TECHNICAL SPECIFICATION

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Lifts for the transport of persons and goods —

Part 21: Global safety parameters (GSPs) meeting the global essential safety requirements (GESRs)

Elévateurs pour le transport de personnes et d'objets —
Partie 21: Paramètres de securité repondant aux exigences essentielles de sécurité globale des ascenseurs

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Contents

Page

Foreword

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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).

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 Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*.

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.

A list of all parts in the ISO 8100 series can be found on the ISO/TC 178 website.

This first edition cancels and replaces ISO/TS 22559-2.

Introduction

This document was prepared in response to the need to set global safety parameters for lifts (elevators).

The objective of the ISO 8100 series is to:

a) define a common global level of safety for all people using, or associated with, lifts (elevators);

b) facilitate innovation of lifts (elevators) 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 be integrated into the detailed local safety standard at a later date;

c) help remove trade barriers.

ISO 8100-20 establishes global essential safety requirements (GESRs) for lifts (elevators) by addressing hazards and risks that can be encountered on a lift (elevator). The GESRs, however, state only the safety objectives of a lift (elevator).

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 a lift (elevator) 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 8100-20.

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

Lifts for the transport of persons and goods —

Part 21: Global safety parameters (GSPs) meeting the global essential safety requirements (GESRs)

1 Scope

This document:

a) specifies global safety parameters (GSPs) for lifts (elevators), their components and their functions;

b) complements the system and methods specified in ISO 8100-20 for mitigating safety risks that can arise in the course of the operation and use of, or work on, lifts (elevators).

NOTE Hereinafter, the term "lift" is used instead of the term "elevator".

It is applicable to lifts that can:

a) be located in any permanent and fixed structure within or attached to a building, except lifts located in:

   1) private residences (single family units); or

   2) means of transport, e.g. ships;

b) have any:

   1) rated load, size of load-carrying unit (LCU) and speed; and

   2) travel distance and number of landings;

c) be affected by fire in the load-carrying unit, earthquakes, weather or floods;

d) be foreseeably misused (e.g. overloaded), but not vandalized.

This document does not specifically cover

a) all the needs of users with disabilities;[1)] or

b) risks arising from:

   1) work on lifts under construction, during testing, or during alterations and dismantling;

   2) use of lifts for firefighting and emergency evacuation;

   3) vandalism;

   4) fire outside the LCU;

   5) explosive atmosphere;

   6) transportation of dangerous goods.

1) Although the GESRs mentioned in this document have been identified and evaluated by risk assessment, not all disabilities or combinations of disabilities of users have necessarily been addressed.

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, *Lifts (elevators), escalators and moving walks — Risk assessment and reduction methodology*

ISO 22199, *Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission*

ISO 22200, *Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Immunity*

ISO 8100-20, *Safety requirements for lifts (elevators) — Part 1: Global essential safety requirements (GESRs)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14798 and the following apply.

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

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

3.1
authorized person
person with authorization to access restricted *lift* (3.8) areas [e.g. machinery spaces, lift *well (hoistway)* (3.5), pit and LCU top] and to work therein, for the purpose of inspecting, testing, repairing, and maintaining the lift or for rescuing users from a stalled *load-carrying unit (LCU)* (3.9)

[SOURCE: ISO 8100-20:2018, 3.1]

3.2
counterweight
mass that contributes traction in the case of a traction *lift* (3.8), or mass that saves energy by balancing all or part of the mass of the *LCU* (3.9) (car) and the *rated load* (3.15)

[SOURCE: ISO 8100-20:2018, 3.3]

3.3
door
landing (3.7) or *LCU* (3.9) mechanical device (including devices that partially or fully enclose the opening) used to secure an LCU or landing entrance

3.4
electromagnetic compatibility
EMC
degree of immunity to incident electromagnetic radiation and level of emitted electromagnetic radiation of electrical apparatuses

3.5
well (GB)
hoistway (US)
travel path(s) (3.19) of the *LCU* (3.9) and related equipment, plus the spaces below the lowest *landing* (3.7) and above the highest landing

3.6
enclosure
well enclosure (GB)
hoistway enclosure (US)
fixed structural elements that isolate the *well (hoistway)* (3.5) from all other areas or spaces

3.7
landing
floor, balcony or *platform* (3.14) used to receive and discharge persons or goods (freight) from the *LCU* (3.9)

3.8
lift (GB)
elevator (US)
lifting appliance intended to transport persons with or without goods or freight by means of a power-ope *rated load* (3.15) -carrying unit that is guided by a fixed guiding system from one *landing* (3.7) to another, at an angle of more than 75° to the horizontal

Note 1 to entry: This term does not include mobile or other working *platforms* (3.14) or baskets, or lifting appliances used in the course of construction of buildings or structures.

Note 2 to entry: See ISO/TR 11071-1:2004, Clause 2, for use of the term “lift” versus the term “elevator” in current national standards for lifts.

[SOURCE: ISO 8100-20:2018, 3.17]

3.9
load-carrying unit
LCU
car
part of a *lift* (3.8) designed to carry persons and/or other goods for the purpose of *transportation* (3.18)

[SOURCE: ISO 8100-20:2018, 3.18]

3.10
machinery space
space inside or outside the *well (hoistway)* (3.5), which contains the lift's mechanical equipment, and can also contain electrical equipment used directly in connection with the *lift* (3.8)

Note 1 to entry: This space can also contain the electric driving machine, the hydraulic machine or means for emergency operation.

3.11
maintenance
process of examination, lubrication, cleaning, adjustment and routine replacement of *lift* (3.8) parts to ensure the safe and intended functioning of the lift and its components after completion of the installation and throughout its life cycle

3.12
non-user
person in the vicinity of a *lift* (3.8), but not intending to access or use the lift

3.13
overload
load in the *LCU* (3.9) that exceeds the *rated load* (3.15) of the *lift* (3.8)

3.14
platform
part of the *LCU* (3.9) that accommodates persons and load for the purpose of *transportation* (3.18)

3.15
rated load
load that the *lift* (3.8) is designed and installed to transport

3.16
relative movement
situation where a *lift* (3.8) component moves in the vicinity of another lift component that is stationary or that moves at a different speed or in a different direction

Note 1 to entry: This can also occur in a situation where a lift component moves in the vicinity of a structure where persons can be present.

EXAMPLE Building floor surrounding the lift *well (hoistway)* (3.5).

3.17
safety parameter
SP
quantitative unit, the value of which, in the form of numerical values or references to International Standards or other standards, provides a level of safety consistent with that provided by relevant standards in current use in the *lift* (3.8) industry and good engineering practices

Note 1 to entry: A global safety parameter (GSP) is a globally agreed upon safety parameter.

3.18
transportation
process in the course of which persons enter, or goods are moved into, an *LCU* (3.9), which is then lifted or lowered to another *landing* (3.7), where the person exits, or goods are removed from, the LCU

3.19
travel path
path and related space between the *lift* (3.8) terminal *landings* (3.7) within which an *LCU* (3.9) travels

Note 1 to entry: For "space" above and below terminal landings, see 3.15.

3.20
uncontrolled movement
situation where the *LCU* (3.9)

— moves when, according to the design of the *lift* (3.8), it was to remain stationary; or

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

EXAMPLE 1 The LCU starts to move away from a *landing* (3.7) while the *users* (3.21) are entering or leaving the LCU due to failure or breakdown of lift components, such as the speed control or brake system.

EXAMPLE 2 The LCU speed exceeds its designed speed or does not decelerate or stop as intended due to failure or breakdown of lift components, such as the speed control or brake system.

3.21
user
person using the *lift* (3.8) for the purpose of normal *transportation* (3.18), without any help or supervision, including a person carrying goods and a person using a specially dedicated operating system to transport goods or loads

Note 1 to entry: An example of use of a specially dedicated operating system is "independent service" for transport of hospital patients, whereby the operation of the lift is under the sole control of the patient's attendant.

3.22
vandalism
deliberate destruction of, or damage to, property for no obvious gain or reason

3.23
working area
working space
area or space defined for use by *authorized persons* (3.1) to perform *maintenance* (3.11), repair, inspection or testing of the *lift* (3.8)

4 Development of global safety parameters (GSPs)

4.1 Purpose of GSPs

To enable verification that the lift and its selected components and functions have achieved safety objectives of applicable GESRs, GSPs, such as strength, clearances, acceleration or retardation values, are provided in this document in the form of numerical values or references to International Standards or other standards.

NOTE For the definition of GESR, see ISO 8100-20:2018, 3.9.

According to ISO 8100-20:2018, 5.1.4, "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 lift 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 or lift configuration. In order to mitigate specific risks identified in the risk assessment process, specific components, functions or GSPs may be used.

ISO 8100-20 and this document do not mandate the use of specific designs of components and functions (such as specific designs of "safety gear", "door interlocks" or "spring buffers") as they are commonly specified and required in prescriptive lift standards. Such components and functions are not mandated in this document as that would inhibit design innovations.

All applicable GESRs shall be fulfilled, in accordance with ISO 8100-20, irrespective of whether or not there is a GSP specified in this document.

4.2 Approach

As was the case with development of ISO 8100-20, the development of this document also involved experts from various parts of the world working in three regional study groups (North American, European and Asia-Pacific). Specialized task groups carried out research in areas, such as anthropometric, ergonomic, spatial and environmental influences by review of relevant International Standards and other standards.

Individual experts and task groups derived safety parameters from independent research of existing standards, anthropometric data, clearances, forces, etc., and a comparison of major codes. GSPs that were determined to provide sufficient mitigation of risks related to relevant GESRs are included in this document.

5 Understanding and implementing GSPs

5.1 Overall objective

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

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 standards.

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).

Listed GSPs should not be interpreted as the only measure of conformity with a GESR. Conformance with a GESR can be achieved by deviating from the listed GSPs, provided that the risk is mitigated using other equally effective protective measures. Parameters consistent with good engineering practices (see also 5.4 and Table 2 remark to GSP 1) or selected from applicable codes or standards may be used. In such cases, it shall be demonstrated 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 ISO 14798:2009, 4.4.1.3.

5.2 Properties and use of GSPs

5.2.1 GSPs

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 lift safety or scientifically developed data which has been applied for some time in safety-related applications. The other standards include lift 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 lifts. Examples of these are safety factors, space sizes to prevent body part entry, space sizes to allow body part entry, forces, deceleration levels and illumination levels. In many cases, the values vary only slightly (e.g. as a result of conversions of imperial to SI units of measurement or due to different origins of the units). Nevertheless, these slightly differing values have proven to result in safe lift operation over many years.

Safety factors should be considered relative to the material being used and its application, based on good engineering practice (see also 5.4 and Table 2 remark to GSP 1).

It is recognized that electronic safety devices and programmable electronic systems in safety-related applications (i.e. PESSRAL) are being extensively used in many industries. Where used in lift safety applications, guidance on safety integrity levels (SILs) is provided in ISO 22201-1.

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.

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

When existing lift 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 a lift system or component 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;

d) after applying the protective measures, the risk shall be re-assessed. Step c) shall be repeated until the risk has been sufficiently mitigated;

