BS ISO 22559-1:2014

BSI Standards Publication

Safety requirements for lifts (elevators)

Part 1: Global essential safety requirements (GESRs)

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National foreword

This British Standard is the UK implementation of ISO 22559-1:2014. It supersedes DD ISO/TS 22559-1:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MHE/4, Lifts, hoists and escalators.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

ISO 22559-1

First edition
2014-02-15

Safety requirements for lifts (elevators) —

Part 1: Global essential safety requirements (GESRs)

Exigences de sécurité des ascenseurs —

Partie 1: Exigences essentielles de sécurité globale des ascenseurs

Reference number
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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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 178, *Lifts, escalators and moving walks*.

This first edition of ISO 22559 cancels and replaces ISO/TS 22559-1:2004.

ISO 22559 consists of the following parts, under the general title *Safety requirements for lifts (elevators)*:

— *Part 1: Global essential safety requirements (GESRs)*

— *Part 2: Safety parameters meeting the global essential safety requirements (GESRs)* (Technical Specification)

— *Part 3: Global conformity assessment procedures (GCAP) — Prerequisites for certification of conformity of lift systems, lift components and lift functions* (Technical Specification)

— *Part 4: Global conformity assessment procedures (GCAP) — Certification and accreditation requirements* (Technical Specification)

Introduction

0.1 After the publication of ISO/TR 11071-1 and ISO/TR 11071-2, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this part of ISO 22559 on safety requirements for lifts.

0.2 The objective of the ISO 22559 series of documents 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; and

c) help remove trade barriers.

NOTE ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the global essential safety requirements (GESRs) specified in this part of ISO 22559.

0.3 Clause 4 describes the approach and methodology used in the development of this part of ISO 22559. Clause 5 gives instructions for the use and implementation of GESRs. The GESRs are presented in Clause 6. Each GESR specifies a safety objective, i.e. what is to be achieved, not how to do it. This allows innovation and development of future technologies. Annex A gives an overview of GESRs in relation to lift subsystems.

0.4 This part of ISO 22559 does not supersede National Regulations. Users of this part of ISO 22559 should comply with the National Regulations. This part of ISO 22559 is intended to support national regulations on safety assessment of new lifts.

0.5 The hazards associated with lifts are similar worldwide. For achieving an appropriate uniform safety level, the requirements in this part of ISO 22559 should be considered in any safety assessment of new lifts.

0.6 ISO 22559-1 GESRs or the EU Lifts Directive 95/16/EC essential health and safety requirements (EHSRs), as well as those EHSRs of the Machinery Directive 2006/42/EC applicable to lifts, when complied with, give an appropriate level of safety for lifts. See Annex B for application of European legislation.

0.7 The ISO 22559 series of documents provides a process for assessment of conformity of lift systems, lift components or lift functions with the safety requirements specified in ISO 22559-1. It includes a structured methodology for establishing, documenting and demonstrating that necessary and appropriate protective measures are taken to eliminate hazards or sufficiently mitigate risks. This process is particularly useful for establishing safety of lift systems, lift components or lift functions involving innovative design or new technologies.

NOTE If one is using the process, parts 1 to 4 of the ISO 22559 series should be used.

0.8 ISO/IEC Guide 51 has been taken into account as far as practicable at the time of drafting of this part of ISO 22559. The process of risk reduction described in ISO/IEC Guide 51 is accomplished using ISO 14798.

INTERNATIONAL STANDARD **ISO 22559-1:2014(E)**

Safety requirements for lifts (elevators) —

Part 1:
Global essential safety requirements (GESRs)

1 Scope

This part of ISO 22559

— specifies GESRs for lifts (elevators), their components and functions, and

— establishes a system and provides methods for minimizing safety risks that may arise in the course of, the operation and use of, or work on, lifts (elevators).

NOTE 1 Hereinafter in this part of ISO 22559, the term “lift” is used instead of the term “elevator”.

NOTE 2 See Clause 5 regarding the use and application of this part of ISO 22559.

This part of ISO 22559 is applicable to lifts that are intended to carry persons or persons and goods that can

a) be located in any permanent and fixed structure or building, except lifts located in means of transport, (e.g. ships);

b) have any

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

   2) travel distance and number of landings;

c) be affected by fire in the load-carrying unit (LCU), earthquake, weather, or flood;

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

This part of ISO 22559 does not cover

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

b) risks arising from

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

   2) use of lifts for fire fighting and emergency evacuation,

   3) vandalism, and

   4) fire outside the LCU.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

1) Although the GESRs specified in this part of ISO 22559 have been identified and evaluated by risk assessment, not all disabilities or combinations of such disabilities of users have necessarily been addressed.

ISO/IEC Guide 51:1999, *Safety aspects — Guidelines for their inclusion in standards*

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

3 Terms, definitions and abbreviated terms

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

3.1
authorized person
person with authorization to access restricted lift areas [e.g. machinery spaces, lift well (hoistway), pit and LCU top] skilled and trained 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)

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

[SOURCE: ISO 14798, definition 2.1]

3.3
counterweight
mass that contributes traction in the case of a traction lift, or mass that saves energy by balancing all or part of the mass of the load-carrying unit (LCU) (car) and the rated load

3.4
door
⟨landing or load-carrying unit (LCU)⟩ mechanical device (including devices that partially or fully enclose the opening) used to secure an LCU or landing entrance

3.5
effect
result of a cause in the presence of a hazardous situation

[SOURCE: ISO 14798, definition 2.2]

3.6
electromagnetic compatibility
EMC
degree of immunity to incident electromagnetic radiation and level of emitted electromagnetic radiation of electrical apparatus

3.7
essential health and safety requirement
EHSR
requirement intended to eliminate or sufficiently mitigate the risk of harm to users, non-users and authorized persons using, or associated with, lifts

3.8
fully loaded load-carrying unit (LCU)
LCU (car) with its rated load

3.9
global essential safety requirement
GESR
globally agreed upon essential safety requirement

Note 1 to entry: See 4.3.3.

3.10
harm
physical injury or damage to the health of people, or damage to property or the environment

[SOURCE: ISO 14798, definition 2.3 and ISO/IEC Guide 51:1999, definition 3.3]

3.11
harmful event
occurrence in which a hazardous situation results in harm

[SOURCE: ISO 14798, definition 2.4 and ISO/IEC Guide 51:1999, definition 3.4]

3.12
hazard
potential source of harm

[SOURCE: ISO 14798, definition 2.5 and ISO/IEC Guide 51:1999, definition 3.5]

3.13
hazardous situation
circumstance in which people, property or the environment are exposed to one or more hazards

[SOURCE: ISO 14798, definition 2.6 and ISO/IEC Guide 51:1999, definition 3.6]

3.14
hoistway
well
travel path(s) of the load-carrying unit (LCU) and related equipment plus the spaces below the lowest landing and above the highest landing

3.15
hoistway enclosure
well enclosure
fixed structural elements that isolate the well (hoistway) from all other areas or spaces

3.16
landing
floor, balcony or platform used to receive and discharge persons or goods (freight) from the load-carrying unit (LCU)

3.17
lift (GB)
elevator (US)
lifting appliance intended to transport persons with or without goods or freight by means of a power-operated load-carrying unit (LCU) that is guided by a fixed guiding system from one landing 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 or baskets, or lifting appliances used in the course of construction of buildings or structures.

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

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

3.19
maintenance
process of examination, lubrication, cleaning and adjustments of lift parts to ensure the safe and intended functioning of the lift and its components after the completion of the installation and throughout its life cycle

3.20
non-user
person in the vicinity of a lift but not intending to access or use the lift

3.21
overload
overloaded
load in the load-carrying unit (LCU) that exceeds the rated load of the lift

3.22
platform
part of the load-carrying unit (LCU) that accommodates persons and load for the purpose of transportation

3.23
protective measure
means used to reduce risk

[SOURCE: ISO 14798, definition 2.8 and ISO/IEC Guide 51:1999, definition 3.8]

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

3.24
rated load
load that the lift is designed and installed to transport

3.25
relative movement
situation where a lift 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 may 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).

3.26
risk
combination of the probability of occurrence of harm and the severity of that harm

[SOURCE: ISO 14798, definition 2.10 and ISO/IEC Guide 51:1999, definition 3.2]

3.27
risk analysis
systematic use of available information to identify hazards and to estimate the risk

[SOURCE: ISO 14798, definition 2.11 and ISO/IEC Guide 51:1999, definition 3.10]

3.28
risk assessment
overall process comprising a risk analysis and a risk evaluation

[SOURCE: ISO 14798, definition 2.12 and ISO/IEC Guide 51:1999, definition 3.12]

3.29
risk evaluation
consideration of the risk analysis results to determine if the risk reduction is required

[SOURCE: ISO 14798, definition 2.13]

3.30
scenario
sequence of a hazardous situation, cause and effect

[SOURCE: ISO 14798, definition 2.14]

3.31
severity
level of potential harm

[SOURCE: ISO 14798, definition 2.15]

3.32
transportation
process in the course of which persons enter, or goods are moved, into a load-carrying unit (LCU), which is then lifted or lowered to another landing, where the person exits, or goods are removed from, the LCU

3.33
travel path
path and related space between the lift terminal landings within which an LCU travels

Note 1 to entry: For "space" above and below terminal landings, see definition 3.14 for "hoistway" or "well".

3.34
uncontrolled movement
situation where the load-carrying unit (LCU) 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 The LCU speed exceeds its designed speed or does not decelerate or stop as intended, due to failure of, or breakdown in, lift components, such as the speed control or brake system.

3.35
unintended movement
situation where the load-carrying unit (LCU) moves when, according to design of the lift, it was to remain stationary

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

3.36
user
person using the lift for the purpose of normal transportation, 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.

3.37
vandalism
deliberate destruction of, or damage to, property for no obvious gain or reason

3.38
working area or space
area or space defined for use by authorized persons to perform maintenance, repair, inspection or testing of the lift

4 Approach and methodology

4.1 Background

4.1.1 During the 1970s, the ISO 4190 series of documents were published, which specifies the building dimensions necessary to permit the installation of lifts. This series also specified criteria for the planning and selection of lifts and the standards for lift fittings.

4.1.2 In order to facilitate further standardization of lift installations and components, ISO/TC 178 carried out extensive comparisons of regional and national safety standards and codes for lifts. The results were published in the ISO/TR 11071 series of documents. These Technical Reports gave directions for possible harmonization of several specific design- and safety-related rules in regional and national standards. No agreement among the experts could be reached for global harmonization of most rules, mainly for the following reasons:

a) the compared standards and codes were based on different assumptions and experiences and written at different stages of industry development, without using a consistent methodology or consistent procedures, as recommended in ISO/IEC Guide 51; and

b) they were written in prescriptive rather than performance language.

4.1.3 It further became clear that prescriptive standards not only continually lag behind the development of lift technologies and the state of the art, but also present impediments to the progress and innovation of industry. Differences in regional and national safety requirements affecting lift designs also pose barriers to free trade. Therefore, a new approach to the development of lift standards affecting lift safety must be taken.

4.2 Approach

ISO/IEC Guide 51 has been taken into account as far as practicable at the time of drafting of this part of ISO 22559.

4.2.2 The intent was to develop EHSRs for lifts whereby the lift is defined in broad terms as a “unit” carrying load from one floor to another, without any design constraints such as those that are usually specified in the regional or national lift standards.

A load-carrying unit (LCU) of a lift in this part of ISO 22559 is not necessarily a “car” that consists of a platform with fully enclosed sides and ceiling. The space in which the unit travels is not necessarily a fully enclosed “well” or “hoistway” as these terms are defined in national standards.

4.2.3 By taking this approach and by using the systematic risk assessment process in accordance with ISO 14798, it was possible to establish EHSRs for lifts without imposing restrictions on the design of, or materials and technologies used in, the lifts.

4.3 Methodology

4.3.1 In order to involve experts from various parts of the world, three regional study groups were formed (North American, European and Asia-Pacific) with broad participation of local lift experts.

4.3.2 Following the risk assessment process set out in ISO/IEC Guide 51 and the methodology specified in ISO 14798 each study group

a) identified all safety risk scenarios, including hazardous situations and harmful events (causes and effects and possible resulting harm) that could arise at all stages and in all conditions of the operation and use of lifts,

b) assessed the risk, and

c) formulated EHSRs that, when implemented, would mitigate the risks.

Table 1 gives examples of risk scenarios related to GESRs.

4.3.3 Reports on the assessment of all risk scenarios and essential safety requirements proposed by each study group were compared and debated within ISO/TC 178 before the final proposals for GESRs for lifts specified in Clause 6 were established.

Table 1 — Examples of risk scenarios related to GESRs

Risk scenarios **NOTE: Risk assessment of all scenarios concluded that all identified risks need mitigation**	**- Hazards** **- Persons exposed**	**Applicable GESR requiring implementation of protective measures**
EXAMPLE 1	Shearing, crushing or abrasion hazards, when:	**6.1.5 Hazards due to relative movement**
1.1 Users are on a moving LCU that has low or perforated guards on its sides. User extends a hand or protrudes a foot beyond the LCU perimeters; user's hand or foot engages with external lift objects and become sheared, crushed or cut.	1.1 persons inside the LCU	Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to
1.2 Users are in the lift entrance area and enter the LCU when the door is closing. The doors contact the users who are entering the LCU. Persons are crushed or sheared or they are destabilized, possibly resulting in an injury due to a fall.	1.2 entering/exiting the LCU; or	a) the relative movement of the LCU and external objects; and
1.3 Non-users are at the floor area in the vicinity of the lift entrance or at the floor around the LCU travel path; enclosure around the LCU travel path is low in height or perforated. Person extends a hand or protrudes a foot towards the moving LCU or any other moving lift equipment in the travel path, which engages with the hand or foot, the person's hand or foot is sheared, crushed or cut.	1.3 located at the floor area in the vicinity of an operating lift	b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.
EXAMPLE 2	**Falling into the lift well**	**6.2.1 Falling into the well (hoistway)**
2.1 There are no guards between the LCU travel path and the floors surrounding the travel path are high above the bottom of the well; a person is close to the well A person leans over the floor edge or the entrance opening sill. The person falls down the well (hoistway).	2.1 Persons close to unguarded well.	Means shall be provided to sufficiently mitigate the risk to users, non-users, and authorized persons of falling into the well (hoistway). NOTE: This GESR addresses the risk of falling into the well (hoistway) —from surrounding floors, and —from landing doors when the LCU is absent.
2.2 Guards in example 2.1 are provided but do not have adequate strength. A person leans against a guard The person breaks through the guard and fall down into the well (hoistway).	2.2 Persons inside LCU or close to the well, whose guard is not sufficiently strong.	
EXAMPLE 3	**Various hazards**	**6.1.3 Equipment inaccessible to users and non-users**

Table 1 *(continued)*

Risk scenarios **NOTE: Risk assessment of all scenarios concluded that all identified risks need mitigation**	**- Hazards** **- Persons exposed**	**Applicable GESR requiring implementation of protective measures**
Users or non-users have access to lift machinery and/or the equipment installed to move or control the LCU. Persons inadvertently or deliberately come into contact with moving or rotating machinery or electrical equipment. This contact results in death or serious injury if the person is drawn into or comes into contact with the machinery; or the a person is electrocuted if he comes into contact with exposed electrical equipment.	Unauthorized persons in areas containing lift machinery or equipment	Equipment that is hazardous shall not be directly accessible to users and non-users. NOTE: Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.
EXAMPLE 4 An authorized person is working on top of the LCU. The working space that does not have sufficient strength to support the authorized person and tools; the working surface collapses. The authorized person falls into the LCU sustaining serious injuries.	**Falling from working area** Authorized person in a designated working area.	**6.5.4 Strength of working areas** Means shall be provided to accommodate and support the mass of authorized person(s) and associated equipment in any designated working area(s). NOTE: The number of authorized persons and the equipment that they carry or use to fulfil the anticipated working activities should be determined. Those activities do not include major repairs when the working area needs to be enlarged and reinforced.

5 Understanding and implementing GESRs

5.1 Overall objective

5.1.1 Clause 6 contains a complete set of safety objectives for lifts in the form of global essential safety requirements (GESRs), which shall be taken into consideration when mitigating safety risks that lifts can present.

5.1.2 The objectives of the global essential safety requirements in Clause 6 are to:

a) introduce a universal approach to identifying and mitigating potential safety risks on new lift or lift component designs that use new technologies, materials or concepts that are not adequately addressed in existing standards, and

b) stimulate harmonization of current lift safety standards.

5.1.3 The GESRs contained in this part of ISO 22559 shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.

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. In other words, the ability of the selected components, functions or GSPs to eliminate or sufficiently mitigate the safety risks shall be demonstrated.

5.2 Use of GESRs

5.2.1 Basis

Each GESR specified in Clause 6 was established after performing the risk assessment of one or more "risk scenarios" that can result in harm to persons (see Table 1). Consequently, when assessing the safety of a lift or its components or functions, all risk scenarios shall be analysed and applicable GESRs shall be identified.

The risk assessment shall be carried out in accordance with ISO 14798.

5.2.2 Ways of using GESRs

5.2.2.1 With respect to a specific task affecting lift safety, such as designing a lift or its components, GESRs can be used in two ways:

— one can begin with the risk assessment of risk scenarios related to the task in order to identify the applicable GESRs as in 5.2.2.2; or

— one can begin with a review of all GESRs in order to identify those that could be applicable to the task, as in 5.2.2.3.

NOTE In addition to designing, tasks could include servicing of, or writing design-prescriptive safety standard for, lifts or components thereof.

5.2.2.2 When designing a lift or its component, a review of the intended use, foreseeable misuse (see 4.5.5.4 of ISO 14798) and the design shall be made, in which all possible risk scenarios are formulated, and risk assessment is performed, in order to find out which, if any, GESRs are applicable to the design. All risk scenarios that could occur during operation and use shall be considered, as well as during the maintenance or inspection of the lift.

The risk scenarios shall include specifications of all hazardous situations, combined with all harmful events (causes, effects and possible levels of harm). The risk analysis of a scenario shall be followed by the process of risk estimation and evaluation in accordance with the methodology specified in ISO 14798. As long as a risk is assessed as not sufficiently mitigated, the design will have to be continually improved until the applicable GESR has been fulfilled.

EXAMPLE By following this process, risk scenarios similar to those in Example 1.1 in Table 1 could be formulated and it could be concluded that there is a possibility of injury to persons exposed to shearing, crushing or abrasion hazards. The assessment of the risk will indicate that the risk needs further mitigation, which shall be achieved by changing the design. If it is not feasible, further mitigation shall be achieved by implementing other protective measures in order to comply with 6.1.5 in Clause 6.

NOTE 1 For practical use of GESRs, see 5.3.

NOTE 2 Guidance and examples for use of GESRs are given in notes in Clause 6, following each GESR. They should assist in understanding of the intent and use of GESRs.

5.2.2.3 The process can start with a review of GESRs. In this case, one considers the design, the lift or its components with intent of identifying those GESRs that could be applicable to the design of the lift or its components. Compliance with each identified GESRs shall be assessed. If the compliance is not self-evident, risk assessment shall be completed to demonstrate compliance.

EXAMPLE In the case of the GESR in 6.1.5 in Example 1 in Table 1, one would examine the lift design or the installed lift to determine whether any person travelling in the LCU, entering or exiting the LCU, being around the lift travel path or well (hoistway), or in any similar situation could be exposed to shearing, crushing, abrasion or similar hazard that can cause harm.

5.2.3 Applicability of GESRs

When analysing the safety of a lift design or component, or when writing a design prescriptive requirement or standard, the applicability of all GESRs shall be determined. Only systematic descriptions of all risk scenarios combined with the risk assessment of all scenarios (see ISO 14798) would determine applicability of individual GESRs.

NOTE The GESR in 6.1.12, related to effects of earthquake on lifts, and the GESR in 6.4.13, related to the risk of an LCU being affected by flood, are examples of GESRs that are not applicable to every lift.

5.2.4 Safety objectives of GESRs

5.2.4.1 GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established.

NOTE For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.

5.2.4.2 Table 1 contains examples that illustrate the method described in 5.2.2.2. In the case of Example 1 of Table 1, in order to eliminate or mitigate the risks to persons inside the LCU, in the lift entrance area and in the area around the LCU travel path, one would have to determine:

a) the minimum height of the guards or walls on the sides of the LCU platform to avoid the shearing, crushing and abrasion hazards;

b) the maximum size of perforations (openings) in the LCU guards or walls, if any;

c) the maximum permissible impact, force, speed, kinetic energy, if any, of the door when closing on the person;

d) the minimum height of the guards or wall separating the LCU travel path and other moving components from the lift landing and floor area around the lift; and

e) the maximum perforation (openings) in the guards or walls around the travel path, if any.

NOTE 1 There are additional GESRs applicable to the guards on the LCU sides (see 6.4.4) and the LCU travel path or well (hoistway) sides (see 6.2.1 in Example 2 of Table 1); they are related to the risk of persons falling into the travel path from the LCU and from the floors around the travel path.

NOTE 2 For illustration of the use of method described in 5.2.2.3 see cases 3 and 4 in Table 1 of ISO/TS 22559-2.

5.2.4.3 When assessing the risk of a lift system, it is recommended that the lift be divided into subsystems and all risk scenarios be formulated and all risks be assessed in relation to one subsystem at a time. However, one GESR can be applicable to more than one subsystem (see Annex A).

5.2.5 Verification of compliance

In order to establish the ability of a selected lift component or function to eliminate or sufficiently mitigate a risk, as required in 5.2.4, risk assessment in accordance with ISO 14798 shall be carried out.

Furthermore, a component can be assessed as being able to eliminate or sufficiently mitigate a risk, but the same component can create a new hazard or the component can incorporate elements that could

fail and make the protective function of the whole component void. For that reason, the reliability of components, built-in elements and functions to perform as intended shall be established through the risk analysis and assessment process.

EXAMPLE A failure of a single solid state or software element in the LCU speed-control components, which are provided for compliance with the GESR in 6.4.6, can make the component non-functional, allowing the LCU to move out of control.

5.3 Use of this part of ISO 22559

5.3.1 Users

This part of the ISO 22559 series provides a uniform process for assessing the safety of lifts. The GESRs are intended for use by the following:

a) writers of safety or safety-related standards for lifts; the type of the standard may be a product safety standard or a product standard containing safety aspects as defined in ISO/IEC Guide 51:1999, 7.1;

b) lift designers, manufacturers and installers, and maintenance, repair and service organizations;

c) independent (third-party) conformity assessment bodies; and

d) inspection and testing bodies and similar organizations.

5.3.2 Standards writers

5.3.2.1 Standards writers (e.g. standards writing committees) should use GESRs when

a) reviewing, updating or revising existing standards; and

b) formulating new standards, including those related to new innovative designs and concepts of lifts or their components not previously covered in published standards.

5.3.2.2 When reviewing, updating or revising existing standards, standards writers should refer to the applicable GESRs to verify that the existing standards provide sufficient rules to ensure full compliance with the safety objectives set in the GESRs.

5.3.2.3 New standards related to lift safety can be performance-type (goal-oriented) or design-prescriptive type standards. In either case, each GESR should be considered, adopted or referenced and used as a basis when specifying safety requirements.

EXAMPLE The GESR in 6.4.2 states "*means shall be provided to support the fully loaded LCU and reasonably foreseeable overload*". Based on this GESR, which addresses the means supporting the LCU (e.g. hydraulic direct-plunger drive) or the means on which the LCU is suspended (e.g. the ropes in traction-type drive), the standards writers should

— in the case of performance-type standards, establish more specific performance requirements for the LCU support or suspension means, such as the minimum working life, resistance to environmental conditions, inspection criteria,

— in the case of a design-prescriptive-type standard, specify design requirements, such as the minimum number of suspension ropes, minimum rope diameter, minimum safety factor, minimum drive-sheave to rope ratio.

5.3.3 Designers, manufacturers, installers, and maintenance, repair and service organizations

5.3.3.1 Lift systems, lift components and lift functions

Lift systems, lift components and lift functions shall be designed, manufactured, installed, adjusted and maintained

a) in accordance with locally adopted lift standards or other applicable standards, intended to meet the protection level required by the GESRs;

b) in accordance with this part of ISO 22559, in which case the lift systems, selected lift components and lift functions shall be proved to meet the safety objective of the GESRs through the risk assessment process in accordance with ISO 14798; or

c) in accordance with a combination of a) and b) and, if necessary, shall be tested, certified and assessed for conformity with applicable regional or local regulations.

5.3.3.2 Proof of compliance

5.3.3.2.1 Compliance with 5.3.3.1 a) is achieved by meeting all of the requirements of a standard that is aligned with the GESRs and other regulations applicable to the jurisdiction in which the lift is to be operated (e.g. local fire standards, building standards).

5.3.3.2.2 Compliance with 5.3.3.1 b) is achieved by identifying all risk scenarios (see 5.2.2) related to the particular lift design and by conducting risk assessment using the methodology of ISO 14798, in order to demonstrate that the requirements specified in all applicable GESRs have been complied with, and their safety objectives achieved.

NOTE According to ISO 14798, a balanced team of experts who have experience in the design, manufacture, installation, maintenance, repair and inspection of lifts should conduct the risk assessment. The team should be led by a facilitator who is well versed and experienced in lift technology and in the use of ISO 14798. The results of the study should be documented. Any identified risks should be sufficiently mitigated. This approach is particularly useful for innovative products that have not been covered by existing design-prescriptive standards.

5.3.3.2.3 The approach in 5.3.3.1 c) applies to lifts that meet most requirements of a standard aligned with the GESRs, but that have certain innovative features not specifically covered by the standard. Such cases may be handled as follows:

a) Identify all areas where the lift does not comply with specific prescriptive requirements of the standard.

b) Identify specific requirements of the standard that the innovative lift features do not meet. In addition, identify all GESRs related to the requirements that the lift, in combination with the innovative features, cannot meet.

c) Conduct risk assessment, as described in 5.3.3.2.2, of the aspects, areas or features of the lift that are expected to meet the GESRs identified in b). Any identified risk shall be sufficiently mitigated so as to achieve a safety level that is at least equivalent to that required by the standard.

5.3.4 Inspection and testing bodies

Where the inspection and testing procedure is not specified in the applicable standards, inspectors shall use this part of ISO 22559 when

a) verifying that applicable GESRs have been taken into account by the designer, manufacturer, installer or maintainer;

b) verifying the suitability of the inspection and testing procedures proposed in the designer's or manufacturer's documentation, or when establishing their own procedure by using GESRs and analysing related risk scenarios; and

c) assessing the inspection and test results.

For this purpose a procedure similar to that described in 5.2 and 5.3.3 shall be followed.

NOTE Refer to Part 3 and 4 of the ISO 22559 series, for general requirements for certification of conformity.

6 Global essential safety requirements (GESRs)

A lift shall comply with the applicable safety requirements specified in this clause.

NOTE 1 The essential safety requirements are grouped in this clause on the basis of the locations where a person could be exposed to a hazard, such as the space adjacent to lift (see 6.2), entrance and egress areas (6.3), space inside the LCU (6.4) and working areas (6.5). The common GESRs are applicable to more than one location (6.1).

NOTE 2 Annex A is provided to give an overview of the GESRs that are potentially applicable to therein specified lift subsystems.

6.1 Common GESRs related to persons at different locations

6.1.1 Supports for lift equipment

The means used to support and secure the lift equipment shall be capable of sustaining all loads and forces (including impact forces) imposed during normal and emergency operation.

NOTE The forces referred to in 6.1.1 are those that result from the intended use, and reasonably foreseeable overload, of the lift during normal operation (loading, unloading, acceleration, braking, etc.) and emergency operation (safety gear operation, buffer impact, etc.).

6.1.2 Lift maintenance and repair instructions

Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work.

NOTE This applies to the lifts and lift components and functions that are subject to wear and tear, not to those designed for maintenance-free operation. Adequate maintenance is a key element in keeping the lift in safe operating condition. This GESR aims to prevent the performance of maintenance and repair work by incompetent persons.

6.1.3 Equipment inaccessible to users and non-users

Equipment that is hazardous shall not be directly accessible to users and non-users.

NOTE Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.

6.1.4 Floors of the LCU and working areas

The floors of the LCU and standing areas of workplaces shall minimize the risk of tripping and slipping.

NOTE LCU and working area floors should be reasonably level, which means that they do not present a perceptible slope. When considering non-slip materials, attention should be paid to the fact that the roughness of a material does not remain consistent over time and can vary depending on housekeeping operations (e.g. cleaning).

6.1.5 Hazards due to relative movement

Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to

a) relative movement of the LCU and external objects; and

b) relative movement of the lift equipment.

NOTE 1 For authorized persons, see 6.5.9.

NOTE 2 This GESR addresses the safety of persons located inside and outside the LCU.

6.1.6 Locking landing doors and closing LCU doors

Any movement of the LCU that is hazardous to persons shall be stopped if any well (hoistway) door is open or unlocked or the LCU door is not closed.

NOTE 1 Well (hoistway) doors include lift landing doors, as well as auxiliary well (hoistway) doors or covers intended for use by authorized persons only (e.g. evacuation doors).

NOTE 2 Levelling and re-levelling (as well as docking or trucking operations) are not considered to be hazardous movements.

NOTE 3 See also GESR 6.4.9.

6.1.7 Evacuation

Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated.

NOTE The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.

6.1.8 Sharp edges

Means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to sharp edges.

NOTE For authorized persons, see 6.5.

6.1.9 Hazards arising from the risk of electrical shock

Where electricity is provided, means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to electrical shock.

NOTE For authorized persons, see 6.5.

6.1.10 Electromagnetic compatibility

The safe operation of a lift shall not be influenced by electromagnetic interferences (EMC). The electromagnetic emission of the lift shall be restricted to specified limits.

The immunity should be sufficient to prevent unsafe situations if the lift is submitted to foreseeable radiation. “Immunity” includes immunity to internal influences (self-generated radiation) and immunity to external influences. The tolerable amount of electromagnetic emission depends on the environment in which the lift is operating and is defined in specific standards.

6.1.11 Illumination of the LCU and the landings

The LCU and the landings shall be provided with adequate illumination.

NOTE Adequate illumination means that the light intensity is sufficient for safe access and operation of the lift control devices, including

— detecting levelling inaccuracy,

— operating landing and LCU controls, and

— minimizing panic by users in the case of power outage.

6.1.12 Effects of earthquakes

In areas subject to earthquake, means shall be provided to minimize the risk to users, when inside the LCU, and authorized persons, of the foreseeable effects of earthquakes on the lift equipment.

The effects on the safety of users and authorized persons need to be considered at all stages: during the earthquake (as much as possible), during rescue from a stalled LCU, and when the lift is returned to normal operation. This assumes that there is no major building failure.

6.1.13 Hazardous materials

The characteristics and quantity of material used for the construction of the lift shall not lead to hazardous situations.

NOTE Hazardous situations for users, non-users and authorized persons refer to toxicity, fumes, exposure to chemicals, flammability, exposure to asbestos, etc.

6.1.14 Environmental influences

Users and authorized persons shall be protected from environmental influences.

Environmental influences include the foreseeable weather and operating conditions of the area where the lift is installed. Users and authorized persons should be protected against direct exposure to the influences (e.g. by heating or cooling the LCU or working space). In addition, there should be adequate protection of safety-related lift elements that are susceptible to weather and operating conditions (e.g. temperature limitations in the machinery space).

6.2 GESRs related to persons adjacent to the lift

6.2.1 Falling into the well (hoistway)

Means shall be provided to sufficiently mitigate the risk of users, non-users, and authorized persons falling into the well (hoistway).

NOTE This GESR addresses the risk of falling into the well (hoistway)

— from surrounding floors, and

— from landing doors when the LCU is absent.

6.3 GESRs related to persons at entrances

6.3.1 Access and egress

Safe means of access and egress shall be provided to the LCU at landings.

NOTE This is applicable to the process of entering and leaving the LCU during normal use of the lift. It suggests that adequate spaces, dimensions, instructions and correct relative positioning of the LCU at the landing should be provided.

6.3.2 Horizontal sill-to-sill gap

The horizontal gap between the sill of the LCU and that of the landings shall be limited.

This measurement is taken perpendicular to the moving direction of users. Children who are able to walk should be considered. The sizes of wheelchair wheels and walking aids should also be taken into account.

6.3.3 Alignment of the LCU and the landing

When users enter or exit the LCU, its platform and the landing floor shall be substantially aligned.

The step caused by the variation of the LCU load should be limited to avoid stumbling on the part of users; the step should be small enough to allow safe access for all users, including persons with impaired mobility.

6.3.4 Self-evacuation from the LCU

Self-evacuation of users shall be possible only when the LCU is at or near a landing.

NOTE "At a landing" means that: the LCU is not too far away from the landing and that the risk of tripping or falling is marginal. "Near a landing" means that: the gaps between the LCU and landing enables users to pass through and not to fall into the travel path.

6.3.5 Gap between the landing doors and the LCU doors

The gap between the landing doors and the LCU doors shall not allow the presence of users.

NOTE This GESR aims to prevent persons, including children, from entering sideways into the space between the LCU and landing doors. This situation can arise when there are:

— multiple panels on the LCU and landing doors, with loose synchronization, and

— combinations of the hinged landing doors and sliding LCU doors.

6.3.6 Means to reopen doors when the LCU is at the landing

Means shall be provided to reopen the LCU and the landing doors, if their closing is obstructed when the LCU is at the landing.

Obstacles interfering with the door movement should be detected. The movement of the doors and the LCU should be prevented until the obstacle is removed. Examples of obstacles are parts of user's body, trolleys, wheelchairs, etc.

6.4 GESRs related to persons in the LCU

6.4.1 Strength and size

The LCU shall accommodate and support the rated load and foreseeable overload.

NOTE This GESR primarily addresses the transportation of people. "Accommodate" in this context means to provide space (volume) for the intended number of users, considering the dimensions and weight of persons. The foreseeable overload, in terms of users means:

— load normally carried by users (e.g. briefcase, luggage, but without tools such as trolleys),

— coincidence of users taller or heavier than average, and

— more users than the LCU is designed for.

6.4.2 LCU support/suspension

Means shall be provided to support the fully loaded LCU and a reasonably foreseeable overload.

NOTE This addresses the strength and failure of the suspension means when the LCU is loaded with its rated load. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached. The rated performances, however, can be affected if the rated load is exceeded.

6.4.3 Overloaded LCU

Means shall be provided to prevent an overloaded LCU from attempting to move away from a landing.

NOTE In this context "to prevent from attempting to move away from a landing" means that the drive system of hoisting machine will not be activated. When the overload condition is detected, no command will be processed. This does not cover ropes stretch, loss of traction, etc. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached.

6.4.4 Falling from the LCU

Means shall be provided to prevent users from falling from the LCU.

NOTE The requirement could be achieved by guards, barriers or walls around the perimeter of the LCU platform. Protection at any opening between the LCU and the well walls that a user could pass through is also required by this GESR, typically the gap between the edges of the LCU and the landing door panels.

6.4.5 LCU travel path limits

The vertical travel of the LCU shall be limited to prevent the LCU from uncontrolled running beyond the travel path.

Means should be provided for safe stopping of the LCU at the end of the travel path. Safe stopping involves no damage to the equipment and no harm to passengers in the LCU. The "end of travel path" includes a certain overrun from the position of normal terminal landings.

6.4.6 Uncontrolled movement of the LCU

Means shall be provided to limit uncontrolled movement of the LCU.

NOTE This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.

6.4.7 LCU collision with objects in or beyond the travel path

Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users.

Means should be provided to prevent the LCU from colliding with any equipment in the well (hoistway). There should be LCU guards or enclosures of adequate strength to avoid dangerous deflection due to horizontal forces. Deflection and deformation of the guards or enclosure should be limited so that they do not create hazardous situation. This GESR also addresses cases where the LCU or counterweight reaches the structural terminals of the well (hoistway). Eventual impact should be buffered so that it is not harmful.

6.4.8 LCU horizontal or rotational motion

Horizontal or rotational motion of the LCU shall be limited to sufficiently mitigate the risk of injury to users and authorized persons.

NOTE Horizontal or rotational free movement of the LCU is to be limited to prevent users from losing balance and falling.

6.4.9 Change of speed or acceleration

Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users.

NOTE This covers changes of speed and acceleration of the LCU for both normal and emergency operations. In the case of an extreme emergency operation (such as stopping a free-falling LCU), the possibility of minor injuries could be tolerated, due to the extremely remote probability of such an occurrence.

6.4.10 Objects falling on the LCU

LCU users shall be protected from falling objects.

NOTE Falling objects are those that can be reasonably expected as a result of misbehaviour, carrying tools or similar activities. Open well (hoistway) installations can also be subject to acts of vandalism (objects thrown from outside). Falling water is not addressed by this GESR.

6.4.11 LCU ventilation

Adequate ventilation shall be provided to the LCU.

NOTE The intent of this GESR is to provide trapped passengers with sufficient air renewal. It is accepted that normal operation does not require particular measures due to the air exchange from door movement and the fact that journeys are relatively short.

6.4.12 Fire/smoke in the LCU

The interior of the LCU shall be constructed of materials that are fire-resistant and that develop a low level of smoke.

NOTE The nature and quantity of the materials used in the LCU (e.g. decorations) can be a very serious source of harm during fire. Factors that need to be considered include the fire resistance, toxicity, etc., of materials. It is, however, understood that parts made of materials that do not strictly meet this specification may be used in small quantities inside the LCU (e.g. control buttons and lighting diffusers).

6.4.13 LCU in flooded areas

Where a risk exists that the LCU could descend into a flooded area, means shall be provided to detect and prevent descent into a flooded area.

6.4.14 Stopping means inside the LCU

Means, located inside the LCU, of intentionally interrupting the movement of the LCU by the user shall only be allowed, if necessary, on lifts with a partially enclosed LCU or lifts for special applications.

NOTE An example of a lift for special application is a goods/passenger lift (freight elevator) with docking (trucking) operation.

6.4.15 Landing and controls indication

Means shall be provided to identify landings and controls for the users in the LCU.

NOTE Ignorance of the controls or one's location can create confusion and unpredictable reactions. In normal conditions, this is probably not a safety issue but it can be significant in emergency situations (fire fighting, etc.).

6.5 GESRs related to persons in working areas

6.5.1 Working area(s) or space(s)

Adequate and safe working area(s) or space(s) shall be provided.

NOTE "Adequate" takes into account the ergonomic principles related to the tasks to be performed.

6.5.2 Accessible equipment

All lift equipment requiring maintenance or repair shall be safely accessible to authorized persons.

If the lift elements requiring maintenance or repair are not accessible, they can be neglected, which would render the use of the lift unsafe. The elements of the lift should be designed taking this into account. "Safely" indicates safe and easy access for maintenance and repair operations.

6.5.3 Access to and egress from working spaces in the well (hoistway)

Access to and egress from working spaces in the well (hoistway) shall be safe.

NOTE Safe egress may be achieved with assistance.

6.5.4 Strength of working area(s)

Means shall be provided to accommodate and support the mass of authorized person(s) and associated equipment in any designated working area(s).

The number of authorized persons and the equipment that they carry or use to fulfil the anticipated working activities should be determined. Those activities do not include major repairs when the working area needs to be enlarged and reinforced.

6.5.5 Restrictions on equipment in lift spaces

Only equipment related to the lift installation or its protection shall be placed in the space containing the lift equipment.

NOTE The intent is to exclude non-authorized personnel (and personnel not acquainted with the dangers of lift operation) from access to spaces needed for the location of the lift equipment [the machine room and well (hoistway)] and to prevent the use of these spaces for storage.

6.5.6 Falling from working areas

Means shall be provided to sufficiently mitigate the risk to authorized person of falling from any working area.

Working places in the well (hoistway), such as the LCU roof, temporary platforms, should be equipped with protective devices (e.g. balustrades) if there is a risk of falling [e.g. a gap between the LCU roof and the well (hoistway) wall].

The means of prevention (e.g. balustrade) should have sufficient height and strength.

6.5.7 LCU movement under control of an authorized person

Only authorized persons shall be provided with means to prevent or to enable the movement of the LCU when they are in the travel path. When an authorized person is within reach of unprotected moving parts of the lift, that person shall be able to prevent or activate movement of the lift equipment.

NOTE Equipment includes all possible moving parts, such as the LCU, counterweight.

6.5.8 Uncontrolled or unintended equipment movement inside the well (hoistway)

Means shall be provided to protect authorized persons from the effects related to uncontrolled or unintended movement of equipment inside the well (hoistway). Any acceleration or deceleration to which an authorized person is subjected as a result of uncontrolled or unintended movement shall be limited to sufficiently mitigate the risk of harm.

If the contact with lift components whose uncontrolled or unintended movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. “Equipment” includes all possible moving parts, such as the LCU, counterweight.

6.5.9 Means of protection from various hazards

Means shall be provided to adequately protect an authorized person, in working spaces, from the effects of shearing, crushing, abrasion, laceration, high temperature, entrapment, etc.

NOTE List of hazards is not all inclusive. Specific hazards need to be considered according to the circumstances. See also 6.1.4.

6.5.10 Falling objects in the well (hoistway)

While in the well (hoistway), authorized persons shall be adequately protected from falling objects.

NOTE Objects that can fall because of an accidental reaction on the part of a person, e.g. hand-held tools, loose material placed on LCU (car) roof, etc.

6.5.11 Electric shock in working spaces

Equipment shall be designed and installed to minimize harm to authorized persons due to the effects of electricity.

NOTE Lift service sometimes requires that authorized people access live parts of electrical equipment.

6.5.12 Illumination of working spaces

All working spaces and access thereto shall be provided with adequate illumination for the use of authorized persons.

“Adequate illumination” means that the light intensity is sufficient for safe access and for performance of any maintenance or repair operation of the lift equipment. Illumination may be switched off in the absence of authorized persons. Emergency lighting should be provided in places where movement of authorized persons in darkness is dangerous.

Annex A
(informative)

Overview of GESRs in relation to lift subsystems

A.1 General

Global essential safety requirements [GESRs] are specified in Clause 6 and are grouped according to the lift locations where a person can be exposed to a hazard, a hazardous situation or event. This annex is provided to assist users who view a lift as a combination of clearly distinguishable subsystems. Table A.1 gives an overview of all GESRs listed in Clause 6 in relation to lift subsystems.

Table A.1 — Cross-referencing of GESRs in Clause 6 and lift subsystems

GESR No.	Global essential safety requirement in Clause 6	Lift subsystem (see A.2 for symbols)									
		B	C	E	G	H	L	M	Sf	Sp	W
6.1	**Common GESRs related to persons at different locations**										
6.1.1	**Supports for lift equipment** The means used to support and secure the lift equipment shall be capable of sustaining all loads and forces (including impact forces) imposed during normal and emergency operation.	X			O	O				O	O
6.1.2	**Lift maintenance and repair instructions** Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work.	O	O	O	O	O	O	O	O	O	O
6.1.3	**Equipment inaccessible to users and non-users** Equipment that is hazardous shall not be directly accessible to users and non-users.	O	O	O		X	O	O	O		O
6.1.4	**Floors of the LCU and working areas** The floors of the LCU and standing areas of workplaces shall minimize the risk of tripping and slipping.						X				X
6.1.5	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects; and b) the relative movement of the lift equipment.		O	X	O	X	X				
6.1.6	**Locking landing doors and closing of LCU doors** Any movement of the LCU that is hazardous to persons shall be stopped if any well (hoistway) door is open or unlocked or the LCU door is not closed.		O	O			O	O	X		

Table A.1 *(continued)*

GESR No.	Global essential safety requirement in Clause 6	Lift subsystem (see A.2 for symbols)									
		B	**C**	**E**	**G**	**H**	**L**	**M**	**Sf**	**Sp**	**W**
6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated.	O	O	X		O	X	O	O		X
6.1.8	**Sharp edges** Means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to sharp edges.			X		O	X				
6.1.9	**Hazards arising from the risk of electrical shock** Where electricity is provided, means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to electrical shock.		X	O			O		O		
6.1.10	**Electromagnetic compatibility** The safe operation of a lift shall not be influenced by electromagnetic interferences (EMC). The electromagnetic emission of the lift shall be restricted to specified limits.		X						O		O
6.1.11	**Illumination of the LCU and the landings** The LCU and the landings shall be provided with adequate illumination during use.	O		X			X				
6.1.12	**Effects of earthquakes** In areas subject to earthquake, means shall be provided to minimize the risk to users, when inside the LCU, and authorized persons, of the foreseeable effects of earthquakes on the lift equipment.	O	X		O	O	X	O	O	O	X
6.1.13	**Hazardous materials** The characteristics and quantity of material used for the construction of the lift shall not lead to hazardous situations.	O		O		X	X				X
6.1.14	**Environmental influences** Users and authorized persons shall be protected from environmental influences.	O	O			O	X		O		X
6.2	**GESRs related to areas adjacent to the lift**										
6.2.1	**Falling into the well (hoistway)** Means shall be provided to sufficiently mitigate the risk to users, non-users, and authorized persons of falling into the well (hoistway).	O		X		X			O		X
6.3	**GESRs related to persons at the entrances**										
6.3.1	**Access and egress** Safe means of access and egress shall be provided to the LCU at landings.	O	O	X			X		O		
6.3.2	**Horizontal sill-to-sill gap** The horizontal gap between the sill of the LCU and that of the landings shall be limited.			X	O		X				
6.3.3	**Alignment of the LCU and the landing** When users enter or exit the LCU, its platform and the landing floor shall be substantially aligned.		X	O			O	O			

Table A.1 *(continued)*

GESR No.	Global essential safety requirement in Clause 6	Lift subsystem (see A.2 for symbols)									
		B	C	E	G	H	L	M	Sf	Sp	W
6.3.4	**Self-evacuation from the LCU** Self-evacuation of users shall be possible only when the LCU is at or near a landing.		X	O		O	X		O		
6.3.5	**Gap between the landing doors and the LCU doors** The gap between the landing doors and the LCU doors shall not allow the presence of users.			X			X				
6.3.6	**Means to reopen doors when the LCU is at the landing** Means shall be provided to reopen the LCU and the landing doors, if their closing is obstructed when the LCU is at the landing.		X	O			O		X		
6.4	**GESRs related to persons in the LCU**										
6.4.1	**Size and strength** The LCU shall accommodate and support the rated load and foreseeable overload.				O		X		O		
6.4.2	**LCU support/suspension** Means shall be provided to support the fully loaded LCU and reasonably foreseeable overload.				O		X	O	O	X	
6.4.3	**Overloaded LCU** Means shall be provided to prevent an overloaded LCU from attempting to move away from a landing.		X				X	O	O		
6.4.4	**Falling from the LCU** Means shall be provided to prevent users from falling from the LCU.						X				
6.4.5	**LCU travel path limits** The vertical travel of the LCU shall be limited to prevent the LCU from uncontrolled running beyond the travel path.		X		X		O	O	X	O	
6.4.6	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU.		X	O			O	X	X		
6.4.7	**LCU collision with objects in or beyond the travel path** Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users.		O		O	O	X		X	O	
6.4.8	**LCU horizontal or rotational motion** Horizontal or rotational motion of the LCU shall be limited to sufficiently mitigate the risk of injury to users and authorized persons.	O	O		X	O	X				O
6.4.9	**Change of speed or acceleration** Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users.		X					O	X		
6.4.10	**Objects falling on LCU** LCU users shall be protected from falling objects.	O				O	X				—

Table A.1 *(continued)*

GESR No.	Global essential safety requirement in Clause 6	Lift subsystem (see A.2 for symbols)									
		B	**C**	**E**	**G**	**H**	**L**	**M**	**Sf**	**Sp**	**W**
6.4.11	**LCU ventilation** Adequate ventilation shall be provided to the LCU.		O			O	X				
6.4.12	**Fire/smoke in the LCU** The interior of the LCU shall be constructed of materials that are fire-resistant and that develop low level of smoke.						X				
6.4.13	**LCU in flooded areas** Where there is a risk that the LCU could descend into a flooded area, means shall be provided to detect and prevent descent into a flooded area.	O	X				O		O		
6.4.14	**Stopping means inside the LCU** Means, located inside the LCU, of intentionally interrupting the movement of the LCU by the user shall only be allowed, if necessary, on lifts with a partially enclosed LCU or lifts for special applications.		X				X		O		
6.4.15	**Landing and controls indication** Means shall be provided to identify landings and controls for the users in the LCU.		X	X			X				
6.5	**GESRs related to persons at working areas**										
6.5.1	**Working area(s) or space(s)** Adequate and safe working area(s) or space(s) shall be provided.	O				O					X
6.5.2	**Accessible equipment** All lift equipment requiring maintenance or repair shall be safely accessible to authorized persons.		O	O	O	O	O	O	O	O	X
6.5.3	**Access to and egress from working spaces in the well (hoistway)** Access to and egress from working spaces in the well (hoistway) shall be safe.	O	O	O		O	O				X
6.5.4	**Strength of working area(s)** Means shall be provided to accommodate and support the mass of authorized person(s) and associated equipment in any designated working area(s).	O				O	O				X
6.5.5	**Restrictions on equipment in lift spaces** Only equipment related to the lift installation or its protection shall be placed in the space containing the lift equipment.	O				O	O				X
6.5.6	**Falling from working areas** Means shall be provided to sufficiently mitigate the risk to authorized persons of falling from any working area.			O		O	O				X

Table A.1 *(continued)*

GESR No.	Global essential safety requirement in Clause 6	Lift subsystem (see A.2 for symbols)									
		B	**C**	**E**	**G**	**H**	**L**	**M**	**Sf**	**Sp**	**W**
6.5.7	**LCU movement under control of an authorized person** Only authorized persons shall be provided with means to prevent or to enable the movement of the LCU when they are in the travel path. When an authorized person is within reach of unprotected moving parts of the lift, that person shall be able to prevent or activate movement of the lift equipment.		X			O	O		O		X
6.5.8	**Uncontrolled or unintended equipment movement inside the well (hoistway)** Means shall be provided to protect authorized persons against effects related to uncontrolled or unintended movement of equipment inside the well (hoistway). Any acceleration or deceleration to which an authorized person is subjected as a result of uncontrolled or unintended movement shall be limited to sufficiently mitigate the risk of harm.		X			O	O		O		X
6.5.9	**Means of protection from various hazards** Means shall be provided to adequately protect an authorized person, in working spaces, from the effects of shearing, crushing, abrasion, laceration, high temperature, entrapment, etc.	O	O	O	O	O	O	O	O	O	X
6.5.10	**Falling objects in well (hoistway)** While in the well (hoistway), authorized persons shall be adequately protected from falling objects.	O				O	O				X
6.5.11	**Electric shock in working spaces** Equipment shall be designed and installed to minimize harm to authorized persons due to the effects of electricity.		X	O		O	O	O	O		X
6.5.12	**Illumination of working spaces** All working spaces and access thereto shall be provided with adequate illumination for the use of authorized persons.	O	O	O		O	O				X

A.2 References and symbols in Table A.1

A.2.1 Symbols in the table heading identifying lift subsystems

B – building, including its structure, well (hoistway), machinery space, and building equipment not provided by lift contractor

C – control subsystem, including electrical equipment and wiring, except “Sf” (safety devices)

E – landing and LCU entrances

G – guiding of the LCU and counterweight system

H – well (hoistway), including interior and surrounding guards or enclosures

L – load-carrying unit (LCU), including its top, if applicable

M – machine, including breaking system

Sf – safety devices

Sp – suspension of LCU system

W – working area or space

A.2.2 Symbols in the table columns

X – a GESR that is primarily applicable to the lift subsystem(s) identified in the heading

O – a GESR that can be applicable to the lift subsystem(s) identified in the heading

— – the GESR for an equivalent hazard is given in 6.5

Annex B
(normative)

Requirements relevant to the EU market

B.1 Only in the areas subject to EU legislation, any lift placed on that market shall comply with the Lifts Directive 95/16/EC.

B.2 Annex C compares the requirements of, and identifies the differences between, the GESRs of this part of ISO 22559 and the EHSRs of the Lifts Directive and the relevant EHSRs of the Machinery Directive 2006/42/EC.

B.3 Other considerations, such as conformity assessment procedures, market surveillance, etc. are beyond the scope of this part of ISO 22559.

Annex C
(informative)

Comparison of GESRs with EHSRs of LD and MD

C.1 General

C.1.1 The objective of this annex is to compare the requirements of, and identify the differences between:

a) EHSRs of the Lifts Directive (95/16/EC) (LD) as well as applicable EHSRs of the Machinery Directive (2006/42/EC) (MD); and

b) GESRs of this part of ISO 22559.

C.1.2 This annex does not provide a legal interpretation of the EHSRs of the LD or the EHSRs of the MD. There are differences in the formulation of the GESRs and EHSRs, so there may not be a one-to-one correlation between specific EHSRs and GESRs. However, meeting all of the relevant EHSRs or all of the relevant GESRs, will appropriately address safety issues on a product.

C.1.3 It should be noted that the GESRs of this part of ISO 22559 are written in performance language while some of the EHSRs of the LD and MD are more prescriptive in nature. Where such differences occur references are made to these specific EHSRs.

C.1.4 This annex applies the "Guidance on the Implications on the ISO Global Relevance policy for CEN standardization" with the intention to support the European new approach directives applicable to lifts. Route B2 as specified in this guidance document is being used.

C.1.5 The basic hazards associated with lifts are similar for typical lift installations around the world. Therefore, safety objectives to be achieved by the designers and installers can be formulated in a commonly acceptable form.

C.1.6 This part of ISO 22559 is a collection of GESRs that should be considered in assessing and reducing risk for any new lift regardless of the geographical location of the installation.

C.1.7 The LD specifies the safety objectives for lifts placed on the market of the EU. The directive formulates the relevant EHSRs and also the conformity assessment procedures included in the LD to be followed to demonstrate conformity to those EHSRs (as listed in Annex I of the LD as well as those of the MD also applicable to lifts). Specific installations may require addressing EHSRs of other applicable Directives.

C.1.8 The comparison in this annex is applicable to lifts, for example with speed > 0,15 m/s, see the scope of the LD for details. Any other lifting appliances need only comply with the MD requirements.

C.2 A Comparison of ISO 22559-1 GESRs and the Lifts Directive EHSRs

Table C.1 is the result of a detailed comparison of EHSRs of the LD and MD and the GESRs of this part of ISO 22559, which highlights and clarifies the differences and demonstrates equivalence of the safety objectives.

To assist the reader, a cross reference of GESRs and EHSRs is provided in Table C.4.

Table C.1 — Comparison of the Essential Health and Safety Requirements of European Lifts Directive 95/16/EC, and Global Essential Safety Requirements of ISO 22559-1:2014

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
Article 2 Clause 3	Member States shall take all necessary measures to ensure that shafts intended for lifts do not contain any piping or wiring or fittings other than that necessary for the operation and safety of the lift.	**GESR 6.5.5**	**Restrictions on equipment in lift spaces** Only equipment related to the lift installation or its protection shall be placed in the space containing the lift equipment.	Equivalent to LD requirements.
ANNEX I PR. 1	Obligations under essential health and safety requirements apply only where the lift or safety component is subject to the hazard in question when used as intended by the installer of the lift or the manufacturer of the safety components.	**Clause 5.2.4.1**	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559—2.	The GESRs specify safety objectives to be met and therefore particular components are not specified in ISO 22559-1. The GESRs are applicable to both the systems and the components involved with safety. Since ISO 22559-1 is a standard not a directive, it does not specify responsibilities to any specific party (e.g. installers). Responsibilities and obligations are defined and allocated within the national regulations (e.g. Lifts directive).
ANNEX I PR. 2	The essential health and safety requirements contained in the Directive are imperatives. However, given the present state of the art, the objectives, which they lay down may not be attainable. In such cases, and to the greatest extent possible, the lift or safety components must be designed and built in such a way as to approximate to those objectives.	Clause 5.1.4	The GESRs contained in this part of ISO 22559 shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
ANNEX I PR. 3	The safety-component manufacturer and the installer of the lift are under an obligation to assess the hazards in order to identify all those which apply to their products; they must then design and construct them taking account of the assessment.	**Clause 5.2.4.1**	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559—2.	See comments to Annex I/PR. 1
ANNEX I PR. 4	In accordance with Article 14, the essential requirements laid down in Directive 89/106/EEC, not included in this Directive, apply to lifts.	**Clause 5**	Understanding and implementing GESRs	Preliminary remarks of LD are addressed by Clause 5 of ISO 22559-1. However, the essential requirements laid down in Directive 89/106/EEC, not included in the Lifts Directive, apply to lifts.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 1.1.	**Application of Directive 89/392/EEC, as amended by Directives 91/368/EEC, 93/44/ EEC and 93/68/EEC.** Where the relevant hazard exists and is not dealt with in this Annex, the essential health and safety requirements of Annex I to Directive 89/392/EEC apply. The essential requirement of Section 1.1.2 of Annex I to Directive 89/392/EEC must apply in any event.	**Clause 5.2.2.2 (partial)**	When designing a lift or its component, a review of the intended use, foreseeable misuse (see 4.5.5.4 of ISO 14798) and the design shall be made, in which all possible risk scenarios are formulated, and risk assessment is performed, in order to find out which, if any, GESRs are applicable to the design. All risk scenarios that could occur during operation and use shall be considered, as well as during the maintenance or inspection of the lift.	While the wording is not identical, the intent of the requirements is the same: all relevant applicable hazards should be considered. Even if ISO 22559-1 does not specifically cover some aspects (e.g. all needs of people with disabilities) for a specific product, specific hazards linked to them are relevant they must be addressed using an appropriate Risk Assessment.
ANNEX I 1.2	**Car** The car must be designed and constructed to offer the space and strength corresponding to the maximum number of persons and the rated load of the lift set by the installer.	**GESR 6.4.1**	**Size and strength** The LCU shall accommodate and support the rated load and foreseeable overload. NOTE: This GESR primarily addresses the transportation of people. "Accommodate" in this context means to provide space (volume) for the intended number of users, considering the dimensions and weight of persons. The foreseeable overload, in terms of users means: — load normally carried by users (e.g. briefcase, luggage, but without tools such as trolleys), —-coincidence of users taller or heavier than average, and — more users than the LCU is designed for.	Equivalent to LD requirements
	In the case of lifts intended for the transport of persons, and where its dimensions permit, the car must be designed and constructed in such a way that its structural features do not obstruct or impede access and use by disabled persons and so as to allow any appropriate adjustments intended to facilitate its use by them.	**Not addressed**		The scope of ISO 22559-1 (see Clause 1 a) covers access to, but not the use of, lifts by persons with disabilities, due to different requirements around the world. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 1.3	**Means of suspension and means of support** The means of suspension and/or support of the car, its attachments and any terminal parts thereof must be selected and designed so as to ensure an adequate level of overall safety and to minimize the risk of the car falling, taking into account the conditions of use, the materials used and the conditions of manufacture.	**GESR 6.1.1**	**Supports for lift equipment** The means used to support and secure the lift equipment shall be capable of sustaining all loads and forces (including impact forces) imposed during normal and emergency operation. NOTE: The forces referred to in 6.1.1 are those that result from the intended use, and reasonably foreseeable overload, of the lift during normal operation (loading, unloading, acceleration, braking, etc.) and emergency operation (safety gear operation, buffer impact, etc.).	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
		GESR 6.4.1	**Size and strength** The LCU shall accommodate and support the rated load and foreseeable overload.	Equivalent to LD requirements.
		GESR 6.4.2	**LCU support/suspension** Means shall be provided to support the fully loaded LCU and reasonably foreseeable overload. NOTE: This addresses the strength and failure of the suspension means when the LCU is loaded with its rated load. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached. The rated performances, however, can be affected if the rated load is exceeded.	Equivalent to LD requirements.
	Where ropes or chains are used to suspend the car, there must be at least two independent cables or chains, each with its own anchorage system. Such ropes and chains must have no joins or splices except where necessary for fixing or forming a loop.			GESRs 6.1.1, 6.4.1, and 6.4.2 have been written in performance language **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 1.4.1.	Lifts must be so designed, constructed and installed as to prevent normal starting if the rated load is exceeded.	**GESR** 6.4.3	**Overloaded LCU** Means shall be provided to prevent an overloaded LCU from attempting to move away from a landing. NOTE: In this context "to prevent from attempting to move away from a landing" means that the drive system of hoisting machine will not be activated. When the overload condition is detected, no command will be processed. This does not cover ropes stretch, loss of traction, etc. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached.	Equivalent to LD requirements.
ANNEX I 1.4.2.	Lifts must be equipped with an overspeed governor. These requirements do not apply to lifts in which the design of the drive system prevents overspeed.	**GESR** 6.4.6	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	GESRs 6.4.6, has been written in performance language. The LD requires an overspeed governor.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 1.4.3.	Fast lifts must be equipped with a speed-monitoring and speed-limiting device.	**GESR** 6.4.6	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	Equivalent to LD requirements.
		GESR 6.4.9	**Change of speed or acceleration** Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users. NOTE: This covers changes of speed and acceleration of the LCU for both normal and emergency operations. In the case of an extreme emergency operation (such as stopping a free-falling LCU), the possibility of minor injuries could be tolerated, due to the extremely remote probability of such an occurrence.	Equivalent to LD requirements.
ANNEX I 1.4.4.	Lifts driven by friction pulleys must be designed so as to ensure stability of the traction cables on the pulley.			LD requirements not addressed in ISO 22559-1. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 1.5.1.	All passenger lifts must have their own individual lift machinery. This requirement does not apply to lifts in which the counterweights are replaced by a second car.	**Not addressed**		LD requirements not addressed in ISO 22559-1. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 1.5.2.	The installer of the lift must ensure that the lift machinery and the associated devices of a lift are not accessible except for maintenance and in emergencies.	**GESR** 6.1.3	**Equipment inaccessible to users and non-users** Equipment that is hazardous shall not be directly accessible to users and non-users. NOTE: Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 1.6.1.	The controls of lifts intended for use by unaccompanied disabled persons must be designed and located accordingly.	**Not Addressed**		The scope of ISO 22559-1 (see Clause 1 a) covers access to, but not the use of, lifts by persons with disabilities, due to different requirements around the world. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 1.6.2.	The function of the controls must be clearly indicated.	**GESR** 6.4.15	**Landing and controls indication** Means shall be provided to identify landings and controls for the users in the LCU. NOTE: Ignorance of the controls or one's location can create confusion and unpredictable reactions. In normal conditions, this is probably not a safety issue but it can be significant in emergency situations (fire fighting, etc.).	Equivalent to LD requirements.
ANNEX I 1.6.3.	The call circuits of a group of lifts may be shared or interconnected.	**Not Addressed**		ISO 22559-1 does not impose any restrictions or different requirement for sharing the call circuits of a group of lifts or their interconnection. Therefore, a design based on ISO 22559-1 will fulfil this LD requirement.
ANNEX I 1.6.4.	Electrical equipment must be so installed and connected that: - there can be no possible confusion with circuits which do not have any direct connection with the lift, - the power supply can be switched while on load, - movements of the lift are dependent on electrical safety devices in a separate electrical safety circuit, - a fault in the electrical installation does not give rise to a dangerous situation.	**Not Addressed**		LD requirements not addressed in ISO 22559-1. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 2.1.	The lift must be designed and constructed to ensure that the space in which the car travels is inaccessible except for maintenance or in emergencies. Before a person enters that space, normal use of the lift must be made impossible.	**GESR** 6.1.3	**Equipment inaccessible to users and non-users** Equipment that is hazardous shall not be directly accessible to users and non-users. NOTE: Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
		GESR 6.5.2	**Accessible equipment** All lift equipment requiring maintenance or repair shall be safely accessible to authorized persons. NOTE: If the lift elements requiring maintenance or repair are not accessible, they can be neglected, which would render the use of the lift unsafe. The elements of the lift should be designed taking this into account. "Safely" indicates safe and easy access for maintenance and repair operations.	
ANNEX I 2.2.	The lift must be designed and constructed to prevent the risk of crushing when the car is in one of its extreme positions.	**GESR** 6.5.9	**Means of protection from various hazards** Means shall be provided to adequately protect an authorized person, in working spaces, from the effects of shearing, crushing, abrasion, laceration, high temperature, entrapment, etc. NOTE: List of hazards is not all inclusive. Specific hazards need to be considered according to the circumstances. See also 6.1.4	LD has specific requirements. **For lifts in the EU, the LD requirements as specified shall be complied with.**
		GESR 6.5.1	**Working area(s) and space(s)** Adequate and safe working area(s) or space(s) shall be provided. NOTE: "Adequate" takes into account the ergonomic principles related to the tasks to be performed.	LD has specific requirements. **For lifts in the EU, the LD requirements as specified shall be complied with.**
	The objective will be achieved by means of free space or refuge beyond the extreme positions.			The GESR 6.5.9 has been written in performance language. **For lifts in the EU, the LD requirements as specified shall be complied with.**
	However, in specific cases, in affording Member States the possibility of giving prior approval, particularly in existing buildings, where this solution is impossible to fulfil, other appropriate means may be provided to avoid this risk.			The "prior approval" procedures of the Member States have to be followed, where required by the Member State.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 2.3.	The landings at the entrance and exit of the car must be equipped with landing doors of adequate mechanical resistance for the conditions of use envisaged. An interlocking device must prevent during normal operation: - starting movement of the car, whether or not deliberately activated, unless all landing doors are shut and locked, - the opening of a landing door when the car is still moving and outside a prescribed landing zone. However, all landing movements with the doors open shall be allowed in specified zones on condition that the levelling speed is controlled.	**GESR** 6.1.5	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	Equivalent to LD requirements.
		GESR 6.1.6	**Locking landing doors and closing LCU doors** Any movement of the LCU that is hazardous to persons shall be stopped if any well (hoistway) door is open or unlocked or the LCU door is not closed. NOTE 1: Well (hoistway) doors include lift landing doors, as well as auxiliary well (hoistway) doors or covers intended for use by authorized persons only (e.g. evacuation doors). NOTE 2: Levelling and re-levelling (as well as docking or trucking operations) are not considered to be hazardous movements. NOTE 3: See also GESR 6.4.9.	Equivalent to LD requirements.
		GESR 6.2.1	**Falling into the well (hoistway)** Means shall be provided to sufficiently mitigate the risk to users, non-users, and authorized persons of falling into the well (hoistway). NOTE: This GESR addresses the risk of falling into the well (hoistway) — from surrounding floors, and — from landing doors when the LCU is absent.	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 3.1.	Lift cars must be completely enclosed by full-length walls, fitted floors and ceilings included, with the exception of ventilation apertures, and with full-length doors. These doors must be so designed and installed that the car cannot move, except for the landing movements referred to in the third subparagraph of Section 2.3, unless the doors are closed, and comes to a halt if the doors are opened. The doors of the car must remain closed and interlocked if the lift stops between two levels where there is a risk of a fall between the car and the shaft or if there is no shaft.	**GESR 6.1.5**	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	GESRs 6.1.5, 6.1.6, and 6.4.4 have been written in performance language with the intention that a platform lift does not meet the requirements. The LD requires a fully enclosed car. **For lifts in the EU, the LD requirements as specified shall be complied with.**
		GESR 6.1.6	**Locking landing doors and closing LCU doors** Any movement of the LCU that is hazardous to persons shall be stopped if any well (hoistway) door is open or unlocked or the LCU door is not closed. NOTE 1: Well (hoistway) doors include lift landing doors, as well as auxiliary well (hoistway) doors or covers intended for use by authorized persons only (e.g. evacuation doors). NOTE 2: Levelling and re-levelling (as well as docking or trucking operations) are not considered to be hazardous movements. NOTE 3: See also GESR 6.4.9.	GESRs 6.1.5, 6.1.6, and 6.4.4 have been written in performance language with the intention that a platform lift does not meet the requirements. The LD requires a fully enclosed car. **For lifts in the EU, the LD requirements as specified shall be complied with.**
		GESR 6.4.4	**Falling from the LCU** Means shall be provided to prevent users from falling from the LCU. NOTE: The requirement could be achieved by guards, barriers or walls around the perimeter of the LCU platform. Protection at any opening between the LCU and the well walls that a user could pass through is also required by this GESR, typically the gap between the edges of the LCU and the landing door panels.	GESRs 6.1.5, 6.1.6, and 6.4.4 have been written in performance language with the intention that a platform lift does not meet the requirements. The LD requires a fully enclosed car. **For lifts in the EU, the LD requirements as specified shall be complied with.**

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 3.2.	In the event of a power cut or failure of components the lift must have devices to prevent free fall or uncontrolled upward movements of the car. The device preventing the free fall of the car must be independent of the means of suspension of the car.	**GESR 6.4.6**	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	LD refers only to "upward" uncontrolled movement while GESRs deal with both directions. **For lifts in the EU, the LD requirements as specified shall be complied with.**
	This device must be able to stop the car at its rated load and at the maximum speed anticipated by the installer of the lift. Any stop occasioned by this device must not cause deceleration harmful to the occupants whatever the load conditions.	**GESR 6.4.9**	**Change of speed or acceleration** Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users. NOTE: This covers changes of speed and acceleration of the LCU for both normal and emergency operations. In the case of an extreme emergency operation (such as stopping a free-falling LCU), the possibility of minor injuries could be tolerated, due to the extremely remote probability of such an occurrence.	
ANNEX I 3.3.	Buffers must be installed between the bottom of the shaft and the floor of the car. In this case, the free space referred to in Section 2.2 must be measured with the buffers totally compressed. This requirement does not apply to lifts in which the car cannot enter the free space referred to in Section 2.2 by reason of the design of the drive system.	**GESR 6.4.5**	**LCU travel path limits** The vertical travel of the LCU shall be limited to prevent the LCU from uncontrolled running beyond the travel path. NOTE: Means should be provided for safe stopping of the LCU at the end of the travel path. Safe stopping involves no damage to the equipment and no harm to passengers in the LCU. The "end of travel path" includes a certain overrun from the position of normal terminal landings.	The LD requires a device to soften the stopping of the car at the end of the travel path. A buffer is not prescriptively required in ISO 22559-1. The GESR requirement prevents the LCU's travel from exceeding the normal travel path, which is not completely reflected in LD. The note of GESR 6.4.5: *"Means should be provided for safe stopping of the LCU at the end of the travel path. Safe stopping involves no damage to the equipment and no harm to passengers in the LCU. The "end of travel path" includes a certain overrun from the position of normal terminal landings"* must be taken into consideration.
ANNEX I 3.4.	Lifts must be so designed and constructed as to make it impossible for them to be set in motion if the device provided for in Section 3.2 is not in an operational position.			Not addressed in this Standard, since the lift should be prevented from starting if any safety device is not in operating condition. Lifts may only be set in motion if all safety devices are in operating condition and not only the devices mentioned in 3.2. Therefore the requirement of 3.4 was not considered in formulation of GESR.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 4.1.	The landing doors and car doors or the two doors together, where motorised, must be fitted with a device to prevent the risk of crushing when they are moving.	**GESR** 6.3.1	**Access and egress** Safe means of access and egress shall be provided to the LCU at landings. NOTE: This is applicable to the process of entering and leaving the LCU during normal use of the lift. It suggests that adequate spaces, dimensions, instructions and correct relative positioning of the LCU at the landing should be provided.	Equivalent to LD requirements.
		GESR 6.3.6	**Means to reopen doors when the LCU is at the landing** Means shall be provided to reopen the LCU and the landing doors, if their closing is obstructed when the LCU is at the landing. NOTE: Obstacles interfering with the door movement should be detected. The movement of the doors and the LCU should be prevented until the obstacle is removed. Examples of obstacles are parts of user's body, trolleys, wheelchairs, etc.	Equivalent to LD requirements.
ANNEX I 4.2.	Landing doors, where they have to contribute to the protection of the building against fire, including those with glass parts, must be suitably resistant to fire in terms of their integrity and their properties with regard to insulation (containment of flames) and the transmission of heat (thermal radiation).	**Not Addressed**		ISO 22559-1(Clause 1 b) 4)) does not address fire issue outside the LCU (lift car). **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 4.3.	Counterweights must be so installed as to avoid any risk of colliding with or falling on to the car.	**GESR** 6.1.5	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
		GESR 6.4.7	**LCU collision with objects in or beyond the travel path** Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users. NOTE: Means should be provided to prevent the LCU from colliding with any equipment in the well (hoistway). There should be LCU guards or enclosures of adequate strength to avoid dangerous deflection due to horizontal forces. Deflection and deformation of the guards or enclosure should be limited so that they do not create hazardous situation. This GESR also addresses cases where the LCU or counterweight reaches the structural terminals of the well (hoistway). Eventual impact should be buffered so that it is not harmful.	Equivalent to LD requirements.
ANNEX I 4.4.	Lifts must be equipped with means enabling people trapped in the car to be released and evacuated.	**GESR** 6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated. NOTE: The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.	Equivalent to LD requirements.
ANNEX I 4.5.	Cars must be fitted with two-way means of communication allowing permanent contact with a rescue service.	**GESR** 6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated. NOTE: The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.	Clause 6.1.7 of ISO 22559-1 is too generic to be understood as addressing the same EHSR as the LD. **For lifts in the EU, the LD requirements as specified shall be complied with.**

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 4.6.	Lifts must be so designed and constructed that, in the event of the temperature in the lift machine exceeding the maximum set by the installer of the lift, they can complete movements in progress but refuse new commands.	**GESR 6.1.14**	**Environmental influences** Users and authorized persons shall be protected from environmental influences. NOTE: Environmental influences include the foreseeable weather and operating conditions of the area where the lift is installed. Users and authorized persons should be protected against direct exposure to the influences (e.g. by heating or cooling the LCU or working space). In addition, there should be adequate protection of safety-related lift elements that are susceptible to weather and operating conditions (e.g. temperature limitations in the machinery space).	GESR 6.1.14 has been written in performance language. Partially equivalent to LD requirements. While the GESR is concerned with environmental influences, the EHSR describes the behaviour of the lift in the case of overheating of the machine.
ANNEX I 4.7.	Cars must be designed and constructed to ensure sufficient ventilation for passengers, even in the event of a prolonged stoppage.	**GESR 6.4.11**	**LCU ventilation** Adequate ventilation shall be provided to the LCU. NOTE: The intent of this GESR is to provide trapped passengers with sufficient air renewal. It is accepted that normal operation does not require particular measures due to the air exchange from door movement and the fact that journeys are relatively short.	Equivalent to LD requirements. **Appropriate ventilation to the car must always be provided.**
ANNEX I 4.8.	The car should be adequately lit whenever in use or whenever a door is opened; there must also be emergency lighting.	**GESR 6.1.11**	**Illumination of the LCU and the landings** The LCU and the landings shall be provided with adequate illumination during use. NOTE: Adequate illumination means that the light intensity is sufficient for safe access and operation of the lift control devices, including — detecting levelling inaccuracy, — operating landing and LCU controls, and — minimizing panic by users in the case of power outage.	Equivalent to LD requirements.
ANNEX I 4.9.	The means of communication referred to in Section 4.5 and the emergency lighting referred to in Section 4.8 must be designed and constructed so as to function even without the normal power supply. Their period of operation should be long enough to allow normal operation of the rescue procedure.	**Not Addressed**	For means of communication	See EHSR 4.5

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
		GESR 6.1.11	**Illumination of the LCU and the landings** The LCU and the landings shall be provided with adequate illumination during use. NOTE: Adequate illumination means that the light intensity is sufficient for safe access and operation of the lift control devices, including — detecting levelling inaccuracy, — operating landing and LCU controls, and minimizing panic by users in the case of power outage.	Equivalent to LD Requirement for emergency lighting (4.8).
ANNEX I 4.10.	The control circuits of lifts which may be used in the event of fire must be designed and manufactured so that lifts may be prevented from stopping at certain levels and allow for priority control of the lift by rescue teams.	**Not Addressed**		The scope of ISO 22559-1excludes fire fighting lifts and fire operation (see Clause 1.3 b) 4))
ANNEX I 5.1.	In addition to the minimum particulars required for any machine pursuant to Section 1.7.3 of Annex I to Directive 89/392/EEC, each car must bear an easily visible plate clearly showing the rated load in kilograms and the maximum number of passengers which may be carried.			Not explicitly addressed by ISO 22559-1. **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 5.2.	If the lift is designed to allow people trapped in the car to escape without outside help, the relevant instructions must be clear and visible in the car.	**GESR** 6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated. NOTE: The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.	Equivalent to LD requirements.
		GESR 6.3.4	**Self-evacuation from the LCU** Self-evacuation of users shall be possible only when the LCU is at or near a landing. NOTE: “At a landing” means that: the LCU is not too far away from the landing and that the risk of tripping or falling is marginal. “Near a landing” means that: the gaps between the LCU and landing enables users to pass through and not to fall into the travel path.	Equivalent to LD requirements.

Table C.1 *(continued)*

	Lifts Directive 95/16/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC Formulation	Commentary on compliance
ANNEX I 6.1.	The safety components referred to in Annex IV must be accompanied by an instruction manual drawn up in an official language of the Member State of the lift installer or another Community language acceptable to him, so that: - assembly, - connection, - adjustment, and - maintenance, can be carried out effectively and without danger.	**GESR** 6.1.2	**Lift maintenance and repair instructions** Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work. NOTE: This applies to the lifts and lift components and functions that are subject to wear and tear, not to those designed for maintenance-free operation. Adequate maintenance is a key element in keeping the lift in safe operating condition. This GESR aims to prevent the performance of maintenance and repair work by incompetent persons	In addition to GESR 6.1.2, that refers to complete lift and more generic, LD also requires instructions for safety components for: - assembly, - connection, - adjustment **For lifts in the EU, the LD requirements as specified shall be complied with.**
ANNEX I 6.2.	Each lift must be accompanied by documentation drawn up in the official language(s) of the Community, which may be determined in accordance with the Treaty by the Member State in which the lift is installed. The documentation shall contain at least: - an instruction manual containing the plans and diagrams necessary for normal use and relating to maintenance, inspection, repair, periodic checks and the rescue operations referred to in Section 4.4, - a logbook in which repairs and, where appropriate, periodic checks can be noted.	**GESR** 6.1.2	**Lift maintenance and repair instructions** Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work. NOTE: This applies to the lifts and lift components and functions that are subject to wear and tear, not to those designed for maintenance-free operation. Adequate maintenance is a key element in keeping the lift in safe operating condition. This GESR aims to prevent the performance of maintenance and repair work by incompetent persons	Partially equivalent to LD requirements, which addresses more aspects. In addition to GESR 6.1.2, LD also requires instructions for normal use and relating to inspection, repair and periodic checks. **For lifts in the EU, the LD requirements as specified shall be complied with.**
		GESR 6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated. NOTE: The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.	Partially equivalent to LD requirements, which addresses more aspects. **For lifts in the EU, the LD requirements as specified shall be complied with.**

Table C.2 — Comparison of the Essential Health and Safety Requirements of Machinery Directive 2006/42/EC, and Global Essential Safety Requirements of ISO 22559-1:2014

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I	**GENERAL PRINCIPLES** 1. The manufacturer of machinery or his authorized representative must ensure that a risk assessment is carried out in order to determine the health and safety requirements which apply to the machinery. The machinery must then be designed and constructed taking into account the results of the risk assessment.	**Clause** 4.2.3	By taking this approach and by using the systematic risk assessment process in accordance with ISO 14798, it was possible to establish EHSRs for lifts without imposing restrictions on the design of, or materials and technologies used in, the lifts.	
ANNEX I General Principles	By the iterative process of risk assessment and risk reduction referred to above, the manufacturer or his authorized representative shall: — determine the limits of the machinery, which include the intended use and any reasonably foreseeable misuse thereof, — identify the hazards that can be generated by the machinery and the associated hazardous situations, — estimate the risks, taking into account the severity of the possible injury or damage to health and the probability of its occurrence, — evaluate the risks, with a view to determining whether risk reduction is required, in accordance with the objective of this Directive, — eliminate the hazards or reduce the risks associated with these hazards by application of protective measures, in the order of priority established in section 1.1.2(b).	**Clause** 4.3.2	Following the risk assessment process set out in ISO/IEC Guide 51 and the methodology specified in ISO 14798 each study group a) identified all safety risk scenarios, including hazardous situations and harmful events (causes and effects and possible resulting harm) that could arise at all stages and in all conditions of the operation and use of lifts, b)assessed the risk, and c) formulated EHSRs that, when implemented, would mitigate the risks. Table 1 gives several examples of risk scenarios related to several GESRs.	
ANNEX I General Principles	2. The obligations laid down by the essential health and safety requirements only apply when the corresponding hazard exists for the machinery in question when it is used under the conditions foreseen by the manufacturer or his authorized representative or in foreseeable abnormal situations. In any event, the principles of safety integration referred to in section 1.1.2 and the obligations concerning marking of machinery and instructions referred to in sections 1.7.3 and 1.7.4 apply.	**Clause** 4.3.2	Following the risk assessment process set out in ISO/IEC Guide 51 and the methodology specified in ISO 14798 each study group d) identified all safety risk scenarios, including hazardous situations and harmful events (causes and effects and possible resulting harm) that could arise at all stages and in all conditions of the operation and use of lifts, e) assessed the risk, and f) formulated EHSRs that, when implemented, would mitigate the risks. Table 1 gives several examples of risk scenarios related to several GESRs.	MD Annex I 1.7.3 has been addressed in Table C.1 and 1.7.4 is not applicable to lifts.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I General Principles	3. The essential health and safety requirements laid down in this Annex are mandatory; However, taking into account the state of the art, it may not be possible to meet the objectives set by them. In that event, the machinery must, as far as possible, be designed and constructed with the purpose of approaching these objectives.	**Clause 5.1.4**	The GESRs contained in this part of ISO 22559 shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
ANNEX I General Principles	4. This Annex is organized in several parts. The first one has a general scope and is applicable to all kinds of machinery. The other parts refer to certain kinds of more specific hazards. Nevertheless, it is essential to examine the whole of this Annex in order to be sure of meeting all the relevant essential requirements. When machinery is being designed, the requirements of the general part and the requirements of one or more of the other parts shall be taken into account, depending on the results of the risk assessment carried out in accordance with point 1 of these General Principles.			As the comparison Table C.2 includes all EHSRs of the MD relevant to lifts, the MD requirement as given in this paragraph is fulfilled.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I	**1.1.1. Definitions**	**Not**		These definitions are necessary for understanding the MD requirements. Relevant definitions exist in ISO 22559-1.
1.1.1	For the purpose of this Annex:	**Addressed**		
	(a) "hazard" means a potential source of injury or damage to health;			
	(b) "danger zone" means any zone within and/or around machinery in which a person is subject to a risk to his health or safety;			
	(c) "exposed person" means any person wholly or partially in a danger zone;			
	(d) "operator" means the person or persons installing, operating, adjusting, maintaining, cleaning, repairing or moving machinery;			
	(e) "risk" means a combination of the probability and the degree of an injury or damage to health that can arise in a hazardous situation;			
	(f) "guard" means a part of the machinery used specifically to provide protection by means of a physical barrier;			
	(g) "protective device" means a device (other than a guard) which reduces the risk, either alone or in conjunction with a guard;			
	(h) "intended use" means the use of machinery in accordance with the information provided in the instructions for use;			
	(i) "reasonably foreseeable misuse" means the use of machinery in a way not intended in the instructions for use, but which may result from readily predictable human behaviour.			

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.1.2**	**1.1.2. Principles of safety integration** (a) Machinery must be designed and constructed so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof. The aim of measures taken must be to eliminate any risk throughout the foreseeable lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping. (b) In selecting the most appropriate methods, the manufacturer or his authorized representative must apply the following principles, in the order given: - eliminate or reduce risks as far as possible (inherently safe machinery design and construction), - take the necessary protective measures in relation to risks that cannot be eliminated, - inform users of the residual risks due to any shortcomings of the protective measures adopted, indicate whether any particular training is required and specify any need to provide personal protective equipment.	Clause 5	**Understanding and implementing GESRs.**	The principle of safety integration is addressed in ISO 22559-1. Equivalence is achieved when all risks including residual ones are mitigated in using ISO 22559-1 as a "standard". MD 1.1.2 addresses risks arising during the life cycle of the lift. **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	(c) When designing and constructing machinery and when drafting the instructions, the manufacturer or his authorized representative must envisage not only the intended use of the machinery but also any reasonably foreseeable misuse thereof. The machinery must be designed and constructed in such a way as to prevent abnormal use if such use would engender a risk. Where appropriate, the instructions must draw the user's attention to ways — which experience has shown might occur — in which the machinery should not be used. (d) Machinery must be designed and constructed to take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protective equipment. (e) Machinery must be supplied with all the special equipment and accessories essential to enable it to be adjusted, maintained and used safely.			
ANNEX I **1.1.3**	**1.1.3. Materials and products** The materials used to construct machinery or products used or created during its use must not endanger persons' safety or health. In particular, where fluids are used, machinery must be designed and constructed to prevent risks due to filling, use, recovery or draining.	**GESR** 6.1.13	**Hazardous materials** The characteristics and quantity of material used for the construction of the lift shall not lead to hazardous situations. NOTE: Hazardous situations for users, non-users and authorized persons refer to toxicity, fumes, exposure to chemicals, flammability, exposure to asbestos, etc.	Equivalent to MD requirements.
ANNEX I **1.1.4**	**1.1.4. Lighting** Machinery must be supplied with integral lighting suitable for the operations concerned where the absence thereof is likely to cause a risk despite ambient lighting of normal intensity. Machinery must be designed and constructed so that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects on moving parts due to the lighting. Internal parts requiring frequent inspection and adjustment, and maintenance areas must be provided with appropriate lighting.	**GESR** 6.1.11	**Illumination of the LCU and the landings** The LCU and the landings shall be provided with adequate illumination during use. NOTE: Adequate illumination means that the light intensity is sufficient for safe access and operation of the lift control devices, including — detecting levelling inaccuracy, — operating landing and LCU controls, and minimizing panic by users in the case of power outage.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.5.12	**Illumination of working spaces** All working spaces and access thereto shall be provided with adequate illumination for the use of authorized persons. NOTE: Adequate illumination" means that the light intensity is sufficient for safe access and for performance of any maintenance or repair operation of the lift equipment. Illumination may be switched off in the absence of authorized persons. Emergency lighting should be provided in places where movement of authorized persons in darkness is dangerous.	Equivalent to MD requirements.
ANNEX I 1.1.5	**1.1.5. Design of machinery to facilitate its handling** Machinery, or each component part thereof, must: — be capable of being handled and transported safely, — be packaged or designed so that it can be stored safely and without damage. During the transportation of the machinery and/or its component parts, there must be no possibility of sudden movements or of hazards due to instability as long as the machinery and/or its component parts are handled in accordance with the instructions. Where the weight, size or shape of machinery or its various component parts prevents them from being moved by hand, the machinery or each component part must: — either be fitted with attachments for lifting gear, or — be designed so that it can be fitted with such attachments, or — be shaped in such a way that standard lifting gear can easily be attached. Where machinery or one of its component parts is to be moved by hand, it must: — either be easily moveable, or — be equipped for picking up and moving safely. Special arrangements must be made for the handling of tools and/or machinery parts which, even if lightweight, could be hazardous.			Not addressed by ISO 22559-1as the construction / alteration / dismantling phases were excluded (see Clause 1.3 b) 1) of ISO 22559-1). **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I	**1.1.6. Ergonomics**	**Addressed**	**Working area(s) and space(s)**	Equivalent to MD requirements.
1.1.6	Under the intended conditions of use, the discomfort, fatigue and physical and psychological stress faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as: — allowing for the variability of the operator's physical dimensions, strength and stamina, — providing enough space for movements of the parts of the operator's body, — avoiding a machine-determined work rate, — avoiding monitoring that requires lengthy concentration, — adapting the man/machinery interface to the foreseeable characteristics of the operators.	**(see comment)** **GESR** **6.5.1**	Adequate and safe working area(s) or space(s) shall be provided. NOTE: "Adequate" takes into account the ergonomic principles related to the tasks to be performed.	Although no specific requirements are specified in GESRs but general hazards are addressed. See also GESR 6.5.1.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.2.1**	**1.2.1. Safety and reliability of control systems** Control systems must be designed and constructed in such a way as to prevent hazardous situations from arising. Above all, they must be designed and constructed in such a way that: — they can withstand the intended operating stresses and external influences, — a fault in the hardware or the software of the control system does not lead to hazardous situations, — errors in the control system logic do not lead to hazardous situations, — reasonably foreseeable human error during operation does not lead to hazardous situations. Particular attention must be given to the following points: — the machinery must not start unexpectedly, — the parameters of the machinery must not change in an uncontrolled way, where such change may lead to hazardous situations, — the machinery must not be prevented from stopping if the stop command has already been given, — no moving part of the machinery or piece held by the machinery must fall or be ejected, — automatic or manual stopping of the moving parts, whatever they may be, must be unimpeded, — the protective devices must remain fully effective or give a stop command, — the safety-related parts of the control system must apply in a coherent way to the whole of an assembly of machinery and/or partly completed machinery. For cable-less control, an automatic stop must be activated when correct control signals are not received, including loss of communication.	**Clause** **0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts. The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	Equivalent to MD requirements. Although no specific requirements are specified in GESRs general hazards are addressed. • See GESRs 6.4.6, 6.4.9, and 6.5.8. • See Clauses 0.1, 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	
		GESR 6.4.6	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.4.9	**Change of speed or acceleration** Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users. NOTE: This covers changes of speed and acceleration of the LCU for both normal and emergency operations. In the case of an extreme emergency operation (such as stopping a free-falling LCU), the possibility of minor injuries could be tolerated, due to the extremely remote probability of such an occurrence.	
		GESR 6.5.8	**Uncontrolled or unintended equipment movement inside the well (hoistway)** Means shall be provided to protect authorized persons against effects related to uncontrolled or unintended movement of equipment inside the well (hoistway). Any acceleration or deceleration to which an authorized person is subjected as a result of uncontrolled or unintended movement shall be limited to sufficiently mitigate the risk of harm. NOTE: If the contact with lift components whose uncontrolled or unintended movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. "Equipment" includes all possible moving parts, such as the LCU, counterweight.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.2.2**	**1.2.2. Control devices** Control devices must be: — clearly visible and identifiable, using pictograms where appropriate, — positioned in such a way as to be safely operated without hesitation or loss of time and without ambiguity, — designed in such a way that the movement of the control device is consistent with its effect, — located outside the danger zones, except where necessary for certain control devices such as an emergency stop or a teach pendant, — positioned in such a way that their operation cannot cause additional risk, — designed or protected in such a way that the desired effect, where a hazard is involved, can only be achieved by a deliberate action, — made in such a way as to withstand foreseeable forces; particular attention must be paid to emergency stop devices liable to be subjected to considerable forces. Where a control device is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence, the action to be performed must be clearly displayed and subject to confirmation, where necessary. Control devices must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Machinery must be fitted with indicators as required for safe operation. The operator must be able to read them from the control position.	**Clause 0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • In formulation of the GESRs, requirements such as those detailed in the MD 1.2.2, have been taken into account, however the GESRs have been written in performance language. **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	From each control position, the operator must be able to ensure that no-one is in the danger zones, or the control system must be designed and constructed in such a way that starting is prevented while someone is in the danger zone. If neither of these possibilities is applicable, before the machinery starts, an acoustic and/or visual warning signal must be given. The exposed persons must have time to leave the danger zone or prevent the machinery starting up. If necessary, means must be provided to ensure that the machinery can be controlled only from control positions located in one or more predetermined zones or locations. Where there is more than one control position, the control system must be designed in such a way that the use of one of them precludes the use of the others, except for stop controls and emergency stops. When machinery has two or more operating positions, each position must be provided with all the required control devices without the operators hindering or putting each other into a hazardous situation.			
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent..	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	
ANNEX I **1.3.1**	**1.3.1. Risk of loss of stability** Machinery and its components and fittings must be stable enough to avoid overturning, falling or uncontrolled movements during transportation, assembly, dismantling and any other action involving the machinery. If the shape of the machinery itself or its intended installation does not offer sufficient stability, appropriate means of anchorage must be incorporated and indicated in the instructions.	**Not Addressed**		Not explicitly addressed by ISO 22559-1. **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I	**1.3.2. Risk of break-up during operation**	**GESR**	**Supports for lift equipment**	Equivalent to MD requirements.
1.3.2	The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used. The durability of the materials used must be adequate for the nature of the working environment foreseen by the manufacturer or his authorized representative, in particular as regards the phenomena of fatigue, ageing, corrosion and abrasion. The instructions must indicate the type and frequency of inspections and maintenance required for safety reasons. They must, where appropriate, indicate the parts subject to wear and the criteria for replacement. Where a risk of rupture or disintegration remains despite the measures taken, the parts concerned must be mounted, positioned and/or guarded in such a way that any fragments will be contained, preventing hazardous situations. Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected to ensure that no risk is posed by a rupture. Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to persons: - when the workpiece comes into contact with the tool, the latter must have attained its normal working condition, - when the tool starts and/or stops (intentionally or accidentally), the feed movement and the tool movement must be coordinated.	6.1.1	The means used to support and secure the lift equipment shall be capable of sustaining all loads and forces (including impact forces) imposed during normal and emergency operation. NOTE: The forces referred to in 6.1.1 are those that result from the intended use, and reasonably foreseeable overload, of the lift during normal operation (loading, unloading, acceleration, braking, etc.) and emergency operation (safety gear operation, buffer impact, etc.).	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.1.2	**Lift maintenance and repair instructions** Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work. NOTE: This applies to the lifts and lift components and functions that are subject to wear and tear, not to those designed for maintenance-free operation. Adequate maintenance is a key element in keeping the lift in safe operating condition. This GESR aims to prevent the performance of maintenance and repair work by incompetent persons.	
ANNEX I **1.3.3**	**1.3.3. Risks due to falling or ejected objects** Precautions must be taken to prevent risks from falling or ejected objects.	**GESR** 6.4.10	**Objects falling on the LCU** LCU users shall be protected from falling objects. NOTE: Falling objects are those that can be reasonably expected as a result of misbehaviour, carrying tools or similar activities. Open well (hoistway) installations can also be subject to acts of vandalism (objects thrown from outside). Falling water is not addressed by this GESR.	Equivalent to MD requirements.
		GESR 6.5.10	**Falling objects in the well (hoistway)** While in the well (hoistway), authorized persons shall be adequately protected from falling objects. NOTE: Objects that can fall because of an accidental reaction on the part of a person, e.g. hand-held tools, loose material placed on LCU (car) roof, etc.	Equivalent to MD requirements.
ANNEX I **1.3.4**	**1.3.4. Risks due to surfaces, edges or angles** Insofar as their purpose allows, accessible parts of the machinery must have no sharp edges, no sharp angles and no rough surfaces likely to cause injury.	**GESR** 6.1.4	**Floors of the LCU and working areas** The floors of the LCU and standing areas of workplaces shall minimize the risk of tripping and slipping. NOTE: LCU and working area floors should be reasonably level, which means that they do not present a perceptible slope. When considering non-slip materials, attention should be paid to the fact that the roughness of a material does not remain consistent over time and can vary depending on housekeeping operations (e.g. cleaning).	Equivalent to MD requirements.
		GESR 6.1.8	**Sharp edges** Means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to sharp edges. NOTE: For authorized persons, see 6.5.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.3.7**	**1.3.7. Risks related to moving parts** The moving parts of machinery must be designed and constructed in such a way as to prevent risks of contact which could lead to accidents or must, where risks persist, be fitted with guards or protective devices. All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work. In cases where, despite the precautions taken, a blockage is likely to occur, the necessary specific protective devices and tools must, when appropriate, be provided to enable the equipment to be safely unblocked. The instructions and, where possible, a sign on the machinery shall identify these specific protective devices and how they are to be used.	GESR 6.1.5	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	Equivalent to MD requirements.
		GESR 6.5.8	**Uncontrolled or unintended equipment movement inside the well (hoistway)** Means shall be provided to protect authorized persons against effects related to uncontrolled or unintended movement of equipment inside the well (hoistway). Any acceleration or deceleration to which an authorized person is subjected as a result of uncontrolled or unintended movement shall be limited to sufficiently mitigate the risk of harm. NOTE 1: If the contact with lift components whose unintended or uncontrolled movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. “Equipment” includes all possible moving parts, such as the LCU, counterweight. NOTE 2: If the contact with lift components whose uncontrolled or unintended movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. “Equipment” includes all possible moving parts, such as the LCU, counterweight.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I 1.3.8	**1.3.8 Choice of protection against risks arising from moving parts** Guards or protective devices designed to protect against risks arising from moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help to make the choice. **1.3.8.1. Moving transmission parts** Guards designed to protect persons against the hazards generated by moving transmission parts must be: — either fixed guards as referred to in section 1.4.2.1, or — interlocking movable guards as referred to in section 1.4.2.2. Interlocking movable guards should be used where frequent access is envisaged.	**GESR** **6.1.5**	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	Equivalent to MD requirements.
	1.3.8.2. Moving parts involved in the process Guards or protective devices designed to protect persons against the hazards generated by moving parts involved in the process must be: — either fixed guards as referred to in section 1.4.2.1, or — interlocking movable guards as referred to in section 1.4.2.2, or — protective devices as referred to in section 1.4.3, or — a combination of the above. However, when certain moving parts directly involved in the process cannot be made completely inaccessible during operation owing to operations requiring operator intervention, such parts must be fitted with: — fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and — adjustable guards as referred to in section 1.4.2.3 restricting access to those sections of the moving parts where access is necessary.	**GESR** **6.1.3**	**Equipment inaccessible to users and non-users** Equipment that is hazardous shall not be directly accessible to users and non-users. NOTE: Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.	GESR 6.1.3 address aspects of the MD requirements. **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR **6.1.5**	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	GESR 6.1.5 address aspects of the MD requirements . **For lifts in the EU, the MD requirement as specified shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I 1.4	**1.4. Required characteristics of guards and protective devices** **1.4.1. General requirements** Guards and protective devices must: — be of robust construction, — be securely held in place, — not give rise to any additional hazard, — not be easy to by-pass or render non-operational, — be located at an adequate distance from the danger zone, — cause minimum obstruction to the view of the production process, and — enable essential work to be carried out on the installation and/or replacement of tools and for maintenance purposes by restricting access exclusively to the area where the work has to be done, if possible without the guard having to be removed or the protective device having to be disabled. In addition, guards must, where possible, protect against the ejection or falling of materials or objects and against emissions generated by the machinery. **1.4.2. Special requirements for guards** **1.4.2.1. Fixed guards** Fixed guards must be fixed by systems that can be opened or removed only with tools. Their fixing systems must remain attached to the guards or to the machinery when the guards are removed. Where possible, guards must be incapable of remaining in place without their fixings.	**GESR** 6.1.5	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	In the formulation of GESR 6.1.5 requirements such as those detailed in the MD 1.4 have been taken into account, however the GESR has been written in performance language. MD has specific requirements for guards and protective devices. **For lifts in the EU, specific requirements of MD shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	1.4.2.2. Interlocking movable guards Interlocking movable guards must: — as far as possible remain attached to the machinery when open, — be designed and constructed in such a way that they can be adjusted only by means of an intentional action. Interlocking movable guards must be associated with an interlocking device that: — prevents the start of hazardous machinery functions until they are closed and — gives a stop command whenever they are no longer closed. Where it is possible for an operator to reach the danger zone before the risk due to the hazardous machinery functions has ceased, movable guards must be associated with a guard locking device in addition to an interlocking device that: — prevents the start of hazardous machinery functions until the guard is closed and locked, and — keeps the guard closed and locked until the risk of injury from the hazardous machinery functions has ceased. Interlocking movable guards must be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous machinery functions.			

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	1.4.2.3. Adjustable guards restricting access Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must be: — adjustable manually or automatically, depending on the type of work involved, and — readily adjustable without the use of tools. **1.4.3. Special requirements for protective devices** Protective devices must be designed and incorporated into the control system in such a way that: — moving parts cannot start up while they are within the operator's reach, — persons cannot reach moving parts while the parts are moving, and — the absence or failure of one of their components prevents starting or stops the moving parts. Protective devices must be adjustable only by means of an intentional action.			
		GESR 6.5.10	**Falling objects in the well (hoistway)** While in the well (hoistway), authorized persons shall be adequately protected from falling objects. NOTE: Objects that can fall because of an accidental reaction on the part of a person, e.g. hand-held tools, loose material placed on LCU (car) roof, etc.	
ANNEX I **1.5.1**	**1.5.1. Electricity supply** Where machinery has an electricity supply, it must be designed, constructed and equipped in such a way that all hazards of an electrical nature are or can be prevented. The safety objectives set out in Directive 73/23/EEC shall apply to machinery. However, the obligations concerning conformity assessment and the placing on the market and/or putting into service of machinery with regard to electrical hazards are governed solely by this Directive.	**GESR** 6.1.9	**Hazards arising from the risk of electrical shock** Where electricity is provided, means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to electrical shock. NOTE: For authorized persons, see 6.5.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.5.11	**Electric shock in working spaces** Equipment shall be designed and installed to minimize harm to authorized persons due to the effects of electricity. NOTE: Lift service sometimes requires that authorized people access live parts of electrical equipment.	Equivalent to MD requirements.
ANNEX I **1.5.2**	**1.5.2. Static electricity** Machinery must be designed and constructed to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system. **1.5.3. Energy supply other than electricity** Where machinery is powered by source of energy other than electricity, it must be so designed, constructed and equipped as to avoid all potential risks associated with such sources of energy.	**GESR** 6.1.9	**Hazards arising from the risk of electrical shock** Where electricity is provided, means shall be provided to sufficiently mitigate the risk to users and non-users of exposure to electrical shock. NOTE: For authorized persons, see 6.5.	Equivalent to MD requirements.
		GESR 6.5.11	**Electric shock in working spaces** Equipment shall be designed and installed to minimize harm to authorized persons due to the effects of electricity. NOTE: Lift service sometimes requires that authorized people access live parts of electrical equipment.	Equivalent to MD requirements.
ANNEX I **1.5.3**	**1.5.3. Energy supply other than electricity** Where machinery is powered by source of energy other than electricity, it must be so designed, constructed and equipped as to avoid all potential risks associated with such sources of energy.	**Not Addressed**		Not covered by ISO 22559-1 not relevant with present technology

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.5.4**	**1.5.4. Errors of fitting** Errors likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design and construction of such parts or, failing this, by information given on the parts themselves and/or their housings. The same information must be given on moving parts and/or their housings where the direction of movement needs to be known in order to avoid a risk. Where necessary, the instructions must give further information on these risks. Where a faulty connection can be the source of risk, incorrect connections must be made impossible by design or, failing this, by information given on the elements to be connected and, where appropriate, on the means of connection.	**Not Addressed**		Not covered by ISO 22559-1, construction / alteration phases not addressed (see Clause 1.3.b.1)
ANNEX I **1.5.5**	**1.5.5. Extreme temperatures** Steps must be taken to eliminate any risk of injury arising from contact with or proximity to machinery parts or materials at high or very low temperatures. The necessary steps must also be taken to avoid or protect against the risk of hot or very cold material being ejected.	**GESR** **6.5.9**	**Means of protection from various hazards** Means shall be provided to adequately protect an authorized person, in working spaces, from the effects of shearing, crushing, abrasion, laceration, high temperature, entrapment, etc. NOTE: List of hazards is not all inclusive. Specific hazards need to be considered according to the circumstances. See also 6.1.4	Equivalent to MD requirements.
ANNEX I **1.5.6**	**1.5.6. Fire** Machinery must be designed and constructed in such a way as to avoid any risk of fire or overheating posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery.	**GESR** **6.1.13**	**Hazardous materials** The characteristics and quantity of material used for the construction of the lift shall not lead to hazardous situations. NOTE: Hazardous situations for users, non-users and authorized persons refer to toxicity, fumes, exposure to chemicals, flammability, exposure to asbestos, etc.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.5.7**	**1.5.7. Explosion** Machinery must be designed and constructed in such a way as to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery. Machinery must comply, as far as the risk of explosion due to its use in a potentially explosive atmosphere is concerned, with the provisions of the specific Community Directives.	**Clause** 5.2.2.2	When designing a lift or its component, a review of the intended use, foreseeable misuse (see 4.5.5.4 of ISO 14798) and the design shall be made, in which all possible risk scenarios are formulated, and risk assessment is performed, in order to find out which, if any, GESRs are applicable to the design. All risk scenarios that could occur during operation and use shall be considered, as well as during the maintenance or inspection of the lift. NOTE 1: For practical use of GESRs, see 5.3. NOTE 2: Guidance and examples for use of GESRs are given in notes in Clause 6, following each GESR. They should assist in understanding of the intent and use of GESRs.	ISO 22559-1 requires all hazards applicable to the lift based on the intended use shall be considered (5.2.2.2). The MD has specific requirements related to the hazard of explosion. **For lifts in the EU, the MD requirement as specified shall be complied with.**
ANNEX I **1.5.10**	**1.5.10. Radiation** Undesirable radiation emissions from the machinery must be eliminated or be reduced to levels that do not have adverse effects on persons. Any functional ionising radiation emissions must be limited to the lowest level which is sufficient for the proper functioning of the machinery during setting, operation and cleaning. Where a risk exists, the necessary protective measures must be taken. Any functional non-ionising radiation emissions during setting, operation and cleaning must be limited to levels that do not have adverse effects on persons.	**GESR** 6.1.10	**Electromagnetic compatibility** The safe operation of a lift shall not be influenced by electromagnetic interferences (EMC). The electromagnetic emission of the lift shall be restricted to specified limits.	EMC requirements are identical. Other radiation aspects are not relevant so not addressed by ISO 22559-1.
ANNEX I **1.5.11**	**1.5.11. External radiation** Machinery must be designed and constructed in such a way that external radiation does not interfere with its operation.	**GESR** 6.1.10	**Electromagnetic compatibility** The safe operation of a lift shall not be influenced by electromagnetic interferences (EMC). The electromagnetic emission of the lift shall be restricted to specified limits.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.5.12**	**1.5.12. Laser radiation** Where laser equipment is used, the following should be taken into account: — laser equipment on machinery must be designed and constructed in such a way as to prevent any accidental radiation, — laser equipment on machinery must be protected in such a way that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health, — optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by laser radiation.	**Clause** 5.2.2.2	When designing a lift or its component, a review of the intended use, foreseeable misuse (see 4.5.5.4 of ISO 14798) and the design shall be made, in which all possible risk scenarios are formulated, and risk assessment is performed, in order to find out which, if any, GESRs are applicable to the design. All risk scenarios that could occur during operation and use shall be considered, as well as during the maintenance or inspection of the lift. NOTE 1: For practical use of GESRs, see 5.3. NOTE 2: Guidance and examples for use of GESRs are given in notes in Clause 6, following each GESR. They should assist in understanding of the intent and use of GESRs.	ISO 22559-1 requires all hazards applicable to the lift based on the intended use (5.2.2.2). **In case of hazard of Laser radiation, the specific MD requirement shall be complied with.**
ANNEX I **1.5.13**	**1.5.13. Emissions of hazardous materials and substances** Machinery must be designed and constructed in such a way that risks of inhalation, ingestion, contact with the skin, eyes and mucous membranes and penetration through the skin of hazardous materials and substances which it produces can be avoided. Where a hazard cannot be eliminated, the machinery must be so equipped that hazardous materials and substances can be contained, evacuated, precipitated by water spraying, filtered or treated by another equally effective method. Where the process is not totally enclosed during normal operation of the machinery, the devices for containment and/or evacuation must be situated in such a way as to have the maximum effect.	**GESR** 6.1.13	**Hazardous materials** The characteristics and quantity of material used for the construction of the lift shall not lead to hazardous situations. NOTE: Hazardous situations for users, non-users and authorized persons refer to toxicity, fumes, exposure to chemicals, flammability, exposure to asbestos, etc.	Equivalent to MD requirements.
ANNEX I **1.5.14**	**1.5.14. Risk of being trapped in a machine** Machinery must be designed, constructed or fitted with a means of preventing a person from being enclosed within it or, if that is impossible, with a means of summoning help.	**GESR** 6.5.3	**Access to and egress from working spaces in the well (hoistway)** Access to and egress from working spaces in the well (hoistway) shall be safe. NOTE: Safe egress may be achieved with assistance.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.1.7	**Evacuation** Means and procedures shall be provided to enable trapped users or authorized personnel to be safely released and evacuated. NOTE: The lift system should have means that would permit the movement of the LCU, under control of an authorized person, to the point of an evacuation opening. Alternative means (e.g. two-way communication means) that do not require movement of the LCU are not excluded. Extreme cases of LCU blockage (due to safety gear setting, material damaged due to earthquakes, etc.) can require external means, appropriate instructions and tooling.	Equivalent to MD requirements.
ANNEX I 1.5.15	**1.5.15. Risk of slipping, tripping or falling** Parts of the machinery where persons are liable to move about or stand must be designed and constructed in such a way as to prevent persons slipping, tripping or falling on or off these parts. Where appropriate, these parts must be fitted with handholds that are fixed relative to the user and that enable them to maintain their stability.	**GESR** 6.1.4	**Floors of the LCU and working areas** The floors of the LCU and standing areas of workplaces shall minimize the risk of tripping and slipping. NOTE: LCU and working area floors should be reasonably level, which means that they do not present a perceptible slope. When considering non-slip materials, attention should be paid to the fact that the roughness of a material does not remain consistent over time and can vary depending on housekeeping operations (e.g. cleaning).	Equivalent to MD requirements.
		GESR 6.3.2	**Horizontal sill-to-sill gap** The horizontal gap between the sill of the LCU and that of the landings shall be limited. NOTE: This measurement is taken perpendicular to the moving direction of users. Children who are able to walk should be considered. The sizes of wheelchair wheels and walking aids should also be taken into account.	Equivalent to MD requirements.
		GESR 6.3.3	**Alignment of the LCU and the landing** When users enter or exit the LCU, its platform and the landing floor shall be substantially aligned. NOTE: The step caused by the variation of the LCU load should be limited to avoid stumbling on the part of users; the step should be small enough to allow safe access for all users, including persons with impaired mobility.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR **6.3.5**	**Gap between the landing doors and the LCU doors** The gap between the landing doors and the LCU doors shall not allow the presence of users. NOTE: This GESR aims to prevent persons, including children, from entering sideways into the space between the LCU and landing doors. This situation can arise when there are: — multiple panels on the LCU and landing doors, with loose synchronization, and — combinations of the hinged landing doors and sliding LCU doors.	Equivalent to MD requirements.
		GESR **6.5.6**	**Falling from working areas** Means shall be provided to sufficiently mitigate the risk to authorized persons of falling from any working area. NOTE 1: Working places in the well (hoistway), such as the LCU roof, temporary platforms, should be equipped with protective devices (e.g. balustrades) if there is a risk of falling [e.g. a gap between the LCU roof and the well (hoistway) wall]. NOTE 2: The means of prevention (e.g. balustrade) should have sufficient height and strength.	Equivalent to MD requirements.
ANNEX I **1.5.16**	**1.5.16. Lightning** Machinery in need of protection against the effects of lightning while being used must be fitted with a system for conducting the resultant electrical charge to earth.	**Clause** **5.2.2.2**	When designing a lift or its component, a review of the intended use, foreseeable misuse (see 4.5.5.4 of ISO 14798) and the design shall be made, in which all possible risk scenarios are formulated, and risk assessment is performed, in order to find out which, if any, GESRs are applicable to the design. All risk scenarios that could occur during operation and use shall be considered, as well as during the maintenance or inspection of the lift. NOTE 1: For practical use of GESRs, see 5.3. NOTE 2: Guidance and examples for use of GESRs are given in notes in Clause 6, following each GESR. They should assist in understanding of the intent and use of GESRs.	ISO 22559-1 requires to all hazards applicable to the lift based on the intended use (5.2.2.2). **In case of hazard of lightning, the specific MD requirement shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.6.1**	**1.6.1. Machinery maintenance** Adjustment and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair, cleaning and servicing operations while machinery is at a standstill. If one or more of the above conditions cannot be satisfied for technical reasons, measures must be taken to ensure that these operations can be carried out safely (see section 1.2.5). In the case of automated machinery and, where necessary, other machinery, a connecting device for mounting diagnostic fault-finding equipment must be provided. Automated machinery components which have to be changed frequently must be capable of being removed and replaced easily and safely. Access to the components must enable these tasks to be carried out with the necessary technical means in accordance with a specified operating method.	**GESR** 6.1.2	**Lift maintenance and repair instructions** Where maintenance or repair is required to ensure continued safety, appropriate instructions shall be provided emphasizing that suitably trained personnel perform any required work. NOTE: This applies to the lifts and lift components and functions that are subject to wear and tear, not to those designed for maintenance-free operation. Adequate maintenance is a key element in keeping the lift in safe operating condition. This GESR aims to prevent the performance of maintenance and repair work by incompetent persons.	The principle of safety integration is addressed in ISO 22559-1. **For lifts in the EU, the MD requirement as specified shall be complied with.**
ANNEX I **1.6.2**	**1.6.2. Access to operating positions and servicing points** Machinery must be designed and constructed in such a way as to allow access in safety to all areas where intervention is necessary during operation, adjustment and maintenance of the machinery.	**GESR** 6.5.2	**Accessible equipment** All lift equipment requiring maintenance or repair shall be safely accessible to authorized persons. NOTE: If the lift elements requiring maintenance or repair are not accessible, they can be neglected, which would render the use of the lift unsafe. The elements of the lift should be designed taking this into account. “Safely” indicates safe and easy access for maintenance and repair operations.	Equivalent to MD requirements.
		GESR 6.5.3	**Access to and egress from working spaces in the well (hoistway)** Access to and egress from working spaces in the well (hoistway) shall be safe. NOTE: Safe egress may be achieved with assistance.	Equivalent to MD requirements.
ANNEX I **1.6.4**	**1.6.4. Operator intervention** Machinery must be so designed, constructed and equipped that the need for operator intervention is limited. If operator intervention cannot be avoided, it must be possible to carry it out easily and safely.	**Not Addressed**		The principle of safety integration in ISO 22559-1 should lead to the same outcome as MD requirements. **However, MD has specific requirements that shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **1.6.5**	**1.6.5. Cleaning of internal parts** The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is impossible to avoid entering the machinery, it must be designed and constructed in such a way as to allow cleaning to take place safely.	**Not Addressed**		The principle of safety integration in ISO 22559-1 should lead to the same outcome as MD requirements. **However, MD has specific requirements that shall be complied with.**
ANNEX I **1.7.1.2**	**1.7.1.2. Warning devices** Where the health and safety of persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped in such a way as to give an appropriate acoustic or light signal as a warning. Where machinery is equipped with warning devices these must be unambiguous and easily perceived. The operator must have facilities to check the operation of such warning devices at all times. The requirements of the specific Community Directives concerning colours and safety signals must be complied with.	**GESR** 6.1.3	**Equipment inaccessible to users and non-users** Equipment that is hazardous shall not be directly accessible to users and non-users. NOTE: Locations that are not accessible include the location behind the enclosure, a locked cover or door, or out-of-reach locations.	Equivalent to MD requirements. Formulation is different but the outcome will be similar.
		GESR 6.5.9	**Means of protection from various hazards** Means shall be provided to adequately protect an authorized person, in working spaces, from the effects of shearing, crushing, abrasion, laceration, high temperature, entrapment, etc. NOTE: List of hazards is not all inclusive. Specific hazards need to be considered according to the circumstances. See also 6.1.4	Equivalent to MD requirements. Formulation is different but the outcome will be similar.
ANNEX I **1.7.2**	**1.7.2. Warning of residual risks** Where risks remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted, the necessary warnings, including warning devices, must be provided.	Clause 5	Understanding and implementing GESRs	The principle is addressed by Clause 5 of ISO 22559-1. **However, for lifts in the EU, MD has specific requirements that shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I	**1.7.3. Marking of machinery**	**Not**		**For lifts in the EU, MD has specific requirements that shall be complied with.**
1.7.3	All machinery must be marked visibly, legibly and indelibly with the following minimum particulars: — the business name and full address of the manufacturer and, where applicable, his authorized representative, — designation of the machinery, — the CE Marking (see Annex III), — designation of series or type, — serial number, if any, — the year of construction, that is the year in which the manufacturing process is completed. It is prohibited to pre-date or post-date the machinery when affixing the CE marking. Furthermore, machinery designed and constructed for use in a potentially explosive atmosphere must be marked accordingly. Machinery must also bear full information relevant to its type and essential for safe use. Such information is subject to the requirements set out in section 1.7.1. Where a machine part must be handled during use with lifting equipment, its mass must be indicated legibly, indelibly and unambiguously.	**Addressed**		

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **4.1.1**	4.1.1. Definitions (a) "Lifting operation" means a movement of unit loads consisting of goods and/or persons necessitating, at a given moment, a change of level. (b) "Guided load" means a load where the total movement is made along rigid or flexible guides whose position is determined by fixed points. (c) "Working coefficient" means the arithmetic ratio between the load guaranteed by the manufacturer or his authorized representative up to which a component is able to hold it and the maximum working load marked on the component. (d) "Test coefficient" means the arithmetic ratio between the load used to carry out the static or dynamic tests on lifting machinery or a lifting accessory and the maximum working load marked on the lifting machinery or lifting accessory. (e) "Static test" means the test during which lifting machinery or a lifting accessory is first inspected and subjected to a force corresponding to the maximum working load multiplied by the appropriate static test coefficient and then re-inspected once the said load has been released to ensure that no damage has occurred.	**Not Addressed**		This is not an EHSR. The purpose of the definitions is to assist the reader of MD. Relevant definitions exist in ISO 22559-1.
	(f) "Dynamic test" means the test during which lifting machinery is operated in all its possible configurations at the maximum working load multiplied by the appropriate dynamic test coefficient with account being taken of the dynamic behaviour of the lifting machinery in order to check that it functions properly. (g) "Carrier" means a part of the machinery on or in which persons and/or goods are supported in order to be lifted.			

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I 4.1.2.2	**4.1.2.2. Machinery running on guide rails and rail tracks** Machinery must be provided with devices which act on the guide rails or tracks to prevent derailment. If, despite such devices, there remains a risk of derailment or of failure of a rail or of a running component, devices must be provided which prevent the equipment, component or load from falling or the machinery from overturning.	**GESR** **6.1.5**	**Hazards due to relative movement** Users and non-users shall be protected from the effects of shearing, crushing or abrasion, or other injuries due to a) the relative movement of the LCU and external objects, and b) the relative movement of the lift equipment. NOTE 1: For authorized persons, see 6.5.9. NOTE 2: This GESR addresses the safety of persons located inside and outside the LCU.	Equivalent to MD requirements. E.g. guide shoes and roller guides are elevator devices which act on guide rails.
		GESR **6.4.8**	**LCU horizontal or rotational motion** Horizontal or rotational motion of the LCU shall be limited to sufficiently mitigate the risk of injury to users and authorized persons. NOTE: Horizontal or rotational free movement of the LCU is to be limited to prevent users from losing balance and falling.	Equivalent to MD requirements. E.g. guide shoes and roller guides are elevator devices which act on guide rails.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **4.1.2.3**	**4.1.2.3. Mechanical strength** Machinery, lifting accessories and their components must be capable of withstanding the stresses to which they are subjected, both in and, where applicable, out of use, under the installation and operating conditions provided for and in all relevant configurations, with due regard, where appropriate, to the effects of atmospheric factors and forces exerted by persons. This requirement must also be satisfied during transport, assembly and dismantling. Machinery and lifting accessories must be designed and constructed in such a way as to prevent failure from fatigue and wear, taking due account of their intended use. The materials used must be chosen on the basis of the intended working environments, with particular regard to corrosion, abrasion, impacts, extreme temperatures, fatigue, brittleness and ageing. Machinery and lifting accessories must be designed and constructed in such a way as to withstand the overload in the static tests without permanent deformation or patent defect. Strength calculations must take account of the value of the static test coefficient chosen to guarantee an adequate level of safety. That coefficient has, as a general rule, the following values: (a) manually-operated machinery and lifting accessories: 1,5; (b) other machinery: 1,25.	**Clause 0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • In formulation of the GESRs 6.1.1 and 6.5.4 requirements such as those detailed in the MD 4.1.2.3 have been taken into account, however the GESRs have been written in performance language. **For lifts in the EU, MD has specific requirements that shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	Machinery must be designed and constructed in such a way as to undergo, without failure, the dynamic tests carried out using the maximum working load multiplied by the dynamic test coefficient. This dynamic test coefficient is chosen so as to guarantee an adequate level of safety: the coefficient is, as a general rule, equal to 1,1. As a general rule, the tests will be performed at the nominal speeds provided for. Should the control circuit of the machinery allow for a number of simultaneous movements, the tests must be carried out under the least favourable conditions, as a general rule by combining the movements concerned.			
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.1.1	**Supports for lift equipment** The means used to support and secure the lift equipment shall be capable of sustaining all loads and forces (including impact forces) imposed during normal and emergency operation. NOTE: The forces referred to in 6.1.1 are those that result from the intended use, and reasonably foreseeable overload, of the lift during normal operation (loading, unloading, acceleration, braking, etc.) and emergency operation (safety gear operation, buffer impact, etc.).	
		GESR 6.5.4	**Strength of working areas** Means shall be provided to accommodate and support the mass of authorized person(s) and associated equipment in any designated working area(s). NOTE: The number of authorized persons and the equipment that they carry or use to fulfil the anticipated working activities should be determined. Those activities do not include major repairs when the working area needs to be enlarged and reinforced.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I 4.1.2.4	**4.1.2.4. Pulleys, drums, wheels, ropes and chains** Pulleys, drums and wheels must have a diameter commensurate with the size of the ropes or chains with which they can be fitted. Drums and wheels must be designed, constructed and installed in such a way that the ropes or chains with which they are equipped can be wound without coming off. Ropes used directly for lifting or supporting the load must not include any splicing other than at their ends. Splicings are, however, tolerated in installations which are intended by design to be modified regularly according to needs of use. Complete ropes and their endings must have a working coefficient chosen in such a way as to guarantee an adequate level of safety. As a general rule, this coefficient is equal to 5. Lifting chains must have a working coefficient chosen in such a way as to guarantee an adequate level of safety. As a general rule, this coefficient is equal to 4. In order to verify that an adequate working coefficient has been attained, the manufacturer or his authorized representative must, for each type of chain and rope used directly for lifting the load and for the rope ends, perform the appropriate tests or have such tests performed	**Clause 0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • In formulation of the GESRs, (e.g. 6.4.2) requirements such as those detailed in the MD 4.1.2.4 have been taken into account. **However, for lifts in the EU, MD has specific requirements that shall be complied with.**
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2	
		GESR 6.4.2	**LCU support/suspension** Means shall be provided to support the fully loaded LCU and reasonably foreseeable overload. NOTE: This addresses the strength and failure of the suspension means when the LCU is loaded with its rated load. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached. The rated performances, however, can be affected if the rated load is exceeded.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
Annex I 4.1.2.5	**4.1.2.5 Lifting accessories and their components** Lifting accessories and their components must be sized with due regard to fatigue and ageing processes for a number of operating cycles consistent with their expected life-span as specified in the operating conditions for a given application. Moreover: (a) the working coefficient of wire-rope/rope-end combinations must be chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 5. Ropes must not comprise any splices or loops other than at their ends; (b) where chains with welded links are used, they must be of the short-link type. The working coefficient of chains must be chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 4; (c) the working coefficient for textile ropes or slings is dependent on the material, method of manufacture, dimensions and use. This coefficient must be chosen in such a way as to guarantee an adequate level of safety; it is, as a general rule, equal to 7, provided the materials used are shown to be of very good quality and the method of manufacture is appropriate to the intended use. Should this not be the case, the coefficient is, as a general rule, set at a higher level in order to secure an equivalent level of safety. Textile ropes and slings must not include any knots, connections or splicing other than at the ends of the sling, except in the case of an endless sling;	**Clause 0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clause 0.1. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. In formulation of the GESRs, (e.g. 6.4.2) requirements such as those detailed in the MD 4.1.2.5 have been taken into account, however the GESRs have been written in performance language. **For lifts in the EU, MD has specific requirements that shall be complied with.**

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
	(d) all metallic components making up, or used with, a sling must have a working coefficient chosen in such a way as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to 4; (e) the maximum working load of a multilegged sling is determined on the basis of the working coefficient of the weakest leg, the number of legs and a reduction factor which depends on the slinging configuration; (f) in order to verify that an adequate working coefficient has been attained, the manufacturer or his authorized representative must, for each type of component referred to in (a), (b), (c) and (d), perform the appropriate tests or have such tests performed.			
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **4.1.2.6**	**4.1.2.6. Control of movements** Devices for controlling movements must act in such a way that the machinery on which they are installed is kept safe. (a) Machinery must be designed and constructed or fitted with devices in such a way that the amplitude of movement of its components is kept within the specified limits. The operation of such devices must, where appropriate, be preceded by a warning. (b) Where several fixed or rail-mounted machines can be manoeuvred simultaneously in the same place, with risks of collision, such machinery must be designed and constructed in such a way as to make it possible to fit systems enabling these risks to be avoided. (c) Machinery must be designed and constructed in such a way that the loads cannot creep dangerously or fall freely and unexpectedly, even in the event of partial or total failure of the power supply or when the operator stops operating the machine. (d) It must not be possible, under normal operating conditions, to lower the load solely by friction brake, except in the case of machinery whose function requires it to operate in that way. (e) Holding devices must be designed and constructed in such a way that inadvertent dropping of the loads is avoided.	**Clause 0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • The application of GERSs 6.4.7 or 6.5.7 adequately addresses the same risks addressed by MD 4.2.1. In formulation of the GESRs, requirements such as those detailed in the MD 4.1.2.6 have been taken into account, however the GESRs have been written in performance language. The MD contains specific prescriptive requirements that should be consulted.
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	
		GESR 6.4.7	**LCU collision with objects in or beyond the travel path** Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users. NOTE: Means should be provided to prevent the LCU from colliding with any equipment in the well (hoistway). There should be LCU guards or enclosures of adequate strength to avoid dangerous deflection due to horizontal forces. Deflection and deformation of the guards or enclosure should be limited so that they do not create hazardous situation. This GESR also addresses cases where the LCU or counterweight reaches the structural terminals of the well (hoistway). Eventual impact should be buffered so that it is not harmful.	
		GESR 6.5.7	**LCU movement under control of an authorized person** Only authorized persons shall be provided with means to prevent or to enable the movement of the LCU when they are in the travel path. When an authorized person is within reach of unprotected moving parts of the lift, that person shall be able to prevent or activate movement of the lift equipment. NOTE: Equipment includes all possible moving parts, such as the LCU, counterweight.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **4.1.2.8.2**	**4.1.2.8.2. Access to the carrier** Where persons have access to the carrier, the machinery must be designed and constructed in such a way as to ensure that the carrier remains stationary during access, in particular while it is being loaded or unloaded.	**GESR** 6.3.1	**Access and egress** Safe means of access and egress shall be provided to the LCU at landings. NOTE: This is applicable to the process of entering and leaving the LCU during normal use of the lift. It suggests that adequate spaces, dimensions, instructions and correct relative positioning of the LCU at the landing should be provided.	Equivalent to MD requirements.
		GESR 6.3.3	**Alignment of the LCU and the landing** When users enter or exit the LCU, its platform and the landing floor shall be substantially aligned. NOTE: The step caused by the variation of the LCU load should be limited to avoid stumbling on the part of users; the step should be small enough to allow safe access for all users, including persons with impaired mobility.	
		GESR 6.4.6	**Uncontrolled movement of the LCU** Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	
ANNEX I **4.2.1**	**4.2.1. Control of movements** Hold-to-run control devices must be used to control the movements of the machinery or its equipment. However, for partial or complete movements in which there is no risk of the load or the machinery colliding, the said devices may be replaced by control devices authorising automatic stops at pre-selected positions without the operator holding a hold-to-run control device.	**Clause** **0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • The application of GERSs 6.4.7 or 6.5.7 adequately addresses the same risks addressed by MD 4.2.1.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 0.2	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	
		Clause 5.1.4	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	
		GESR 6.4.7	**LCU collision with objects in or beyond the travel path** Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users. NOTE: Means should be provided to prevent the LCU from colliding with any equipment in the well (hoistway). There should be LCU guards or enclosures of adequate strength to avoid dangerous deflection due to horizontal forces. Deflection and deformation of the guards or enclosure should be limited so that they do not create hazardous situation. This GESR also addresses cases where the LCU or counterweight reaches the structural terminals of the well (hoistway). Eventual impact should be buffered so that it is not harmful.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR [6.5.7](#)	**LCU movement under control of an authorized person** Only authorized persons shall be provided with means to prevent or to enable the movement of the LCU when they are in the travel path. When an authorized person is within reach of unprotected moving parts of the lift, that person shall be able to prevent or activate movement of the lift equipment. NOTE: Equipment includes all possible moving parts, such as the LCU, counterweight.	
ANNEX I **4.3.1**	**4.3.1. Chains, ropes and webbing** Each length of lifting chain, rope or webbing not forming part of an assembly must bear a mark or, where this is not possible, a plate or irremovable ring bearing the name and address of the manufacturer or his authorized representative and the identifying reference of the relevant certificate. The certificate mentioned above must show at least the following information: (a) the name and address of the manufacturer and, if appropriate, his authorized representative; (b) a description of the chain or rope which includes: - its nominal size, - its construction, - the material from which it is made, and - any special metallurgical treatment applied to the material; (c) the test method used; (d) the maximum load to which the chain or rope should be subjected in service. A range of values may be given on the basis of the intended applications.	**Not Addressed**		Outside scope of ISO 22559-1. Administrative requirements covered by ISO/TS 22559 –3 and –4.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
ANNEX I **6.1.1**	**6.1.1 Mechanical strength** The carrier, including any trapdoors, must be designed and constructed in such a way as to offer the space and strength corresponding to the maximum number of persons permitted on the carrier and the maximum working load. The working coefficients for components set out in sections 4.1.2.4 and 4.1.2.5 are inadequate for machinery intended for the lifting of persons and must, as a general rule, be doubled. Machinery intended for lifting persons or persons and goods must be fitted with a suspension or supporting system for the carrier designed and constructed in such a way as to ensure an adequate overall level of safety and to prevent the risk of the carrier falling. If ropes or chains are used to suspend the carrier, as a general rule, at least two independent ropes or chains are required, each with its own anchorage.	**Clause** **0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses the requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. In formulation of the GESRs, (e.g. 6.4.2) requirements such as those detailed in the MD 6.1.1 have been taken into account, however the GESRs have been written in performance language. **However, for lifts in the EU, MD has specific requirements that shall be complied with.**
		Clause **0.2**	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard	
		Clause **5.1.4**	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2	
ANNEX I **6.3.1**	**6.3.1 Risks due to movements of the carrier** Machinery for lifting persons must be designed, constructed or equipped in such a way that the acceleration or deceleration of the carrier does not engender risks for persons.	**GESR** 6.4.9	**Change of speed or acceleration** Means shall be provided to ensure that any change of speed or acceleration of the LCU shall be limited to minimize the risk of injury to the users. NOTE: This covers changes of speed and acceleration of the LCU for both normal and emergency operations. In the case of an extreme emergency operation (such as stopping a free-falling LCU), the possibility of minor injuries could be tolerated, due to the extremely remote probability of such an occurrence.	Equivalent to MD requirements.
ANNEX I **6.3.2**	**6.3.2. Risk of persons falling from the carrier** The carrier must not tilt to an extent which creates a risk of the occupants falling, including when the machinery and carrier are moving. Where the carrier is designed as a work station, provision must be made to ensure stability and to prevent hazardous movements. If the measures referred to in section 1.5.15 are not adequate, carriers must be fitted with a sufficient number of suitable anchorage points for the number of persons permitted on the carrier. The anchorage points must be strong enough for the use of personal protective equipment against falls from a height. Any trapdoor in floors or ceilings or side doors must be designed and constructed in such a way as to prevent inadvertent opening and must open in a direction that obviates any risk of falling, should they open unexpectedly.	**GESR** 6.4.4	**Falling from the LCU** Means shall be provided to prevent users from falling from the LCU. NOTE: The requirement could be achieved by guards, barriers or walls around the perimeter of the LCU platform. Protection at any opening between the LCU and the well walls that a user could pass through is also required by this GESR, typically the gap between the edges of the LCU and the landing door panels.	Equivalent to MD requirements. It is understood that MD 6.3.2 addresses falling in or from the LCU. The lift is not considered to be a work station, therefore the paragraph "Where the carrier is designed as a work station, provision must be made to ensure stability and to prevent hazardous movements" is not applicable.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR	**LCU horizontal or rotational motion**	
		6.4.8	Horizontal or rotational motion of the LCU shall be limited to sufficiently mitigate the risk of injury to users and authorized persons. NOTE: Horizontal or rotational free movement of the LCU is to be limited to prevent users from losing balance and falling.	
ANNEX I	**6.4.1 Risks to persons in or on the carrier**	**GESR**	**Uncontrolled movement of the LCU**	Equivalent to MD requirements.
6.4.1	The carrier must be designed and constructed in such a way as to prevent risks due to contact between persons and/or objects in or on the carrier with any fixed or moving elements. Where necessary in order to fulfil this requirement, the carrier itself must be completely enclosed with doors fitted with an interlocking device that prevents hazardous movements of the carrier unless the doors are closed. The doors must remain closed if the carrier stops between landings where there is a risk of falling from the carrier. The machinery must be designed, constructed and, where necessary, equipped with devices in such a way as to prevent uncontrolled upward or downward movement of the carrier. These devices must be able to stop the carrier at its maximum working load and at the foreseeable maximum speed. The stopping action must not cause deceleration harmful to the occupants, whatever the load conditions.	6.4.6	Means shall be provided to limit uncontrolled movement of the LCU. NOTE: This GESR aims to protect against the effects resulting from the movement of LCU at a speed exceeding the designed speed and also to prevent effects resulting from unexpected starts of LCU movement. Examples of such occurrences are: travel of the LCU towards terminal landings at speed exceeding its rated speed, or movement of the LCU away from a landing when doors are open and users are entering or exiting. An example of the foreseeable failures that can cause such occurrences is the breakdown in lift components such as speed control, or drive or braking system.	
		GESR	**LCU Collision with objects in or beyond the travel path**	
		6.4.7	Means shall be provided to avoid collision of the LCU with any equipment in the travel path that could cause injuries to users. NOTE: Means should be provided to prevent the LCU from colliding with any equipment in the well (hoistway). There should be LCU guards or enclosures of adequate strength to avoid dangerous deflection due to horizontal forces. Deflection and deformation of the guards or enclosure should be limited so that they do not create hazardous situation. This GESR also addresses cases where the LCU or counterweight reaches the structural terminals of the well (hoistway). Eventual impact should be buffered so that it is not harmful.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR 6.5.7	**LCU movement under control of an authorized person** Only authorized persons shall be provided with means to prevent or to enable the movement of the LCU when they are in the travel path. When an authorized person is within reach of unprotected moving parts of the lift, that person shall be able to prevent or activate movement of the lift equipment. NOTE: Equipment includes all possible moving parts, such as the LCU, counterweight.	
		GESR 6.5.8	**Uncontrolled or unintended equipment movement inside the well (hoistway)** Means shall be provided to protect authorized persons against effects related to uncontrolled or unintended movement of equipment inside the well (hoistway). Any acceleration or deceleration to which an authorized person is subjected as a result of uncontrolled or unintended movement shall be limited to sufficiently mitigate the risk of harm. NOTE: If the contact with lift components whose unintended or uncontrolled movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. "Equipment" includes all possible moving parts, such as the LCU, counterweight. NOTE: If the contact with lift components whose uncontrolled or unintended movement can be harmful, authorized persons should be provided with means to mitigate such risk, such as controls over equipment movement or permanently available screens that separate the moving parts from the working area to guard against accidental contact. "Equipment" includes all possible moving parts, such as the LCU, counterweight.	
ANNEX I **6.4.3**	**6.4.3 Access to the carrier** The guards at the landings and on the carrier must be designed and constructed in such a way as to ensure safe transfer to and from the carrier, taking into consideration the foreseeable range of goods and persons to be lifted.	**GESR** 6.3.1	**Access and egress** Safe means of access and egress shall be provided to the LCU at landings. NOTE: This is applicable to the process of entering and leaving the LCU during normal use of the lift. It suggests that adequate spaces, dimensions, instructions and correct relative positioning of the LCU at the landing should be provided.	Equivalent to MD requirements.

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		GESR **6.3.3**	**Alignment of the LCU and the landing** When users enter or exit the LCU, its platform and the landing floor shall be substantially aligned. NOTE: The step caused by the variation of the LCU load should be limited to avoid stumbling on the part of users; the step should be small enough to allow safe access for all users, including persons with impaired mobility.	
ANNEX I **6.5**	**6.5 Markings** The carrier must bear the information necessary to ensure safety including: — the number of persons permitted on the carrier, — the maximum working load.	**Clause** **0.1**	After the publication of parts 1 and 2 of ISO/TR 11071, discrepancies were noted in the lift safety standards, and it was agreed that there was a need for an ISO publication that would set global essential safety requirements for lifts (elevators). The work, however, could start only after ISO 14798 was completed. This methodology was a critical tool in the development of this ISO document on safety requirements for lifts.	ISO 22559-1 addresses these requirements in the following ways: • See Clauses 0.1 and 0.2. • See also Clauses 5.1.4, and 5.2.4.1 of ISO 22559-1. • In the formulation of the GESRs, requirements such as those detailed in the MD 6.5, have been taken into account. See GESR 6.4.2 and 6.4.3. **However, for lifts in the EU, MD has specific requirements that shall be complied with.**
		Clause **0.2**	The objective of the ISO 22559 series of documents 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; and c) help remove trade barriers. NOTE: ISO/TS 22559-2 contains global safety parameters (GSPs) for lifts (elevators) that should further assist in the use and implementation of the GESRs specified in this standard.	
		Clause **5.1.4**	The GESRs contained in this standard shall be followed wherever possible. However, given the present state of the art, the objectives that the GESRs specify are sometimes unattainable. In such cases, the lift or its components shall be designed and built in such a way as to approximate to those objectives to the greatest possible extent.	

Table C.2 *(continued)*

	Machine Directive 2006/42/EC Formulation	GESR/ Clause	Comparison of ISO 22559-1:2014 with Machinery Directive 2006/42/EC Formulation	Commentary on compliance
		Clause 5.2.4.1	GESRs are not "protective measures" in terms of ISO 14798. A GESR states only the safety objective; it does not specify how to achieve the objective. Therefore, when designing a lift, appropriate components and functions shall be selected in terms of parameters such as size, dimensions, strength, force, energy, material, acceleration, reliability of performance of safety-related parts, etc., as applicable, and their ability to eliminate or sufficiently mitigate risks to achieve compliance with the objective specified in the GESR shall be established. NOTE: For more details on safety parameters in relation to GESRs see ISO/TS 22559-2.	
		GESR 6.4.2	**LCU support/suspension** Means shall be provided to support the fully loaded LCU and reasonably foreseeable overload. NOTE: This addresses the strength and failure of the suspension means when the LCU is loaded with its rated load. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached. The rated performances, however, can be affected if the rated load is exceeded.	
		GESR 6.4.3	**Overloaded LCU** Means shall be provided to prevent an overloaded LCU from attempting to move away from a landing. NOTE: In this context "to prevent from attempting to move away from a landing" means that the drive system of hoisting machine will not be activated. When the overload condition is detected, no command will be processed. This does not cover ropes stretch, loss of traction, etc. It is, however, understood that the integrity of the lift would be maintained if the foreseeable overload condition were reached.	

Table C.3 — GESRs listed in ISO 22559-1 not clearly addressed by the EHSRs of Lifts Directive 95/16/EC and relevant EHSRs of Machinery Directive 2006/42/EC

	Lifts Directive 95/16/EC	GESR	Comparison of ISO 22559-1:2014 with Lifts Directive 95/16/EC	Commentary on compliance
	See - LD Annex I PR 1	6.1.12	In areas subject to earthquake, means shall be provided to minimize the risk to users, when inside the LCU, and authorized persons, of the foreseeable effects of earthquakes on the lift equipment.	
	See - LD Annex I PR 1	6.4.13	Where there is a risk that the LCU could descend into a flooded area, means shall be provided to detect and prevent descent into a flooded area.	
	Note: LD does not cover partially enclosed LCU. A risk assessment must be performed for any special application – the means allowing intentional interruption of the movement is a specific safety measure.	6.4.14	Means, located inside the LCU, of intentionally interrupting the movement of the LCU by the user shall only be allowed, if necessary, on lifts with a partially enclosed LCU or lifts for special applications.	

Table C.4 — Relationship between the GESRs of ISO 22559-1 and the Essential Health and Safety Requirements of the Lifts Directive 95/16/EC and the Machinery Directive 2006/42/EC

Clause(s)/Subclause(s) of ISO 22559-1	**Essential Health and Safety requirement of the Lifts directive 95/16/EC**	**Essential Health and Safety requirement of the Machinery Directive 2006/42/EC**
6.1 Common GESRs related to persons at different locations		
6.1.1 Supports for lift equipment	Annex I / 1.3 Annex I / 4.8	Annex I / 1.3.2 Annex I / 4.1.2.3
6.1.2 Lift maintenance and repair instructions	Annex I / 6.1 Annex I / 6.2	Annex I / 1.3.2 Annex I / 1.6.1
6.1.3 Equipment inaccessible to users and non-users	Annex I / 1.5.2 Annex I / 2.1	Annex I / 1.7.1.2
6.1.4 Floors of the LCU and working areas		Annex I / 1.3.4 Annex I / 1.5.15
6.1.5 Hazards due to relative movement	Annex I / 2.3 Annex I / 3.1 Annex I / 4.3	Annex I / 1.3.7 Annex I / 1.3.8 Annex I / 1.4 Annex I / 4.1.2.2
6.1.6 Locking landing doors and closing LCU doors	Annex I / 2.3 Annex I / 3.1	
6.1.7 Evacuation	Annex I / 4.4 Annex I / 5.2	Annex I / 1.5.14
6.1.8 Sharp edges		Annex I / 1.3.4
6.1.9 Hazards arising from the risk of electrical shock		Annex I / 1.5.1
6.1.10 Electromagnetic compatibility		Annex I / 1.5.10 Annex I / 1.5.12
6.1.11 Illumination of the LCU and the landings	Annex I / 4.8	Annex I / 1.1.4
6.1.12 Effects of earthquakes		
6.1.13 Hazardous materials		Annex I / 1.1.3 Annex I / 1.5.6 Annex I / 1.5.13
6.1.14 Environmental influences	Annex I / 4.6	Annex I / 1.5.11
6.2 GESRs related to persons adjacent to the lift		

Table C.4 *(continued)*

Clause(s)/Subclause(s) of ISO 22559-1	**Essential Health and Safety requirement of the Lifts directive 95/16/EC**	**Essential Health and Safety requirement of the Machinery Directive 2006/42/EC**
6.2.1 Falling into the well (hoistway)	Annex I / 2.3	
6.3 GESRs related to persons at the entrances		
6.3.1 Access and egress	Annex I / 4.1	Annex I / 4.1.2.8.2 Annex I / 6.4.3
6.3.2 Horizontal sill-to-sill gap		Annex I / 1.5.15
6.3.3 Alignment of the LCU and the landing		Annex I / 1.5.15 Annex I / 4.1.2.8.2 Annex I / 6.4.3
6.3.4 Self-evacuation from the LCU	Annex I / 5.2	
6.3.5 Gap between the landing doors and the LCU doors		Annex I / 1.5.15
6.3.6 Means to reopen doors when the LCU is at the landing	Annex I / 4.1	
6.4 GESRs related to persons in the LCU		
6.4.1 Size and strength	Annex I / 1.2 Annex I / 1.3	
6.4.2 LCU support/suspension	Annex I / 1.3	Annex I / 4.1.2.4 Annex I / 6.1.1
6.4.3 Overloaded LCU	Annex I / 1.4.1	
6.4.4 Falling from the LCU	Annex I / 3.1	Annex I / 6.3.2
6.4.5 LCU travel path limits	Annex I / 3.3	
6.4.6 Uncontrolled movement of the LCU	Annex I / 1.4.2 Annex I / 1.4.3 Annex I / 3.2	Annex I / 1.2.1 Annex I / 4.1.2.8.2 Annex I / 6.4.1
6.4.7 LCU collision with objects in or beyond the travel path	Annex I / 4.3	Annex I / 4.2.1 Annex I / 4.1.2.6 Annex I / 6.4.1
6.4.8 LCU horizontal or rotational motion	Annex I / 6.3.2	Annex I / 4.1.2.2
6.4.9 Change of speed or acceleration	Annex I / 1.4.2 Annex I / 1.4.3 Annex I / 3.2	Annex I / 1.2.1 Annex I / 6.3.1

Table C.4 *(continued)*

Clause(s)/Subclause(s) of ISO 22559-1	**Essential Health and Safety requirement of the Lifts directive 95/16/EC**	**Essential Health and Safety requirement of the Machinery Directive 2006/42/EC**
6.4.10 Objects falling on the LCU	Annex I / 1.3.3	Annex I / 6.4.1
6.4.11 LCU ventilation	Annex I / 4.7	
6.4.12 Fire/smoke in the LCU		Annex I / 1.5.6
6.4.13 LCU in flooded areas		
6.4.14 Stopping means inside the LCU		
6.4.15 Landing and controls indication	Annex I / 1.6.2	
6.5 GESRs related to persons in working areas		
6.5.1 Working area(s) or space(s)		Annex I / 1.1.6
6.5.2 Accessible equipment	Annex I / 2.1	Annex I / 1.6.2
6.5.3 Access to and egress from working spaces in the well (hoistway)		Annex I / 1.6.2
6.5.4 Strength of working area(s)		Annex I / 4.1.2.3
6.5.5 Restrictions on equipment in lift spaces	Article 2 / Clause 3	
6.5.6 Falling from working areas		Annex I / 1.5.15
6.5.7 LCU movement under control of an authorized person	Annex I / 1.5.2	Annex I / 1.2.2 Annex I / 4.1.2.6 Annex I / 4.2.1 Annex I / 6.4.1
6.5.8 Uncontrolled or unintended equipment movement inside the well (hoistway)		Annex I / 1.2.1 Annex I / 1.3.7 Annex I / 6.4.1
6.5.9 Means of protection from various hazards	Annex I / 1.7.1.2 Annex I / 2.2	Annex I / 1.5.5
6.5.10 Falling objects in the well (hoistway)		Annex I / 1.3.3
6.5.11 Electric shock in working spaces	Annex I / 1.5.2	Annex I / 1.5.1
6.5.12 Illumination of working spaces		Annex I / 1.1.4

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[4] ISO/TR 11071-1:2004, *Comparison of worldwide lift safety standards — Part 1: Electric lifts (elevators)*

[5] ISO/TR 11071-2:2006, *Comparison of worldwide lift safety standards — Part 2: Hydraulic lifts (elevators)*

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