



**International
Standard**

ISO 8103-1

Escalators and moving walks —

**Part 1:
Safety requirements**

Escaliers mécaniques et trottoirs roulants —

Partie 1: Exigences de sécurité

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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 document 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).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by the European Committee for Standardization (CEN) (as EN 115-1:2017) and was adopted, without modification other than those given below by Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*

- change "this European Standard" or "this standard" to "this document";
- change any "EN ISO xxxx" references to "ISO xxxx" references.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 General

The content of this document was already published in EN 115-1:2017. This document contains only editorial changes and update of references.

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e. g. trade unions, organizations for people with special needs);
- service providers, e. g. for maintenance (small, medium and large enterprises);
- consumers (in the case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

0.2 General remarks

The contents of this document are based on the assumption that persons using escalators and moving walks are able to do so unaided. However, physical and sensory abilities in a population can vary over a wide range, escalators and moving walks are also likely to be used by persons with a range of other disabilities.

Some individuals, in particular older people, might have more than one impairment. Some individuals are not able to use an escalator or moving walk independently and rely on assistance/support being provided by a companion. Furthermore, some individuals can be encumbered by objects or be responsible for other persons, which can affect their mobility. The extent to which an individual is incapacitated by impairments and encumbrances often depends on the usability of products, facilities and the environment.

The use of wheelchairs on escalators and moving walks can lead to dangerous situations which cannot be mitigated by machine designs and therefore should not be permitted.

The use of lifts is the preferred method of vertical travel for most people with disabilities and in particular wheelchair users and persons with guide dogs.

Additional signs should be provided to indicate the location of other facilities, these facilities should be in close proximity to the escalators and moving walks and easy to find.

The risks arising from the configuration of escalators and moving walks within a building (e.g. obstructions or voids adjacent to escalators) should be risk assessed according to methodology of the ISO 14798 by the building designer/owner at the building design stage and measures identified to eliminate hazards or reduce risk to an acceptable level.

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It is assumed that negotiations have been made for each contract between the customer and the supplier/installer (see also [Annex A](#)) about:

- a) intended use of the escalator or moving walk;
- b) environmental conditions;
- c) civil engineering problems;
- d) other aspects related to the place of installation.

Planning of traffic flows and evacuation/rescue purposes are under the responsibility of the building designer/owner.

If escalators or moving walks are intended to be operated under special conditions, such as directly exposed to the weather or explosive atmosphere, or in exceptional cases serve as emergency exits, appropriate design criteria, components, materials and instructions for use should be used that satisfy the particular conditions.

An Interpretation Committee has been established to clarify, if necessary, the spirit in which the clauses of the standard have been drafted and to specify the requirements appropriate to particular cases. Interpretation Requests can be sent to the National Standard Bodies which will contact the responsible Technical Committee ISO/TC 178. The formats of an interpretation request and the interpretation are given in the Information Note – System of ISO/TC 178 series of standards, Interpretations and Frequently Asked Questions (FAQ) procedures.

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Escalators and moving walks —

Part 1: Safety requirements

1 Scope

This document is applicable for new escalators and moving walks (pallet or belt type) as defined in [Clause 3](#).

This document deals with all significant hazards, hazardous situations, and events relevant to escalators and moving walks when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see [Clause 4](#)).

This document is not applicable to escalators and moving walks which were manufactured before the date of its publication. It is, however, recommended that existing installations be adapted to this document.

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.

EN 1929-2:2004, *Basket trolleys — Part 2: Requirements, tests and inspection for basket trolleys with or without a child carrying facility, intended to be used on passenger conveyors*

EN 1929-4:2005, *Basket trolleys — Part 4: Requirements and tests for basket trolleys with additional goods carrying facility(ies), with or without a child carrying facility, intended to be used on passenger conveyors*

EN 1990:2002¹⁾, *Eurocode — Basis of structural design*

EN 1993-1-1:2005, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1998-1:2004, *Eurocode 8: Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 10025-1:2004, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3:2004, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4:2004, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10025-5:2004, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

EN 10025-6:2004+AMD1:2009, *Hot rolled products of structural steels — Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition — Amendment 1*

EN 10083-1:2006, *Steels for quenching and tempering — Part 1: General technical delivery conditions*

1) This standard is currently impacted by the amendment EN 1990:2002/A1:2005.

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- EN 10083-2:2006, *Steels for quenching and tempering — Part 2: Technical delivery conditions for non alloy steels*
- EN 10083-3:2006, *Steels for quenching and tempering — Part 3: Technical delivery conditions for alloy steels*
- EN 12015:2014, *Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission*
- EN 12016:2013, *Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Immunity*
- EN 13501-1:2007+AMD1:2009, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests — Amendment 1*
- EN 60068-2-6:2008, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)*
- EN 60068-2-14:2009, *Environmental testing — Part 2-14: Tests — Test N: Change of temperature (IEC 60068-2-14:2009)*
- EN 60068-2-27:2009, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock (IEC 60068-2-27:2008)*
- EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2006, modified)*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*
- EN 60664-1:2007, *Insulation coordination for equipment within low-voltage systems — Part 1: Principles, requirements and tests (IEC 60664-1:2007)*
- EN 60947-4-1:2010²⁾, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1:2009)*
- EN 60947-5-1:2004³⁾, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2004)*
- EN 61249 (all parts), *Materials for printed boards and other interconnecting structures (IEC 61249, all parts)*
- EN 62061:2005⁴⁾, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*
- EN 62326-1:2002, *Printed boards — Part 1: Generic specification (IEC 62326-1:2002)*
- ISO 868:2003, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*
- ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*
- ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design*
- ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*
- ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*
- ISO 3864-3:2012, *Graphical symbols — Safety colours and safety signs — Part 3: Design principles for graphical symbols for use in safety signs*

2) This standard is currently impacted by the amendment EN 60947-4-1:2010/A1:2012.

3) This standard is currently impacted by the amendment EN 60947-5-1:2004/A1:2009.

4) This standard is currently impacted by the amendment EN 62061:2005/A1:2013.

HD 60364-4-41:2007, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1.1

angle of inclination

maximum angle to the horizontal in which the steps, the pallets or the belt move

3.1.2

authorized person

suitably trained person with authorization to access restricted areas of escalators and moving walks (e.g. machinery spaces, separate machine rooms) and to work there for the purpose of inspection, testing and maintenance

Note 1 to entry: Authorized persons should be competent for the tasks they have been authorized for (see also [3.1.8](#)).

3.1.3

balustrade

part of the escalator/moving walk which ensures the user's safety by providing stability, protecting from moving parts and supporting the handrail

3.1.4

balustrade decking

transverse member of the balustrade which meets the handrail guidance profile and which forms the top cover of the balustrade

3.1.5

brake load

load on the step/pallet/belt which the brake system is designed to stop the escalator/moving walk

3.1.6

comb

pronged section at each landing that meshes with the grooves

3.1.7

comb plate

platform at each landing to which the combs are attached

3.1.8

competent person

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

Note 1 to entry: National Regulation may require certification of competence.

3.1.9

escalator

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

Note 1 to entry: Escalators are machines - even when they are out of operation - and cannot be considered as fixed staircases.

3.1.10

exterior panel

part of the exterior side of the enclosure of an escalator or moving walk

3.1.11

failsafe circuit

safety related electrical and/or electronic system with defined failure mode behaviour

3.1.12

handrail

power-driven moving rail for persons to grip while using the escalator or moving walk

3.1.13

interior panel

panel located between the skirting or lower inner decking and the handrail guidance profile or balustrade decking

3.1.14

lower inner decking

profile that connects the skirting with the interior panel when they do not meet at a common point

3.1.15

lower outer decking

profile that connects the exterior panels with the interior panel

3.1.16

machinery

escalator or moving walk machine(s) mechanisms and associated equipment

3.1.17

machinery spaces

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

3.1.18

maximum capacity

maximum flow of persons that can be achieved under operational conditions

3.1.19

moving walk

power-driven installation for the conveyance of persons in which the user carrying surface remains parallel to its direction of motion and is uninterrupted (e.g. pallets, belt)

Note 1 to entry: Moving walks are machines - even when they are out of operation - and should not be used as a fixed access.

3.1.20

newel

end of balustrade

3.1.21

nominal speed

speed in the direction of the moving steps, pallets or the belt stated by the manufacturer for which the escalator or moving walk has been designed, without load on the steps/pallets/belt at nominal frequency and nominal voltage

3.1.22

rise

vertical distance between the upper and lower finished floor levels

3.1.23

safety circuit

part of the electric safety system consisting of electrical safety devices

3.1.24

safety devices

part of a safety circuit consisting of safety switches and/or failsafe circuits and/or E/E/PE, used to carry out safety functions

3.1.25

safety integrity level

SIL

discrete level for specifying the safety integrity requirements of the safety functions to be allocated to the E/E/PE

Note 1 to entry: In this document, SIL 1 is representing the lowest level and SIL 3 the highest, even when it does not make use of SIL 3.

3.1.26

safety related electrical, electronic and programmable electronic devices (E/E/PE)

system for control, protection or monitoring based on one or more electrical, electronic or programmable electronic devices, including all elements of the system such as power supplies, sensors and other input devices, data highways and other communication paths, and actuators and other output devices, used in safety related applications as listed in [Table 8](#) and [Table 9](#)

3.1.27

safety system

safety related part of the electrical control system as an arrangement of safety circuits and monitoring devices

3.1.28

skirting

vertical part of the balustrade interfacing with the steps, pallets or belt

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3.1.29

skirt deflector

device to minimize the risk of trapping between the step and the skirting

3.1.30

structural rated load

load which the structure is designed for

3.2 Symbols and abbreviations

The following symbols and corresponding units of measurement of the following [Table 1](#) are used in this document.

Table 1 — Symbols and corresponding units of measurement used in this document

Symbol	Designation	Unit	Figures
a_{gR}	Peak ground acceleration (reference peak ground acceleration on type A ground)	m/s ²	—
b_1	Distance between the handrail centre lines	m	Figure 6
b_2	Width of the handrail	mm	Figure 6
b_3	Horizontal distance between skirting and interior panel	mm	Figure 6
b_4	Width of the horizontal part of the lower inner decking that directly joins the interior panel	mm	Figure 6
b_5	Horizontal distance between the inner edge of the handrail and the top edge of the interior panel	mm	Figure 6
b_6', b_6''	Horizontal distance between the handrail profile and guide or cover profiles	mm	Figure 6
b_7	Width of the grooves	mm	Figure 5
b_8	Web width	mm	Figure 5
b_9	Horizontal distance between the outer edge of the handrail and a non-continuous obstruction, e.g. roof intersection, column	mm	Figure A.1
b_{10}	Horizontal distance between the outer edge of the handrail and a continuous obstruction, e.g. wall	mm	Clause 5, Figure A.1
b_{11}	Horizontal distance between the handrails of adjacent escalators/moving walks	mm	Figure A.1
b_{12}	Perpendicular distance between the lower edge of the handrail and the balustrade decking	mm	Figure 6
b_{13}	Width of the lower outer decking	mm	Figure 7
b_{14}	Horizontal distance between the outer edges of interior panels on adjacent escalators or moving walks	mm	Figure 7
b_{15}	Horizontal distance between the building structure (wall) and the centreline of the handrail	mm	Figure 7
b_{16}	Horizontal distance between the centrelines of the handrails of adjacent escalators/moving walks	mm	Figure 7
b_{17}	Horizontal distance of the anti-slide device to the outer edge of the handrail	mm	Figure 7
b_{18}	Perpendicular distance between the lower edge of the handrail and the point where the handrail stand is connected to the balustrade	mm	Figure 6
h_1	Vertical distance between the top of the handrail and step nose or pallet surface or belt surface	m	Figures 5, 6
h_2	Perpendicular distance between top edge of skirting or bottom edge of cover joints and the line of the step nose or the tread surface of the pallets or belt	mm	Figure 6
h_3	Distance between the entry of handrail into the newel and the floor	m	Figures 5, 6
h_4	Free height above any point of step surfaces, pallets or belt over the area between both outer edges of the handrails including the area to the end of the newel and the unrestricted area at all points	m	Figures 5, A.1
h_5	Height of the deflector	m	Figures 5, 7
h_6	Clearance between the upper edge of the tread surface and the root of the comb teeth	mm	Figure 5
h_7	Depth of the grooves	mm	Figure 5
h_8	Mesh depth of the comb into the grooves of the tread	mm	Figure 5
h_9	Vertical distance between floor and lower end of the anti-climbing device	mm	Figure 7
h_{10}	Vertical distance between lower edge of the handrail and upper end of the access restriction device	mm	Figure 7