
**Safety of amusement rides and
amusement devices —**

**Part 2:
Operation and use**

Sécurité des manèges et des dispositifs de divertissement —

Partie 2: Fonctionnement et utilisation
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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. 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. www.iso.org/patents

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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 254, *Safety of amusement rides and amusement devices*.

ISO 17842 consists of the following parts, under the general title *Safety of amusement rides and amusement devices*:

- *Part 1: Design and manufacture*
- *Part 2: Operation and use*
- *Part 3: Requirements for inspection during design, manufacture, operation and use*

Safety of amusement rides and amusement devices —

Part 2: Operation and use

1 Scope

This part of ISO 17842 specifies the minimum requirements necessary to ensure the safe maintenance, operation, inspection and testing of the following: mobile, temporary or permanently installed machinery and structures, e.g. roundabouts, swings, boats, Ferris wheels, roller coasters, chutes, grandstands, membrane or textile structures, booths, stages, side shows, and structures for artistic aerial displays. The above items, hereafter called *devices*, are intended to be installed both repeatedly without degradation or loss of integrity, and temporarily or permanently in fairgrounds and amusement parks or any other locations. Fixed grandstands, construction site installations, scaffolding, removable agricultural structures and simple coin operated children's amusement devices, carrying not more than three children, are not covered by this document.

Existing national rules on workers' safety are not concerned by this document.

ISO 17842-3 contains inspection requirements during design, manufacture, operation and use.

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.

ISO 2307, *Fibre ropes — Determination of certain physical and mechanical properties*

ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 9554, *Fibre ropes — General specifications*

ISO 7001, *Graphical symbols — Public information symbols*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 7165, *Fire fighting — Portable fire extinguishers — Performance and construction*

ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO/IEC 17020, *Conformity assessment — Requirements for the operation of various types of bodies performing inspection*

ISO 17842-1, *Safety of amusement rides and amusement devices — Design and manufacture*

ISO 17842-3, *Safety of amusement rides and amusement devices — Requirements for inspection during design, manufacture, operation and use*

ISO/TS 17929, *Biomechanical effects on amusement ride passengers*

IEC 60947-3, *Low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

ISO 17842-2:2015(E)

EN 12385, *Steel wire ropes — Safety*

EEC 2006/7/EC, *DIRECTIVE 2006/7/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17842-1, ISO 17842-2, ISO/IEC 17020 and ISO/TS 17929, and the following apply.

NOTE Any symbols connected with the respective terms or units are explained in the clauses concerned.

3.1 amusement device

arrangement of equipment that produces the desired effect of amusement or entertainment when the guest moves through it or on it primarily by his or her own action, or any other system that is not covered by the term *amusement ride* (3.2)

Note 1 to entry: In this document, the word *device* is used to refer to an amusement device or *amusement ride* (3.2).

3.2 amusement ride

equipment that is designed to entertain the *passengers* (3.22) during motion, including the biomechanical effects

Note 1 to entry: In this document, the word *device* is used to refer to an *amusement device* (3.1) or amusement ride.

Note 2 to entry: See ISO/TS 17929 for the definition of biomechanical effect.

3.3 attendant

person appointed to work under the supervision of an operator, to assist in the operation of an device available for use by the public

3.4 competent person

person who has acquired through training, qualifications or experience, or a combination of these, the knowledge and skills enabling that person to perform a specified task

3.5 controller

<ride> person or organization having overall control of an amusement device

Note 1 to entry: This may be either an individual or corporate body owning an amusement device, or the concessionaire or lessee who has been granted control of the device by the owner for a specified period.

3.6 designer engineer

person or body responsible for the design of a device (or modifications thereof), including, but not limited to establishing and describing the configuration of the amusement ride or device, conducting appropriate risk assessment(s), establishing strength (including fatigue strength), designing and specifying electrical/electronic control systems, defining inspection criteria and including the provision of the necessary documentation

3.7 design review

document detailing the review of all the applicable design documents, to determine the suitability for use of a device

3.8
design risk assessment
DRA

document produced by the designer to ensure a safe design within the agreed scope of supply

3.9
device log

book or file containing all the necessary information about the use and history of any device

3.10
fence

structure designed to restrict or prevent movement across a boundary

3.11
gate

section of fencing that may be opened to provide access

3.12
guest

person who interacts with a device

Note 1 to entry: While both are guests, a *passenger* (3.22) is active and a *spectator* (3.33) passive.

3.13
inspection

procedures and investigations necessary for the *inspection body* (3.14) to decide whether the device can continue to be operated safely, or whether it requires any improvements and/or defects to be remedied immediately or within a specified time

3.14
inspection body

any organization operating in accordance with ISO/IEC 17020 carrying out approval, examination and tests of devices

3.15
initial approval

design and calculation review, verification, examinations and tests executed by the inspecting body before a device is first made available for public use

3.16
latching

<restraint> means of being held secure against opening except by intentional action of the *passenger* (3.22), operator or other means

Note 1 to entry: This can include *restraints* (e.g. drop bars) held in place by gravity, detents or other means.

3.17
locking

Note 1 to entry: means by which a locked *restraint* (3.27) is held secure against opening except by intentional action of the operator or other means not accessible by the *passenger* (3.22)

3.18
manufacturer

any natural or legal person who is responsible for designing and manufacturing a product with the view to placing it on the market under his own name

Note 1 to entry: Any commercial operator that either places a product on the market under his own name or trademark or modifies a product in such a way that compliance with applicable requirements may be affected should be considered the manufacturer and should assume the obligations of the manufacturer.

3.19

major modification

safety-related alteration to the hardware or software of a device, including the introduction of a new safety-related component or the substitution of a safety-related component, which results in a deviation from the design specification

3.20

operator

person appointed by the controller to be in charge of the operation of a device at all times when it is intended to be available for the public

3.21

operation and use risk assessment

OURA

document, produced by the controller, that details all of the considered risks inherent during all modes of device operation at the particular location and the means taken to mitigate them

3.22

passenger

patron

any person using a device

3.23

passenger containment

components (e.g. seating, foot wells, handrails, passenger restraints) designed to prevent *passengers* (3.22) from moving outside a predetermined area on a ride either as a result of biomechanical effects, the ride forces or the behaviour of the passenger

3.24

passenger safety envelope

safety envelope

motion safety envelope

passenger clearance envelope

theoretical or actual physical space that may be encroached upon by any part of a passenger (3.22) of an amusement ride during the ride cycle

3.25

passenger unit

PU

part or parts of a device in or on which the passengers (3.22) are intended to ride

3.26

platform

horizontal or slightly inclined surface raised above the level of an adjacent area

3.27

restraint

system, device, or characteristic that is intended to inhibit or restrict the body movement and/or maintain the body position to tolerate accelerations of the patron(s) while on the amusement ride or device

3.28

reach envelope

patron reach envelope

passenger reach envelope

physical space where a passenger (3.22) could reach during a ride cycle while properly positioned, as defined by the ride analysis, in the amusement ride or device and limited only by the vehicle, seat geometry, and restraint system

3.29**repair**

restoration of components or assemblies to the requirements set out in the manual

3.30**reasonably foreseeable misuse**

<human error> use of a machine in a way not intended by the designer, but which can result from readily predictable human behaviour

[SOURCE: ISO 12100:2010, 3.24]

3.31**safety-related component**

component of a device on which the safety of the *passengers* (3.22) is dependent

3.32**service**

replacement or replenishment of components, including fluids which are designated to be replaced or replenished at specified intervals

3.33**spectator**

person in the vicinity of a device, typically watching the operation of the device or waiting to gain access to the use the device

3.34**trial run**

proving run of a device during which no passengers (3.22) are carried

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4 Operation, maintenance and use of amusement rides and amusement devices

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4.1 Introduction

This part of ISO 17842 is concerned with the installing, assembly and disassembly, operating, dismantling, handling, maintaining, repairing, modifying and inspecting of devices, and is addressed to controllers, operators, attendants and inspection bodies.

4.2 Standard documentation

The documents, which shall accompany devices, are

- manuals (see ISO 17842-1),
- device log (see ISO 17842-1), and
- operation and use risk assessment (OURA), incorporating the residual risks resulting from the design risk assessment (DRA).

4.3 Duties of the controller

4.3.1 General

The controller or nominated delegate(s) shall

- ensure that the required documentation accompanies the device when being bought, sold or otherwise transferred or supplied,
- select and train operators and attendants,

- assemble, and disassemble safely,
- ensure safe operation in full compliance with: manual(s), all laws, prescriptions and regulations issued by local and national authorities,
- service, maintain, repair and modify safely,
- where required, ensure that only devices which have valid operational documentation and are examined and tested by appropriate inspection bodies, are operated,
- maintain, keep available and update as required the operating manual and device log, as well as creating necessary reports,
- ensure that where operators do not have a clear view of all loading or unloading points, devise a clear system of signals for checking with attendants that it is safe to start, ensure every person using the system is instructed in how to use it and display a copy of the signal code in appropriate positions,
- ensure that emergency procedures are established, well documented and regularly practiced, and
- provide full instructions on the control or communications system.

The ride controller can delegate any part of his duties, but remains responsible.

4.3.2 Selection and training of staff

Obtaining suitable and competent staff involves selection, training, testing of knowledge and understanding, monitoring, auditing and keeping records. The controller shall select people able to put the safety of the public first, likely to follow procedures conscientiously and having the maturity and authority to give confidence to the public.

Adequate training shall be provided to all employees and training records kept. Training shall be appropriate to the risks and given in a way that those being trained can understand.

The operator and attendants of devices shall demonstrate competency in the operation of devices according to the manual(s).

No operators or attendants of the device shall be younger than required by national standards or law in the country of use.

Operators and attendants, depending on their duties, shall be provided with suitable and sufficient information and training in the working of their devices, covering the following:

- systems of work for safe operation, including speed limits and any other specific safety measures;
- procedures for reporting breakdown, defects or unusual occurrences;
- loading and unloading procedures;
- passenger restrictions as detailed in the manual such as height and weight limits, medical conditions, disabilities (see *guest behaviour* in ISO 17842-1);
- control of waiting and viewing areas;
- use and operation of passenger containment and passenger restraint systems including the checking of restraint closure;
- controlled/emergency stop procedures;
- emergency procedures, including passenger evacuation.

4.3.3 Assembly and disassembly

4.3.3.1 Siting of Devices

4.3.3.1.1 General

Devices shall be sited and assembled in accordance with manufacturer's instruction and applicable national requirements.

4.3.3.1.2 Standard conditions for the siting of devices

The ride controller or his representative shall ensure that a device is only sited on ground which is suitable for this purpose in accordance with the manual(s). For example ensure that the ground

- can safely bear the load of the device. For existing structures, e.g. buildings or piers, a detailed inspection and calculation shall be carried out in order to establish permissible loads,
- is sufficiently flat, even and stable for the attraction to be assembled and used on safely, in accordance with the device log and manual.

The ground shall be checked at regular intervals after assembly, to confirm that there is no deterioration in its load bearing capacity, especially during adverse weather conditions. Drainage shall be considered.

The controller shall establish the position of underground services or overhead lines which may present hazards during the assembly or operation of the device, taking advice as necessary from the appropriate authority. Where these could be a source of danger to persons employed or to members of the public, all reasonably practicable precautions shall be taken to prevent such danger, either by the provision of adequate and suitably placed barriers or otherwise.

Care shall be taken to ensure that underground services are not struck when poles or pegs are placed in the ground or when excavation is undertaken. Service location techniques shall be employed before any such work is commenced, unless it has been confirmed beforehand that there are no services present.

When positioning devices, controllers shall apply the following principles.

- a) The proximity to other fixed or mobile structures or services shall be in accordance with ISO 17842-1.
- b) There shall be sufficient clearance between adjacent devices, buildings or other occupied areas to minimize the risk of fire spread.
- c) Consideration shall be given to any possibility of uplift caused by wind.
- d) They shall be arranged so that the public have safe access to each device at entrance, and safe egress at exit points, so that there are no bottle necks which could cause overcrowding in an emergency.
- e) Sufficient clearance shall be provided between and above devices on main access routes, so as to provide access for emergency service vehicles, and provide access to fixed fire hydrants even when the public may be being evacuated.
- f) Where rides cross over or pass through each other, as a minimum the clearance envelopes for each ride (see ISO 17842-1 and/or ISO/TS 17929) shall apply. The controllers shall ensure that safety envelopes for both passengers and spectators are not compromised.
- g) The OURA will need to consider whether protection is required to prevent falling objects hitting passengers or spectators.

NOTE Local regulations can exist that define the minimum distance between amusement rides and devices and other structures, objects, services, etc.