacent group of 6 broken or damaged and liable to cause entrapment or injury.
Cleanliness
Accumulation of loose dirt, fluff and grease on the whole or substantial proportion of the step band, drive system, truss and/or guarding
Motor covers
Motor cover missing, damaged or insecure.
Handwinding equipment
Emergency hand-winding equipment not on site or unserviceable
Operational brake
Not functioning, out of adjustment, or contaminated.
Auxiliary brake
Not functioning, out of adjustment, or contaminated.
Main drive chain
Main drive chain worn, damage, corroded or out of adjustment.
Newel bearings
Newel bearing defective.
Tracks
Any track or track brackets broken, loose, fractured or in imminent danger of failure.
Trailer wheel axles
One or more trailer wheel axles turning
Bearings
One or more bearing retention devices damaged or in unsatisfactory condition.
Wheels
Any step chain or trailer wheels missing

Item (where applicable)
Up thrust track
No clearance on up thrust tracks.
Trailer wheel tyres
One or more trailer wheel tyres missing.
Chain Wheel Tyres
One or more chain wheel tyres missing on same or adjacent steps.
Chain wheel axles
One or more of the chain wheel axles turning.
Insecure or missing fixing in chain wheel axle
Up thrust pins
One up thrust pin (or lug) missing on any step fitted with two pins by design
Both pins missing on the same step or one pin missing on a step fitted with only one pin by design
Plain risers
Riser heavily indented or distorted at step sides and liable to cause injury or entrapment.
Cleated risers
Any broken or damaged cleats liable to cause entrapment or injury
Guards
Guards missing or damaged
Lubrication or lubrication systems
Any evidence of inadequate lubrication.

ANNEX D— Example report of thorough examination of an escalator or moving walk

Inspection Companies are free to use other formats containing the minimum required information similar to that in LOLER 1998 — Schedule 1.

Owner/Duty Holder		Address	
Date of this examination		Type of Examination	

Type: (P) - Periodic; (O) - Examination after the Occurrence of Exceptional Circumstances.

Distinguishing No. and Description	
Manufacturer and date	
Location	
Details of defects found. Defects noted should be consistent with the rejection criteria listed in	
Access and guarding	
Running condition	
Electrical Safety devices	
Earthing continuity	
Braking system	
Treadway (steps and pallets)	
Comb plate/comb	
Balustrades, decking, skirt	
Handrails	
Skirt Deflector devices	
Surrounds, lighting and warning/advisory signs	
Drive system	
Controller	
Other (specify)	
Parts inaccessible?	
Defects found which affect continued safety and repairs required immediately or in a specified time. If none state “none”.	
Other defects and repairs required. If none state “none”.	
Other observations. If none state “none”.	
Date of last thorough examination	Due date of next thorough examination

I confirm that the equipment was thoroughly examined on: …… and that subject to any remedial action(s) noted above being completed, is safe to operate.

Details of person making the report (name, address, qualifications and employer/self-employed) Details

of person authenticating report on behalf of the author (if different)

Date of Issue of Report: ……..

ANNEX E — SAFETY SIGNS

E.1 Introduction

Safety signs are categorised as prohibition, mandatory, warning and information. The first three must follow the shape and colours stipulated. Certain information signs, such as those which indicate a safe place, emergency exit, first aid or firefighting equipment must comply with the regulations. Other information signs should follow the shape, i.e. rectangular or square, but may use pictograms and different colours providing they are not confusing. The most relevant signs applicable to escalators and moving walks are prohibition and mandatory.

Prohibition Signs

A round annular shape with red circular edging on a white background and a black pictogram indicating the prohibited activity/equipment with a red diagonal line through the pictogram.

Mandatory Signs

Round shape with a blue background and a white pictogram indicating the mandatory activity

Note: Examples of signs recommended by BS EN115-1:2017 are given below.

Sign 1 — Prohibition sign "Push chairs not permitted"

Sign 2 — Mandatory action sign "Use handrail"

Sign 3 — Mandatory action sign “Small children shall be held firmly”

Sign 4 — Mandatory action sign “Dogs shall be carried”

ANNEX F — TERMS AND DEFINITIONS

F.1 Approved Code of Practice (ACOP)

approved code of practice that has been approved by the Health and Safety Executive, with the consent of the Secretary of State

F.2 checks

procedures necessary to identify defects

F.3 competent person

A competent person is someone with the necessary skills, knowledge and experience to manage health andsafety

F.4 duty holder

person who is placed under a legal obligation by health and safety legislation

Note: Such people may include: owners, occupiers, nominated persons, managers, facilities managers, the self-employed etc as appropriate in the case concerned.

F.5 escalator

power-driven, inclined, continuous moving stairway used for raising or lowering people in which the user carrying surface (e.g. steps) remains horizontal[2]

A.6 mandatory sign

safety sign that indicates a specific course of action is to be taken[3]

F.7 moving walk

power-driven installation for the conveyance of passengers, either on the same level

or between different building levels in which the passenger carrying surface is typically comprised of pallets or a belt (forming a continuous surface i.e. no steps)

Note: Previously called passenger conveyor.

[2] BS EN115-1 (2017)

[3] BS5499-1 (2002)

F.8 owner

legal entity having right of possession of an escalator or moving walk

F.9 prohibition sign

safety sign that indicates that specific behavior is forbidden[4]

F.10 safety sign

sign that gives a safety message, by means of a combination of a safety colour and a geometric shape and which, by the inclusion of a pictogram, gives a particular meaning[2]

F.11 servicing company

company, which provides servicing, repair and maintenance for, escalators and moving walks

F.12 supplementary test

functional or other test/examination that may be necessary to check the safety related parts in support of a thorough examination

F.13 thorough examination

Systematic and detailed examination carried out by a competent person to detect any defects which are or might become dangerous

Note 1: The term 'Thorough Examination' is used throughout these guidelines in the same manner as previously used in HSE PM 45 to mean a statutory inspection carried out at suitable intervals to identify whether the equipment can be operated, adjusted and maintained safely and that any deterioration (for example defect, damage, wear) can be detected and remedied before it results in unacceptable risks. (PUWER Reg 6(2) Guidance Para 136 refers).

Note 2: The term 'Thorough Examination' should not be confused with maintenance carried out by a servicing company (see Clause 1.5 below).

F.14 user

person making use of the services of the escalator or moving walk

[4] BS 5499-1 (2002)

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