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BSI Standards Publication

Escalators and moving walks

Part 6: Safety parameters meeting the GESRs

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National foreword

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Part 6:
Safety parameters meeting the GESRs

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Development of global safety parameters (GSPs) ... **7**
4.1 Purpose of GSPs ... 7
4.2 Approach ... 7
5 Understanding and implementing GSPs ... **7**
5.1 Overall objective ... 7
5.2 Properties and use of GSPs ... 8
5.2.1 GSPs ... 8
5.2.2 Process of implementing GSPs] ... 8
5.2.3 Ways of using GESRs and GSPs ... 9
5.2.4 Applicability of GESRs and GSPs ... 9
5.2.5 Safety objectives of GSPs ... 10
5.3 Use of ISO/TS 25740-1 and this document ... 15
6 Global safety parameters ... **15**
Annex A (informative) **Anthropometric and design data summary** ... **34**
Annex B (normative) **Figures** ... **36**
Bibliography ... **40**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*..

A list of all parts in the ISO 8103 series can be found on the ISO website.

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Introduction

This document was prepared under the old numbering of the ISO 25740 series. With the resolution of the plenary Meeting in Sydney 09/2016, the new number of this document will be ISO/TS 8103-6. When the renumbering of the standards to 810x-family is finished, this document is revised.

This document was prepared in response to the need to set global safety parameters for escalators and moving walks.

The objective of ISO/TS 25740-1 and this document is to:

a) define a common global level of safety for all people using, or associated with escalators and moving walks;

b) facilitate innovation of escalators and moving walks not designed according to existing local, national or regional safety standards, while maintaining equivalent levels of safety. If such innovations become state of the art, they can then be integrated into the detailed local safety standard, at a later date; and

c) help remove trade barriers.

ISO/TS 25740-1 establishes global essential safety requirements (GESRs) for escalators and moving walks by addressing hazards and risks that can be encountered on escalators and moving walks. The GESRs however, state only safety objectives of escalators and moving walks.

This document provides guidance and criteria for achieving conformance with safety requirements of GESRs by specifying global safety parameters (GSPs) for use and implementation, where applicable, in an escalator or moving walk to eliminate hazards or mitigate safety risks addressed in the GESRs. However, GSPs are not mandatory.

Clause 4 describes the approach and methodology used in the development of this document. Clause 5 gives instructions for the use and implementation of GSPs. The GSPs are presented in Clause 6 in the sequence of GESRs in ISO/TS 25740-1.

This document is a product safety standard in accordance with ISO/IEC Guide 51.

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Escalators and moving walks —

Part 6:
Safety parameters meeting the GESRs

1 Scope

This document:

a) specifies global safety parameters (GSPs) for escalators and moving walks, their components and their functions;

b) complements the system and methods specified in ISO/TS 25740-1 for mitigating safety risks that can arise in the course of, the operation and use of, or work on, escalators and moving walks.

This document is applicable to escalators and moving walks that can:

a) be located in any permanent and fixed structure within or attached to a building;

b) have any

   1) rated load, size of load carrying unit and speed, and

   2) travel height;

c) be affected by fire and weather;

d) be foreseeably misused, but not vandalized.

This document does not specifically cover

— needs of users with disabilities, and

— risks arising from

   — work on escalators and moving walks under construction or during alterations and dismantling;

   — vandalism, and

   — fire in the environment of the escalator or moving walk.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14798:2009, *Lifts (elevators), escalators and moving walks — Risk assessment and reduction methodology*

ISO/TS 25740-1:2011, *Safety requirements for escalators and moving walks — Part 1: Global essential safety requirements (GESR)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
authorized person
person suitably trained with authorization to access restricted areas of *escalators* (3.9) and *moving walks* (3.25) (e.g. machinery spaces, separate machine rooms) and to work there, for the purpose of inspecting, testing and maintaining

[SOURCE: ISO/TS 25740-1:2011, 3.1]

3.2
cause
circumstance, condition, event or action that in a *hazardous situation* (3.16) contributes to the production of an *effect* (3.6)

[SOURCE: ISO 14798:2009, 2.1]

3.3
competent person
person in possession of the necessary technical knowledge, skills, qualification and experience to perform a work or task

3.4
control
system that governs the starting, acceleration, speed, deceleration and/or stopping of the *LCU* (3.20)

[SOURCE: ISO/TS 25740-1:2011, 3.3]

3.5
corrective action
action taken to reduce *risk* (3.30)

[SOURCE: ISO/TS 25740-1:2011, 3.4]

3.6
effect
result of a *cause* (3.2) in the presence of a *hazardous situation* (3.16)

[SOURCE: ISO 14798:2009, 2.2]

3.7
electromagnetic compatibility
EMC
degree of immunity to incident electromagnetic radiation and level of emitted electromagnetic radiation of electrical apparatus

3.8
enclosure of the travel path
structural elements which isolate the travel path from all other areas or space

[SOURCE: ISO/TS 25740-1:2011, 3.12]

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3.9
escalator
power-driven, inclined, continuous moving stairway, including guards adjacent to the travel path, used for raising or lowering persons in which the user carrying surface of the LCU (e.g. steps) remains horizontal

[SOURCE: ISO/TS 25740-1:2011, 3.15]

3.10
essential safety requirement
ESR
requirement intended to eliminate or sufficiently mitigate the *risk* (3.30) of *harm* (3.13) to *users* (3.41), *non-users* (3.26), and *authorized persons* (3.1) using or associated with *escalators* (3.9) and *moving walks* (3.25)

3.11
global essential safety requirement
GESR
globally agreed upon essential safety requirement

Note 1 to entry: See 3.10.

3.12
global safety parameter
GSP
globally agreed upon *safety parameter* (3.34)

Note 1 to entry: See 3.34.

3.13
harm
physical injury or damage to the health of people, or damage to property or the environment

[SOURCE: ISO 14798:2009, 2.3]

3.14
harmful event
occurrence in which a *hazardous situation* (3.16) results in *harm* (3.13)

[SOURCE: ISO 14798:2009, 2.4]

3.15
hazard
potential source of *harm* (3.13)

[SOURCE: ISO 14798:2009, 2.5]

3.16
hazardous situation
circumstance in which people, property or the environment are exposed to one or more *hazards* (3.15)

[SOURCE: ISO 14798:2009, 2.6]

3.17
incident
effect
event or occurrence, which can, but does not necessarily create a *risk* (3.30) of *harm* (3.13), including risks possible due to, shearing, crushing, falling, impact, trapping, fire, electric shock, exposure to weather, etc.

[SOURCE: ISO/TS 25740-1:2011, 3.13]

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3.18
landing
floor, balcony or platform used to receive and discharge persons from the *LCU* (3.20)

[SOURCE: ISO/TS 25740-1:2011, 3.14]

3.19
life cycle
period of usage of a component or the machinery

[SOURCE: ISO 14798:2009, 2.7]

3.20
load carrying unit
LCU
step/pallet/belt designed to carry persons for the purpose of transportation

[SOURCE: ISO/TS 25740-1:2011, 3.17]

3.21
LCU system
continuous connection of multiple *LCUs* (3.20) designed to carry persons for the purpose of transportation forming a transportation path

3.22
machinery
escalator (3.9) or *moving walks* (3.25) machine(s) mechanisms and associated equipment

[SOURCE: ISO/TS 25740-1:2011, 3.18]

3.23
machinery space
space(s) inside or outside of the supporting structure where the machinery as a whole or in parts is placed

3.24
maintenance
process of examination, lubrication, cleaning, adjustments, repair and replacement of parts of *escalators* (3.9) and *moving walks* (3.25) to ensure the safe and intended functioning of escalators and moving walks and its components after the completion of the installation and throughout its *life cycle* (3.19)

3.25
moving walk
power-driven installation for the conveyance of persons, including guards adjacent to the travel path, in which the user carrying surface of the *LCU* (3.20) remains parallel to its direction of motion and is uninterrupted (e.g. pallets, belt)

[SOURCE: ISO/TS 25740-1:2011, 3.16]

3.26
non-user
person in the vicinity of an *escalators* (3.9) or *moving walks* (3.25) but not intending to access or use it

[SOURCE: ISO/TS 25740-1:2011, 3.20]

3.27
protective measures
means used to reduce *risk* (3.30)

Note 1 to entry: Protective measures include risk reduction by inherently safe design, protective devices, personal protective equipment, information for use and installation, and training.

Note 2 to entry: See also definition for “corrective actions” in 3.5.

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[SOURCE: ISO 14798:2009, 2.8]

3.28
rated load
load that the *escalator* (3.9) or *moving walks* (3.25) is designed to move

[SOURCE: ISO/TS 25740-1:2011, 3.22]

3.29
relative movement
situation where a component of an *escalator* (3.9) or *moving walks* (3.25) moves in the vicinity of other components of escalators or moving walks that is stationary, or that moves at a different speed or in a different direction; also a situation where a component of an escalator or moving walk moves in the vicinity of a structure where persons may be present

EXAMPLE Building floor surrounding the escalator or moving walk.

3.30
risk
combination of the probability of occurrence of *harm* (3.13) and the *severity* (3.36) of that harm

[SOURCE: ISO 14798:2009, 2.10]

3.31
risk analysis
systematic use of available information to identify *hazards* (3.15) and to estimate the *risk* (3.30)

[SOURCE: ISO 14798:2009, 2.11]

Note 1 to entry: This method aims at systematically identifying and assessing hazards, evaluating risks and recommending risk reduction measures.

3.32
risk assessment
overall process comprising a *risk analysis* (3.31) and a *risk evaluation* (3.33)

[SOURCE: ISO 14798:2009, 2.12]

3.33
risk evaluation
consideration of the *risk analysis* (3.31) results to determine if the risk reduction is required

[SOURCE: ISO 14798:2009, 2.13]

3.34
safety parameter
SP
quantitative unit, the value of which, in the form of numerical values or references to ISO, IEC or other standards, provides a level of safety consistent with that provided by relevant standards in current use in the *escalator* (3.9) or *moving walks* (3.25) industry and sound engineering practices

3.35
scenario
sequence of a *hazardous situation* (3.16), *cause* (3.2) and *effect* (3.6)

[SOURCE: ISO 14798:2009, 2.14]

3.36
severity
qualitative measure of the worst possible *incident/effect* (3.17) that could be caused by a specific *hazard* (3.15)

[SOURCE: ISO 14798:2009, 2.15]

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3.37
sound engineering practice
use of engineering or technical methods to design or evaluate a design or system by taking into account relevant factors that can influence its efficacy and operation

Note 1 to entry: This practice also involves the use of applicable standards, specifications, codes, regulatory and industrial guidelines, as well as accepted engineering and design methods and installation and maintenance practices.

3.38
transportation
process whereby persons step onto a moving *LCU* (3.20), which then travels from one *landing* (3.18) to another landing, where the person exits the LCU

[SOURCE: ISO/TS 25740-1:2011, 3.29]

3.39
travel path
path and related space within which *LCU* (3.20) travels between the *landing* (3.18)

[SOURCE: ISO/TS 25740-1:2011, 3.33]

3.40
uncontrolled movement
situation where

— *LCU* (3.20) moves when the *escalator* (3.9) or *moving walks* (3.25) was to remain stationary, or

— LCU travels at a speed that is out of control of the means designed and intended to control the LCU speed during operation.

EXAMPLE 1 LCU starts to move, due to failure of, or breakdown in, escalator or moving walk components, such as speed control, drive or brake system.

EXAMPLE 2 The LCU speed exceeds its designed speed or does not decelerate or stop as intended, due to failure of, or breakdown in, components of an escalator or moving walk, such as speed control, drive or brake system.

[SOURCE: ISO/TS 25740-1:2011, 3.31]

3.41
user
person using the *escalator* (3.9) or *moving walk* (3.25) for the purpose of transportation

[SOURCE: ISO/TS 25740-1:2011, 3.32]

3.42
vandalism
deliberate destruction of or damage to property for no obvious gain or reason

3.43
working area or space
area or space defined for use by *authorized persons* (3.1) to perform maintenance, inspection or testing of an *escalator* (3.9) or *moving walks* (3.25)

[SOURCE: ISO/TS 25740-1:2011, 3.33]

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4 Development of global safety parameters (GSPs)

4.1 Purpose of GSPs

4.1.1 To enable verification that the escalator, or moving walk, and its selected components and functions have achieved safety objectives of applicable GESRs, global safety parameters (GSPs), such as strength, clearances, acceleration or deceleration values, are provided in this document in the form of numerical values or references to International Standards or other standards.

4.1.2 According to ISO/TS 25740-1:2011, 5.1.5, a GESR states only the safety objective, or "what" shall be done or accomplished but not "how" to accomplish the objective. Therefore, in order to achieve the safety objective of a GESR, appropriate designs of escalators and moving walks components and functions shall be selected and their compliance with the GESR shall be verified. ISO 14798 describes a risk assessment process that can help to establish that the GESRs have been fulfilled with a specific design. In order to mitigate specific risks identified in the risk assessment process, specific components, functions or GSPs may be used.

4.1.3 ISO/TS 25740-1 and this document do not mandate the use of specific designs of components and functions (such as, specific designs of "steps", "machines", or "supporting elements") as they are commonly specified and required in prescriptive standards for escalators and moving walks. Mandating such components and functions in this document would inhibit design innovations.

4.1.4 All applicable GESRs shall be fulfilled in accordance with ISO/TS 25740-1, irrespective of whether or not there is a GSP specified in this document.

4.2 Approach

4.2.1 As was the case with development of ISO/TS 25740-1, the development of this document also involved experts from various parts of the world.

4.2.2 Individual experts derived safety parameters from independent research of existing standards, anthropometric data, clearances, forces, etc., and a comparison of major codes. GSPs which were determined to provide sufficient mitigation of risks related to relevant GESRs have been included in this document (see Annex A).

5 Understanding and implementing GSPs

5.1 Overall objective

5.1.1 Consistent with the purpose described in 4.1, global safety parameters in relation to individual GESRs are specified in Clause 6.

5.1.2 The objective of the global safety parameters in Clause 6 is to

a) introduce parameters that provide universal means to demonstrate compliance with GESRs, and

b) stimulate the harmonization of safety parameters in existing national and regional standards.

5.1.3 To accomplish the safety objective of a GESR, a GSP, although not mandatory, can be an adequate means of achieving compliance. The list of GSPs in Table 2 is not exhaustive.

Table 2 specifies fixed minimum or maximum values. Where the GSP gives a possible range of values in the referenced International Standards, dependent on the circumstance in which it is used, justification that the correct value has been chosen can be required to suit the particular hazardous situation(s).

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5.1.4 Listed GSPs should not be interpreted as the only measure of conformity with a GESR. Conformance with a GESR may be achieved by deviating from the listed GSPs, provided that the risk is mitigated using other equally effective protective measures. Parameters consistent with sound engineering practices or selected from applicable codes or standards may be used. In such cases, it is necessary to demonstrate that the type of parameters chosen:

a) sufficiently mitigate the risk addressed in the GESR, and

b) ensure that any new risks created by implementation of the parameter(s) are sufficiently mitigated.

NOTE See also ISO 14798.

5.2 Properties and use of GSPs

5.2.1 GSPs

5.2.1.1 The GSPs are listed in Table 2.

NOTE 1 International Standards and other standards have been used wherever applicable for developing GSPs as they represent long-standing history in escalator and moving walk safety, or scientifically developed data which has been applied for some time in safety-related applications. The other standards include escalator and moving walk safety codes, electrical codes, anthropometric standards and various materials standards. In all cases, the use of the relevant standard is to assist the user of this document.

NOTE 2 This document recognizes that slightly different or non-identical values for safety-related criteria have been used around the world in order to ensure the safe operation of escalators and moving walks. Examples of these are safety factors, space sizes to prevent body part entry, space, forces, deceleration and acceleration rates and illumination levels. In many cases, the values vary only slightly (e.g. as a result of conversions of imperial to SI units of measure, or due to different origins of the units). Nevertheless, these slightly differing values have proven to result in safe escalator and moving walk operation over many years.

5.2.1.2 Safety factors should be considered relative to the material being used and its application, based on sound engineering practice considering all applicable codes and standards.

5.2.1.3 It is recognized that electronic safety devices and programmable electronic systems in safety-related applications (i.e. PESSRAE) are extensively used in many industries. Where used in escalator and moving walk safety applications, guidance on safety integrity levels (SILs) is provided in ISO 22201-2.

For devices using electro-mechanical or non-programmable electronic devices, methods such as Failure Modes and Effects Analysis (FMEA) should be considered to establish the safety level.

5.2.1.4 The values in Table 2 are globally harmonized values based upon current applicable national or regional standards, with the recognition that some of the values are not absolute in nature.

5.2.1.5 When existing national, regional or international escalator or moving walk safety standards are revised, these GSPs (i.e. these values and generic International Standards) should be considered.

5.2.2 Process of implementing GSPs]

In evaluating an escalator or moving walk or its components for compliance with a particular GESR, the following risk assessment and risk reduction process, in accordance with ISO 14798, shall be applied.

a) The risk scenario, which includes the hazardous situation addressed in a GESR and the harmful event, shall be formulated.

b) Risk shall be estimated, evaluated and assessed.

c) If the risk level requires mitigation, protective measures are proposed. The protective measures should eliminate the hazard or reduce the risk. Reducing the risk may include implementing GSPs.

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