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Sports and recreational facilities — Trampoline parks — Safety requirements

Installations sportives et récréatives — Parcs de trampolines — Exigences de sécurité

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Foreword

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

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

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

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

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

This document was prepared by Technical Committee ISO/TC 83, *Sports and other recreational facilities and equipment,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 136, *Sports, playground and other recreational facilities and equipment,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Introduction

Trampoline parks offer a wide range of social, recreational and sport-based activities and can be aimed towards people of varying ages and skill levels. Risk-taking is a feature of trampoline parks. Trampoline parks aim to offer users the chance to encounter acceptable risks as part of a stimulating, challenging and controlled environment. As such they have the responsibility to balance the need to offer risk and the need to keep users safe from serious harm.

The existence of and adherence to this document will not prevent all injuries. Trampoline use has an inherent risk of injury, particularly if the equipment is used or supervised improperly. A high percentage of trampoline park users are children. Children benefit from, and develop knowledge and skill by, experimenting on equipment.

This document aims to define requirements that minimize the likelihood of serious and fatal accidents while allowing users, especially children, to expand their level of competence, socialize and enjoy themselves.

The most serious risks involved in any trampolining activity are spinal and neck injuries that can arise from incorrectly performed actions and failed landings. Experience has shown that adolescents and adults are more likely to perform high-risk actions. In trampoline parks the most frequent injury mechanisms are uncontrolled landings and misjudgement of one's own capabilities, resulting in both minor and more severe injuries.

For trampoline parks, potential risks can be reduced through construction (design, manufacture and installation) and operation (supervision, staff training, maintenance, instructions and continuous risk management etc.). Ongoing work to identify possible risks and injury scenarios is essential to ensure that all critical risks are mitigated and that all reasonable safety measures are established in the form of safety policies, safety procedures, safety information to users, staff education, etc.

This document aims to:

— reflect the range of trampoline park concepts found on the market, from parks for children to areas aimed at target groups with high gymnastic demands and prior knowledge;

— set a general framework for design and operating conditions;

— prevent accidents with a disabling or fatal consequence;

— not restrict the manufacturer's construction freedom;

— not to restrict the operator's operational freedom;

— allow and encourage innovation;

— provide a direction for future developments for existing and new trampoline parks.

The committee recognized that they had a duty of care to protect trampoline park users from hazards that may not be obvious to the user. With these factors in mind, the Committee agreed that the document should aim to provide requirements to minimize the hazards known to cause injury.

This document is the result of an extensive process with a large group of experts from 3 continents that was finalized under COVID-19 conditions. It has proven challenging to come to a document that allows for all cultural and legal differences, since around the world similar installations are operated differently. This document is hesitant to set requirements that limit or block nonconventional-but-safe methods of operation. In applying this document, the legal and social conventions of the country in which the trampoline park is operated should be followed.

Sports and recreational facilities — Trampoline parks — Safety requirements

1 Scope

This document specifies safety requirements for the design, construction, inspection and maintenance of trampoline parks and their components.

This document also specifies minimum operational requirements to ensure an appropriate level of safety and service when used for recreational, training or educational purposes.

This document is applicable to trampoline parks and trampoline park areas within multi activity parks. This also includes landing areas such as airbags and foam pits.

This document is intended for use by trampoline park manufacturers, installers, operators, inspectors and enforcement bodies.

This document does not cover:

a) general building regulations;

b) fire regulations;

c) planning regulations;

d) water testing;

e) food and drink provision;

f) non-trampoline activities e.g. artificial climbing, parkour, obstacle courses and miscellaneous future activities;

g) chemical composition of components;

h) outdoor trampoline parks;

i) equipment and procedures covered by the referenced documents listed in Clause 2;

j) general aspects of work safety.

2 Normative references

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

EN 913:2018+A1:2021, *Gymnastic equipment — General safety requirements and test methods*

EN 1176-1, *Playground equipment and surfacing — Part 1: General safety requirements and test methods*

EN 12503-1, *Sports mats — Part 1: Gymnastic mats, safety requirements*

EN 12503-2, *Sports mats — Part 2: Pole vault and high jump mats, safety requirements*

EN 13219:2008, *Gymnastics equipment — Trampolines — Functional and safety requirements, test methods*

EN 13814-1, *Safety of amusement rides and amusement devices – Part 1: Design and manufacture*

EN 14960-1, *Inflatable play equipment — Part 1: Safety requirements and test methods*

EN 15312:2007+A1:2010, *Free access multi-sports equipment — Requirements, including safety test methods*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 1421, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 1806, *Fishing nets — Determination of mesh breaking force of netting*

ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

3 Terms and definitions

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

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

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

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

3.1
trampoline park
venue with multiple *trampolines* (3.2) and/or trampoline courts

Note 1 to entry: Trampoline parks are offered both stand-alone and in conjunction with other (active) leisure activities.

3.2
trampoline
construction consisting of a frame, impact attenuation, trampoline bed and suspension system

3.3.1
park trampoline
fixed device that a user bounces on with a *performance index* (3.4) ≤ 95

3.3.2
performance trampoline
fixed device that has the potential of generating a greater height of rebound than a *park trampoline* (3.3.1) with a *performance index* (3.4) > 95

3.4
performance index
numeric value which describes the level of performance of a *trampoline* (3.2) in terms of achievable jump height

3.5
framework
structure to which trampoline components are attached

3.6
padding
material used to attenuate the effect of impact with a hard surface

3.7
suspension system
material used to provide bounce to a trampoline bed

EXAMPLE Springs, rubber cables etc.

3.8
suspension system protector
material used to assist in protecting the user from entrapment/contact with the *suspension system* (3.7)

3.9
feature
specific equipment or combination of equipment offered as an attraction

Note 1 to entry: Examples of typical features in a trampoline park: dodge ball court, basketball court, trampoline court, trampoline with dismount foam pit, park trampoline, performance trampoline, performance wall, jump-tower with airbag, etc.

3.10
dismount device
area of impact attenuation material into which a user shall actively jump from a piece of equipment

Note 1 to entry: Dismount devices can be, for example, air bags or foam pits.

3.11
walk-the-wall
wall used in combination with trampoline activity

3.12
air bag
inflatable installation that provides an area of protection capable of dissipating the kinetic energy of one or more persons simultaneous falling from not more than a specified height onto the specified landing zone

3.13
containment system
methods used to contain the *user* (3.24) and materials to a *feature* (3.9) in the park

Note 1 to entry: The containment system can be manufactured from a material such as netting, PVC or impact attenuation material designed to assist in preventing users and other projectiles from passing out of the activity area.

3.14
redundant barrier system
secondary safety measure under or behind a *trampoline* (3.1) that helps passively contain the *user(s)* (3.24) to minimize the *risk* (3.45) for the user in case of failure of the trampoline bed

3.15
mesh size
distance between two knots or connections of mesh rope, measured from the centre to the centre of these connections

3.16
activity area
specified zone within the trampoline park for physical activity

Note 1 to entry: There can be one or more activity areas in a trampoline park, for example: young children area, park trampoline area, performance trampoline area.

3.17
young children area
area that is designated by the *operator* (3.32) as an area specifically for children under 6 years of age either permanently or for specific *session(s)* (3.19)

3.18
non-trampoline activity area
zone within the trampoline park that contains devices for physical activity other than defined trampolines

3.19
session
allotted time period devoted to an event or *activity* (3.20)

Note 1 to entry: Examples of sessions: young children takeover, fitness classes, dodgeball tournaments, etc.

3.20
activity
pursuit that a user or a group of users does on one or more specific *features* (3.9)

Note 1 to entry: Examples of typical activities in a trampoline park: play dodgeball, play basketball, bounce on trampoline court, bounce from trampoline to foam pit, jump from platform to foam pit, bounce on performance trampoline, etc.

3.21
action
physical movement

Note 1 to entry: Examples of typical actions in a trampoline park: plain vertical bouncing, handspring, somersault, horizontal bouncing, etc.

3.22
horizontal bouncing
jumping-activity where the users' body centre line is parallel to the trampoline bed

Note 1 to entry: See Figure 1 which illustrates horizontal bouncing.

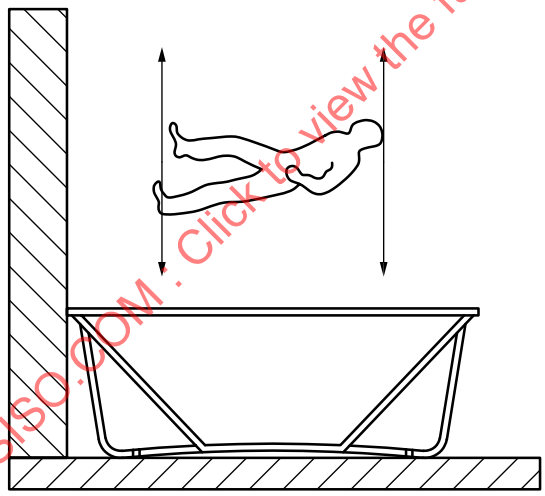


Figure 1 — Horizontal bouncing

3.23
vertical bouncing
jumping-activity where a user's body centre line is perpendicular to the trampoline bed

Note 1 to entry: See Figure 2 which illustrates vertical bouncing.

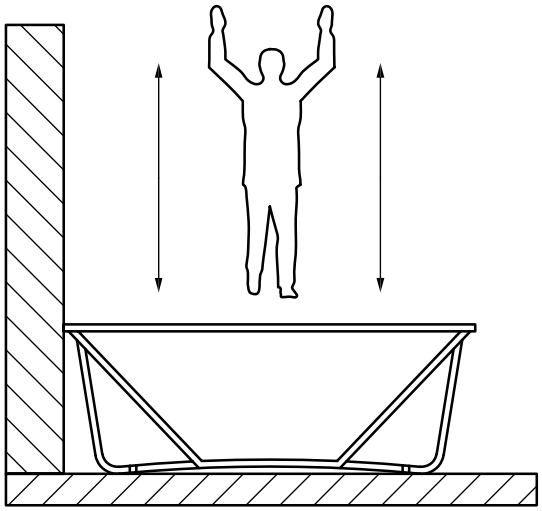


Figure 2 — Vertical bouncing

3.24
user
person taking part in *activities* (3.20) in a trampoline park

3.25
user group
subset of intended users who are differentiated from other intended users by factors such as age, culture or expertise that are likely to influence usability

[SOURCE: ISO/IEC 25062:2006, 4.7]

Note 1 to entry: Examples of user groups:

— persons within a certain age interval, e.g. young children;

— persons with a certain skill level;

— persons with certain disabilities;

— persons with certain physical/mental conditions;

— a visiting school class;

— participants in a birthday party session;

— participants in a company kickoff session;

— participants in a workout session.

3.26
young child
child below 6 years

3.27
accompanying person
individual who holds a higher duty of care for the child(ren) or vulnerable persons they are attending with

3.28
staff
persons who work for and within an organization

[SOURCE: ISO 29995:2021, 3.2.12]

3.29
supervisor
competent person (3.41) that has responsibility for managing the users in the trampoline park

Note 1 to entry: This includes e.g. interacting and taking action in case of risky behaviour.

3.30
supervision
management of and interaction with users for ensuring that the users follow the rules and safety instructions

3.31
supervision ratio
number of *supervisors* (see 3.29) to *users (x:y)* (3.24)

3.32
operator
person, entity or organization that is responsible for the maintenance/operation of a trampoline park

3.33
designer
person or company that sets out and engineers the trampoline park equipment and/or the layout of the trampoline park *activities* (3.20)

3.34
installer
person or company that erects the trampoline park

3.35
manufacturer
person or company that fabricates trampoline park equipment

3.36
as-built drawings
pack of drawings showing the as-built layout of the trampoline park allowing the *operator* (3.32) to readily identify any bed or other part, enabling spares or replacements to be ordered accurately

3.37
usage and maintenance manual
document provided by the *designer* (3.33) and/or *manufacturer* (3.35) on how to safely handle and operate the equipment

3.38
calculated trampoline bed height
total vertical trampoline bed deflection due to forces generated by a person with the maximum weight allowance given by the manufacturer and a dynamic factor of 3 (*park trampoline*, see 3.3.1) or 4,5 (*performance trampoline*, 3.3.2)

Note 1 to entry: Test procedure according to EN 13219:2008, 5.3.

3.39
free travel
space under the suspension in landing zones of foam pits free of any obstruction when in use

3.40
capacity
maximum number of users for which the (*activity area* (3.16) of the) trampoline park has been designed to accommodate

3.41
competent person
person who has acquired thorough training, qualifications or experience, or a combination of these, the knowledge and skills enabling that person to perform a specific task

3.42
inspector
competent person (3.41) or company who evaluates conformity to the requirements

3.43
emergency action plan
document that gives specific instructions on the actions taken by all employees in the event of an emergency

3.44
accident
event that occurs unexpectedly, suddenly and unintentionally and that damages something or injures someone

3.45
risk
likelihood and severity of hazardous events

Note 1 to entry: This is a simplification of the ISO Guide 73:2009 definition tailored to the safety field.

3.46
hazard
source of potential harm

[SOURCE: ISO Guide 73:2009, 3.5.1.4]

3.47
incident
event or occurrence, which can, but does not necessarily, create a risk of harm, including possible risks due to shearing, crushing, falling, impact, trapping, fire, electric shock, exposure to weather etc.

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

3.48
near miss
event which could have, but did not, lead to an injury

3.49
head injury criterion
measure of the severity of a head injury likely to arise from an impact

3.50
free height of fall
greatest vertical distance from the clearly intended body support to the impact area below

[SOURCE: EN 1176-1:2017, 3.7; modified: without the note]

3.51
critical fall height
maximum *free height of fall* (3.49) for which a surface will provide an acceptable level of impact attenuation

[SOURCE: EN 1176-1:2017, 3.31; modified: without the note]

3.52
risk assessment
overall process of risk identification, risk analysis and *risk evaluation* (3.53)

[SOURCE: ISO Guide 73:2009, 3.4.1]

3.53
risk evaluation
process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable

[SOURCE: ISO Guide 73:2009, 3.7.1]

3.54
risk reduction
process of identifying and implementing (a) control measure(s) that eliminate or reduce the likelihood of an incident occurring due to the identified hazard/hazardous situation and/or the potential severity of injury that could occur due to the identified hazard/hazardous situation, to a tolerable level

3.55
risk reporting
form of communication intended to inform particular internal or external stakeholders by providing information regarding the current state of risk and its management

[SOURCE: ISO Guide 73:2009, 3.8.2.3]

3.56
site-specific risk assessment
process of identifying hazards and associated risks in a given facility

3.57
risk management process
systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring and reviewing risk

[SOURCE: ISO Guide 73:2009, 3.1]

3.58
design risk assessment
documented evaluation of the *risk* (3.45) to users inherent in the activities, and measures incorporated in the design and manufacturing to mitigate the risk, including identification of any residual risk that the operator should address in its standard operating procedures and policies

3.59
site-specific risk management process
risk management process (3.57) applicable for a certain site/facility

3.60
risk identification
process of finding, recognizing and describing *risks* (3.45)

[SOURCE: ISO Guide 73:2009, 3.5.1]

4 Requirements of construction

4.1 General

NOTE 1 The designer, manufacturer, installer and operator of a trampoline park can be the same or different entities.

The designer and operator (to the extent that they are involved in the design of the trampoline park) shall be responsible for:

a) providing a layout that reduces the risk to users of the trampoline park;

b) undertaking a design risk assessment of the layout of the trampoline park;

c) risk reduction by choice of design specification; and

d) identifying any residual risks to users of the trampoline park that have not been designed out through the design specification.

Additionally, the manufacturer, designer and operator may take environmental aspects into consideration (see Annex C).

Whenever there is playing field equipment or other sports equipment used in conjunction with trampolines, the relevant international or national standard shall be considered.

The designer shall design the trampoline park in a way that activity areas can be supervised in line with Clause 5.

NOTE 2 The designer and manufacturer are not responsible for designing out all potential risks to users from undertaking trampoline park activities.

4.2 Usage and maintenance manual

The manufacturer shall ensure that a usage and maintenance (U&M) manual for all equipment delivered is available for the operator.

The manufacturer shall provide a U&M manual with the trampoline park equipment in an appropriate language, agreed by both parties.

The U&M manual shall include the following details, as a minimum:

a) capacity – maximum number of users, excluding employees and spectators, for which the trampoline park or an area of the park has been designed to accommodate in accordance with 4.11;

b) number – people per trampoline bed;

c) range of user weight;

d) usage instructions on how to use the trampoline park equipment in a proper way;

e) repairs, replacements and maintenance – information on how to undertake repairs and maintenance that can be completed by the operator;

f) opening checks – details of the checks to be carried out before each day's sessions in the trampoline park in accordance with 5.11.2 b);

g) periodic maintenance – details of maintenance inspections and checks that the manufacturer recommends the operator carries out on a regular basis and their suggested frequency;

h) annual inspection – details of what the manufacturer recommends to be inspected;

i) design risk assessment (see 3.57) – a copy of the design risk assessment highlighting the designer's and manufacturer's assessment of the risk to users (see 5.5);

j) as-built drawings (see 3.36) which shall include falling space and impact area and respective dimension;

k) all safety-relevant information from the certifier of the park equipment (e.g. airbag, trampoline) for the operator;

l) information on cleanliness and hygiene routines (see 5.10).

4.3 Trampoline and bouncing facilities

All trampolines shall be classified as either a performance trampoline or a park trampoline using the performance index test method described within Annex E.

Trampolines complying with EN 13219 or FIG Apparatus Norms shall be deemed performance trampolines.

All other trampolines, which the rules do not apply to shall be specified explicitly by the manufacturer as park or performance trampoline.

Upon request, the manufacturer shall provide results of the performance index test according to Annex E for a trampoline to proof their suitability for classification as either a performance trampoline or a park trampoline, in accordance with Table 1.

The space beneath all trampoline beds of the different trampoline types shall be free of any obstacle or obstruction.

NOTE The redundant barrier system is exempt from this requirement.

Table 1 — Performance index for the categorization of trampolines

Category	Performance Index
Performance trampoline	≥ 95
Park trampoline	< 95
Bouncing facilities, according to EN 1176-1	—

4.4 Park trampolines

4.4.1 Heights

The minimum park trampoline bed height shall be the calculated trampoline bed height plus 170 mm above any obstruction. For accessibility the minimum trampoline bed height shall be 864 mm above the floor.

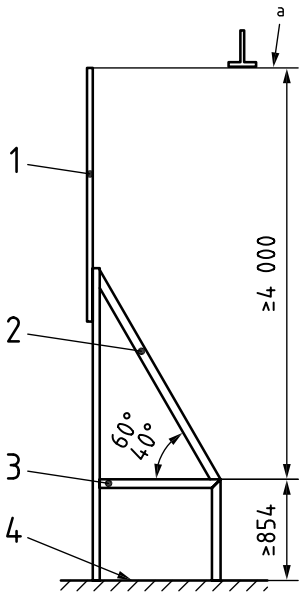
For designs where structural elements are required between the trampoline bed (e.g. braces for trampoline tracks) these elements shall be covered with an impact attenuating surface suited for a fall height of 1 500 mm when tested according to Annex D. A minimum clearance of 80 mm between the trampoline bed and the impact attenuating surface during proof loading condition shall be achieved.

The manufacturer shall provide results of a test procedure according to EN 13219:2008, 5.3 for each trampoline upon request by the operator.

The underside of a park trampoline shall be easily accessible for cleaning, inspection and maintenance.

The lowest solid obstruction in the roof or ceiling structure of the building shall be 4 000 mm above horizontal trampoline beds or greater height as required by the manufacturer's design risk assessment. The top of the free height is considered equal to the top of the containment netting.

Dimensions in millimetres



Key

1 containment netting
2 angled trampoline
3 trampoline bed
4 floor
[a] Lowest obstacle in the roof space.

Figure 3 — Park trampoline height

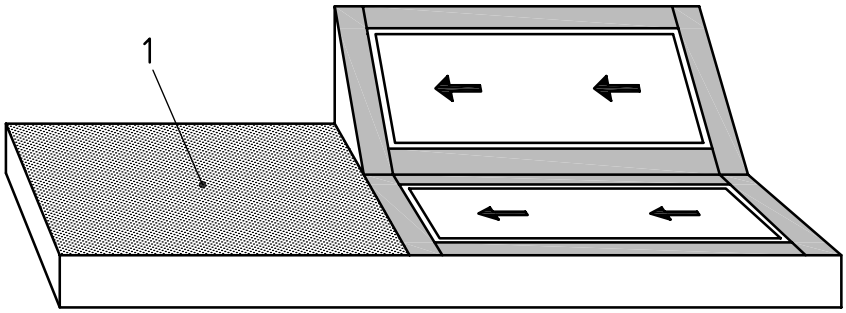
The length and width of any horizontal trampoline beds shall be determined by the designer and/or manufacturer.

Three types of angled trampolines are recognised:

— Type 1: "Angled trampolines" at the perimeter or within a jumping area shall be angled between 45° and 60° to the horizontal (see Figure 3).

— Type 2: "Small angled trampolines" for dismount into a foam pit or airbag shall be angled downwards in the direction of movement with an angle of maximum 16°. The trampoline shall be small enough to allow for only 1 jump.

— Type 3: "Large angled trampolines" for dismount into a foam pit or airbag (see Figure 4) shall be angled between 45° and 60° to the horizontal. The foam pit or airbag must extend behind the angled trampoline. Special attention must be given to preventing contact with the frame by users at the edges of the trampoline bed.



Key

1 foam pit

Figure 4 — A type 3 angled trampoline

Any fixed object higher than 1 200 mm within a jumping area (rather than forming its perimeter) shall have a horizontal cross section no larger than 800 mm × 800 mm so as not to create a visual barrier with preventing users from seeing other users on the other side of that object.

Rest areas or any other device from which a user can dismount onto a park trampoline shall be max. 1 200 mm above horizontal frame, padded according to attenuation materials as specified in this practice.

4.4.2 Framework construction

4.4.2.1 Design

The designer shall specify a trampoline equipment framework that is sufficiently strong to withstand the activities taking place. The strength shall be proven with calculation in accordance with 6.2.

The designer shall design the framework so that no part of the frame or legs can be contacted by the user whilst bouncing.

The designer shall design the framework in accordance with an applicable standard for the material from which the framework has been manufactured.

The designer shall design the framework to accommodate the highest load resulting from calculations. These calculations may include (but are not limited to):

a) the tension of trampoline bed and springs;

b) maximum user weight × (max. jump height + 1 000 mm);

c) overload conditions based on 3 users of the maximum permissible user weight for every square meter of trampoline bed.

The construction shall be able to withstand the highest load resulting from calculations.

NOTE When a user transitions from vertical bouncing to horizontal bouncing the effective fall height is increased by the distance between feet and centre point of gravity. To incorporate this increase in impact energy 1 000 mm is added to the jump height.

4.4.2.2 Stability

The minimum subfloor construction shall be identified in the design risk assessment to ensure that the floor is suitable for the intended use.

The frame shall be sufficiently designed or secured to the floor to ensure the frame doesn't get damaged and causes no damage while being used.

The trampoline park equipment shall be stable, e.g. by securing to the floor of the trampoline park using fixings selected by the designer or manufacturer to suit the sub-floor construction.

The stability shall be sufficient to ensure the framework does not get displaced during anticipated use of the trampoline park.

Test in accordance with 6.1.

4.4.3 Trampoline beds

Trampolines shall be installed with a redundant barrier system to mitigate risks in case of failure.

Springs shall be inaccessible to users.

A suspension system protector shall be in place to mitigate the risk of user entrapment.

The safe jumping area shall be clearly recognizable to users. The difference between the safe and the unsafe jumping zone shall be marked with contrasting colours.

4.4.4 Framework padding

The impact area shall be padded with an impact attenuation material designed for a critical fall height of 1 500 mm. Test in accordance with Annex D. The extent of the impact area is 1 500 mm (horizontal) around a trampoline bed measured from the edge of a trampoline bed if accessible by the user.

The extent of the falling space shall be at least 1 500 mm (horizontal) around a trampoline bed and 2 400 mm (vertical). All objects within the falling space shall be padded, if accessible by the user.

The trampoline jumping bed shall be provided in a clearly perceptible contrast to the surrounding padding.

The padding shall be secured such to ensure the functionality to the trampoline framework or trampoline beds.

The padding shall be dimensionally stable and firmly secured to the trampoline framework.

If the impact absorbing materials consist of modular elements, the sections shall be securely connected together or the gaps shall be covered so that it is impossible for the user to enter into the gaps between modular elements according to EN 12572-2.

4.4.5 Layout

For trampoline courts, tumbling lanes etc., free and falling surfaces of at least 1 500 mm shall be provided on all sides of the trampoline or be padded appropriately (see 4.4.4).

The layout of the trampoline park shall be designed to avoid any obstructions located within or adjacent to jumping areas where possible. If obstructions are unavoidable, risks shall be reduced in accordance with the requirements in this document.

Consideration should be given in the design process to the provision of netting to prevent balls travelling from one activity zone to another.

Where any hard immovable obstructions, other than a walk-the-wall feature such as columns, fall within a jumping area then, subject to the operator's risk assessment (see 5.1), these obstructions shall be surrounded by a raised padded rest area and the obstruction shall be padded to a height of at least 2 400 mm above the level of the rest area.

4.4.6 Trip hazards

All surfaces shall be designed and installed to avoid or minimise trip hazards. The use of contrasting colours is encouraged. When installed properly impact attenuation is considered an acceptable trip hazard.

4.5 Performance trampolines and wall trampolines

4.5.1 General

Performance trampolines shall be located in a separate area so that it is clear to users that the performance trampolines are different to the park trampolines. The trampoline bed of a performance trampoline should be of a different colour to that of a park trampoline. Special attention is needed for all features with performance trampolines.

It shall not be possible to jump between park trampolines and performance trampolines.

NOTE 1 Performance trampolines can be located with one or more of their edges located adjacent to a walk-the-wall feature.

NOTE 2 Transition between park and performance trampolines can be prevented by not allowing overlap of falling areas or by placing a fence of sufficient height.

Trampolines that have a trampoline bed smaller than 1 800 mm (length or width) shall not be used for a walk-the-wall feature.

Park trampolines shall not be used for a walk-the-wall feature if the wall is higher than 1 200 mm.

There shall be no obstacle (such as balustrade or steps), other than the walk-the-wall feature and its' associated balustrade, within the falling space of a performance trampoline or wall trampoline. The extent of the falling space is 2 000 mm (horizontal) around any accessible side of a performance or wall trampoline. The vertical extend of the falling space shall be specified by the manufacturer of the performance or wall trampoline bed.

NOTE 3 For further information see FIG Apparatus Norms [NR1].

Signage of the performance trampolines shall describe to users the competence requirements and that the trampoline has a greater rebound potential.

4.5.2 Heights

4.5.2.1 Performance trampolines for vertical bouncing

The minimum performance trampoline bed height shall be the calculated trampoline bed height plus 230 mm above any obstruction. For accessibility and safety of the user the minimum performance trampoline bed height shall be 1 150 mm above the floor.

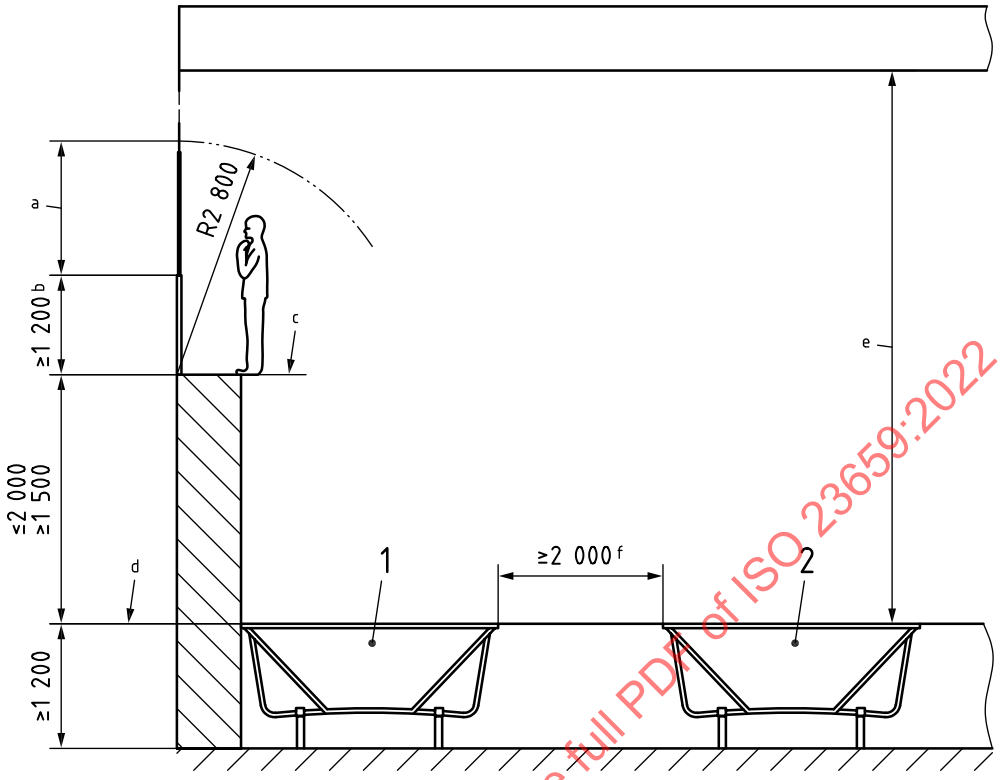
The manufacturer shall provide results of a test procedure according to EN 13219:2008, 5.3 for each trampoline upon request.

The lowest solid obstruction in the roof or ceiling structure of the building shall be 6 000 mm above horizontal trampoline beds or greater height as required by the manufacturer's design risk assessment. A risk assessment can be used to justify lower ceiling heights.

4.5.2.2 Performance trampolines for horizontal bouncing

See Figure 5 for an illustration of performance trampoline heights.

Dimensions in millimetres



Key

1 trampoline for horizontal bouncing

2 trampoline for vertical bouncing

a Containment netting.

b Solid barrier e.g. balustrade/wall.

c Wall height (variable).

d Trampoline height.

e Clearance to lowest obstacle in roof space, min. 6 000 mm.

Figure 5 — Vertical clearance for performance trampolines

Performance trampolines positioned adjacent to a walk-the-wall feature and used exclusively for horizontal bouncing shall be positioned so that the trampoline bed is a minimum of 1 200 mm above the floor.

The horizontal top surface of the walk-the-wall feature shall be a minimum of 600 mm wide and its height shall be between 1 500 mm and 2 000 mm above the level of the trampoline bed. Walk-the-wall features between 2 000 mm and 3 000 mm are allowed, but shall only be accessible by using the trampoline. Walk-the-wall features without platforms are excluded from this requirement.

NOTE This is to ensure that all users using this wall are capable of using the trampoline up to this height.

EXAMPLE The walk-the-wall feature might not be one height over part of the length of a trampoline and a different height over the other part of the length, but the height of the walk-the-wall feature over the length of a trampoline may be different to the height of a perpendicular walk-the-wall feature over the width of that same trampoline.

Vertical padding is not required.

Any unprotected obstacle shall be a minimum clear height of 2 800 mm above the top of the walk-the-wall feature.

Roofs that are lower than the above shall show compensation in padding or specific instructions.

A containment system shall be designed so the user cannot fall off the non-activity side of the wall.

A wall construction shall be designed or operated to avoid collision between users.

4.5.3 Padding

Frames and springs to all performance trampolines shall be padded in accordance with the corresponding fall height as listed by the supplier. Impact attenuation characteristics shall at least be in accordance with Annex D and/or FIG Apparatus Norms.

The impact area shall be padded with an impact attenuation material designed for a critical fall height of 3 000 mm.

The extent of the impact area is 2 000 mm (horizontal) around a trampoline bed measured from the edge of a performance or wall trampoline bed.

NOTE 200 mm thick gymnastics landing matting in accordance with FIG Apparatus Norms [NR1] are commonly used.

4.5.4 Walk-the-wall

The face of the walk-the-wall feature may be manufactured from a smooth or textured timber or laminate surface or it can be padded with an impact attenuation material that does not impede on the usability as a walk-the-wall feature.

The top of the walk-the-wall feature lower than 2 000 mm shall be padded with an impact attenuation material. Impact with the edge of the top surface shall be prevented, e.g. by making the impact attenuation material has a 20 mm overhang.

Park trampolines shall not be used for a walk-the-wall feature if the wall is higher than 1 200 mm.

4.6 Dismount devices

4.6.1 General

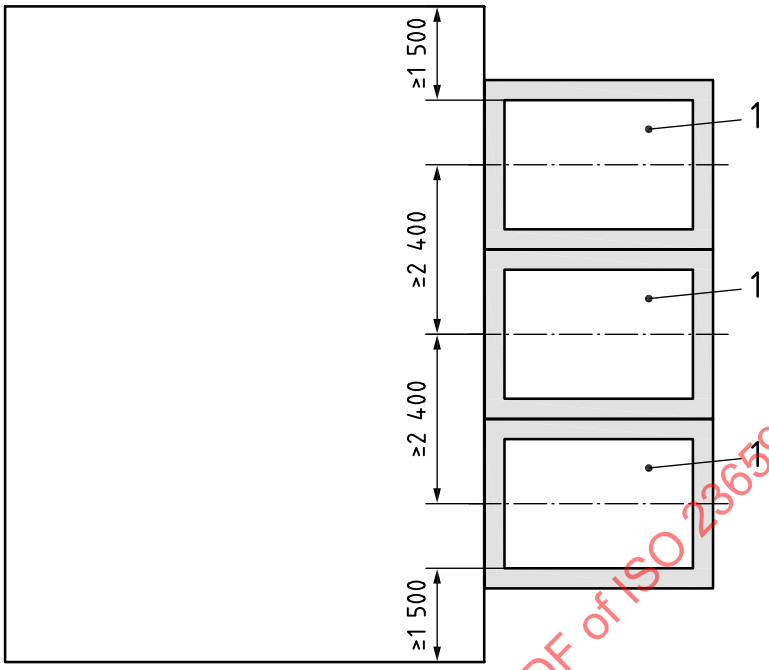
When dismounting from a park or performance trampoline or a jump tower into a dismount device (e.g. dismount pits and airbag devices) there is a risk that the user does not reach the dismount device or lands in the dismount device but rotates backwards which risks the user's head hitting the front edge of the trampoline.

The landings, as specified by the manufacturer that are permitted shall be clearly signed in the dismount device area.

Both sides and the end of a dismount device shall incorporate edge padding using an impact attenuation material to cushion a user if they strike the edge of the surrounding platform on exit. The padding shall fulfil parameters of a falling height of 2 000 mm (head injury criterion value 1 000 and/or g_{max} 200).

There shall be no overlap in landing zones in dismount devices. See Figure 6 and Figure 7:

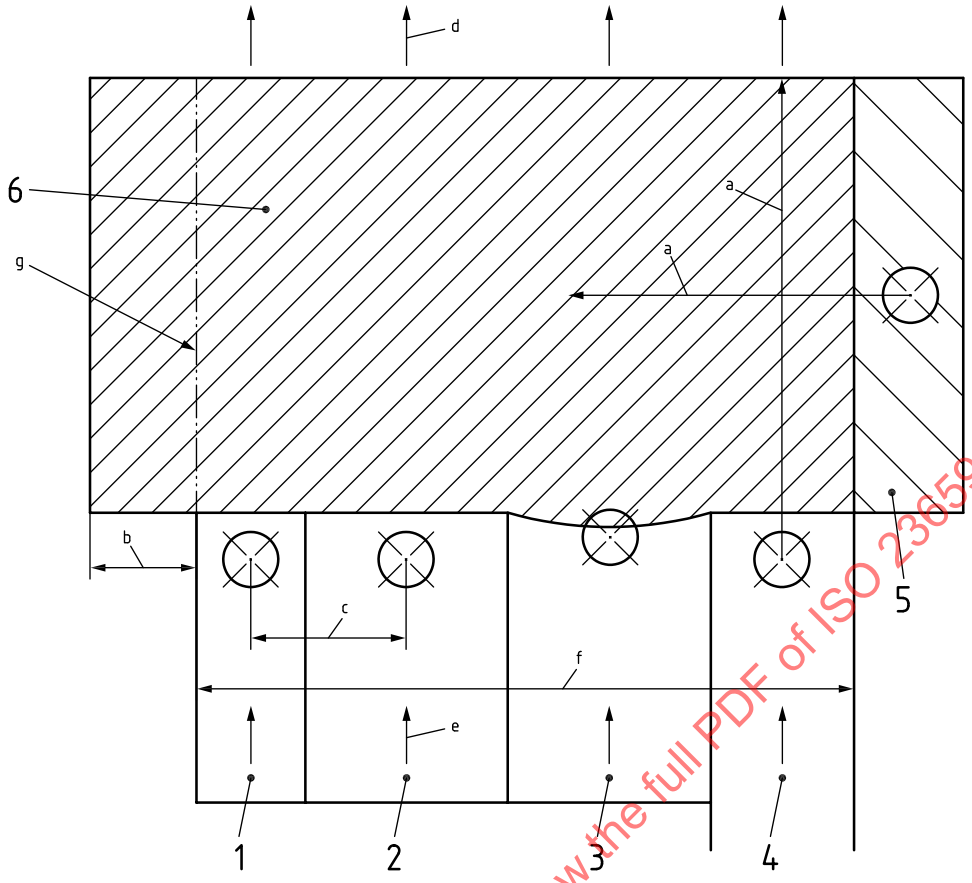
Dimensions in millimetres



Key

1 trampoline bed

Figure 6 — Landing zones in dismount devices



Key

1 run and jump
2 performance trampoline
3 waterfall trampoline
4 long tumbling trampoline
5 angled wall trampoline
6 dismount pit area
a Dimension of pit, > 6 000 mm in direction of travel from any entry point.
b Distance from trampoline bed, > 1 200 mm (if b < 1 200 mm user containment e.g. padded wall is required).
c Distance between center of adjacent entry points, > 2 400 mm.
d Preferred direction of egress.
e Direction of travel.
f Range of dismount activities.
g Edge of dismount activities.

Figure 7 — Detailed landing zones

EXAMPLE It is not permissible to enter one pit from the front and the back, unless the activity is segregated by containment netting, or dimensions are such that no overlap occurs.

Any entry point to a dismount device (park trampoline, jump platform or other) shall only permit entry as well as landing in one direction (i.e. there should not be a dismount device at both ends of one park trampoline).

It shall be clear for users how to leave the dismount device (see Figure 7). The exit route for a user shall not cross the entry route for any other user.

4.6.2 Dismount device foam pit

NOTE Dismount device foam pits have a high risk of serious injury. It is determined that there are many factors that influence the safety level of a foam pit, e.g. dimensions, depth, foam block shape and material, user age & weight, user experience, usage type, safety instructions, applied rules, maintenance, supervision, etc.

The following risks are associated with trampoline park dismount foam pits, and shall be considered in design:

— bottoming out (shall be prevented);

— risk perception by users (e.g. overestimation of skills and / or foam pit safety level);

— fire, including prevention and evacuation;

— suffocation/overheating (e.g. small children);

— cross traffic during entry and exit;

— entry from height;

— use of hazardous materials and chemicals;

— foam pit block dust;

— foam block shape, size, amount and characteristics;

— all possible landing positions;

— evacuation in case of injury (e.g. in case of spinal injuries);

— shifting impact attenuating characteristics (these should remain within bounds during daily use and for the lifetime of the foam pit, e.g. compacting, displacement of blocks from the landing zone to the sides, block ageing, etc.).

The following requirements have proven in practice that non-adherence will invariably lead to foam pits with insufficient safety levels:

— no risk of contact with hard parts in, around or under the foam pit;

— impact attenuating materials shall be suited for the expected fall height/impact;

— permitted landing positions shall be available to users, e.g. signage;

— head or shoulders first landings shall not be permitted under any circumstance;

— minimum foam pit length is 5 850 mm in the indicated direction of travel;

— minimum landing zone width per entry of 2 400 mm;

— minimum distance between foam pit side edge and the entry side edge of 1 500 mm;

— during operations foam pits shall be maintained and monitored for compaction in line with manufacturers recommendations;

— there shall be an impact attenuating system between foam pit suspension and floor and/or hard obstacles (e.g. a layer of foam). It is recommended to use a foam layer on the bottom of the foam pit with a height of approximate 50 mm with a relative density of 30. The type of foam should be a closed cell foam;

— there shall be adequate and hazard-based supervision, see Clause 5.

Foam pits should never use dimensions smaller than mentioned below (see Figure 8).

— Foam blocks shall be suspended (e.g. by a trampoline) at least 600 mm above the floor at the foam pit suspension mounts. Suspension must allow for at least 350 mm of free travel in landing zones. In case of using a foam layer on the bottom of the pit, the foam shall not impede on the free travel distance. Optional blocks of appropriate material located outside of landing zones may be installed on the bottom of the pit to support the suspension (see Figure 8).

— There shall be at least 1 000 mm of foam blocks when it concerns a park trampoline dismount foam pit combination.

— There shall be at least 1 200 mm of foam blocks when it concerns a performance trampoline dismount foam pit combination.

— Total foam pit depth shall never be less than 1 600 mm when it concerns a park trampoline dismount foam pit combination.

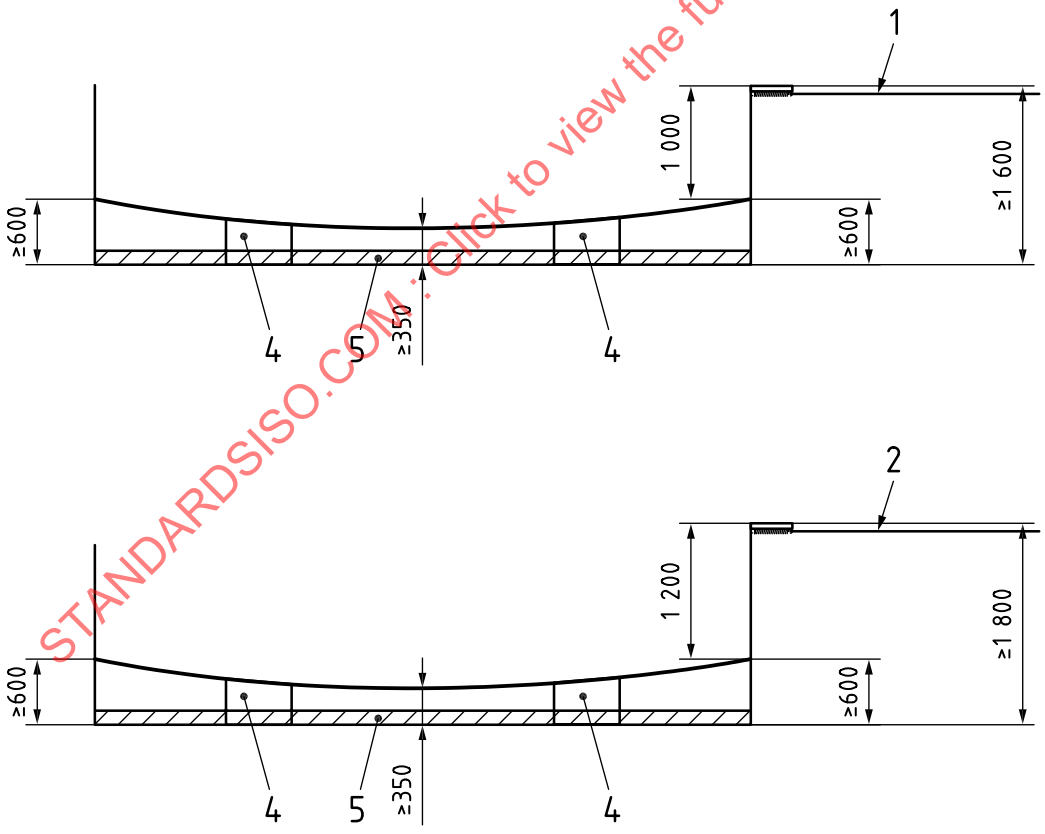
— Total foam pit depth shall never be less than 1 800 mm when it concerns a performance trampoline dismount foam pit combination.

For characteristics that are not specified in the above, foam pits shall achieve a safety level comparable to airbags. See 4.6.4.

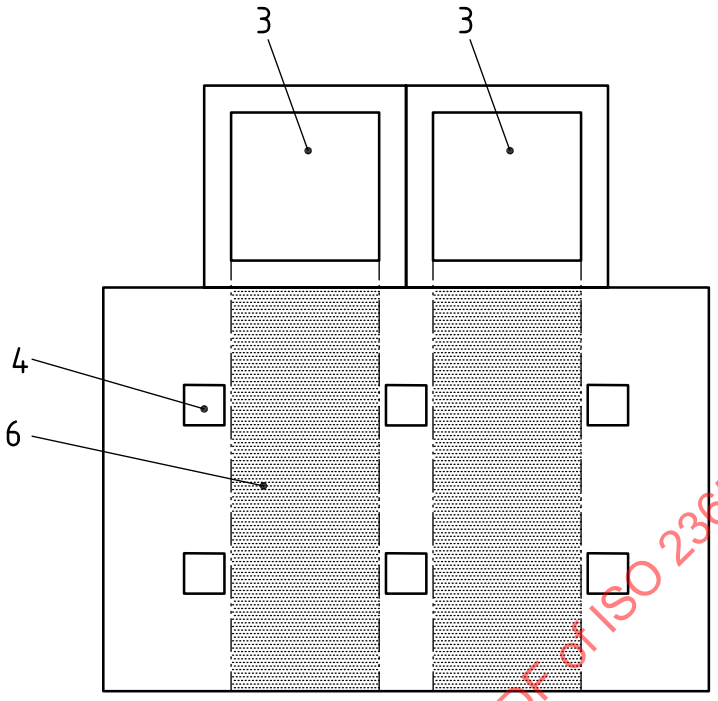
Dimensions in millimetres

a)

b)



c)



Key

1 park trampoline
2 performance trampoline
3 trampoline bed
4 optional block
5 optional layer of foam
6 landing zone

Figure 8 — Dismount device foam pit

If the foam pit is surrounded at its edge by any combination of angled trampoline walls, smooth walls or containment netting (no hold) then the side edge of the foam pit can align with the side edge of the trampoline leading into the foam pit without the need for an additional gap between the side edge of the trampoline and the side edge of the foam pit.

4.6.3 Resi-pit

Resi-pits shall be in accordance with EN 12503-1.

NOTE 1 A resi-pit system incorporates large safety mattresses [thick foam mats (resi-mats) with a PVC or similar cover].

Resi-pits shall not be used for landing on from a park or performance trampoline or a platform.

NOTE 2 The foam within the resi-mats can incorporate air gaps to soften the landing.

NOTE 3 Resi-pits are designed for falling onto from low level activities (typically no more than 1 000 mm) rather than dismounting into and can therefore safely be less deep than other types of dismount devices.

4.6.4 Dismount device air bag

4.6.4.1 General

NOTE 1 Dismount airbags can lead to serious injury when used improperly (see also the Note within 4.6.2)

The following residual risks are associated with trampoline park dismount airbags, and shall be considered in design and/or operation:

— risk perception by users (e.g. overestimation of skills and/or airbag safety level);

— cross traffic during entry and exit;

— entry from height;

— all possible landing positions;

— evacuation in case of injury (e.g. in case of spinal injuries);

— improper pressure in relation to user weight;

— fire, including prevention and evacuation.

Airbag supplier shall be able to provide test data to support the safe fall height and weight levels, tested according to EN 12503-2 and EN 14960-1.

Air bag devices designed for dismounting into shall have a height of at least 1 200 mm.

Air bag devices designed for dismounting into from a park trampoline shall be suited for a fall height of 3 500 mm.

Air bag devices designed for dismounting into shall be suited for the corresponding fall height as stated by the manufacturer of the means of entry +2 000 mm. Both horizontal and vertical momentum shall be taken into account when assessing the suitability of the airbag.

NOTE 2 1 000 mm is added as safety for the increased travel of the centre point of gravity when going from standing to laying down position or seated landing. Another 1 000 mm is added as a redundancy against bottoming out.

The air bag device shall be prepared in accordance with the requirements of the manufacturer of the air bag.

An airbag shall have a pressure gauge for daily inspection of the pressure.

An airbag shall have an internal pressure measurement for constant inspection of the pressure when in use. There should be the possibility to set a minimum and maximum pressure level to 10 PA (0,1 mbar).

An airbag shall be equipped with both a visual and audible alarm that goes off in case of loss of pressure in the airbag below the set minimum pressure level. The alarm should have an internal battery to keep working during an electrical malfunction.

Special care should be given to ensure the alarm signals are effective in busy and noisy situations.

If the airbag is deflated there is risk of a fall from height. This shall be covered in the site-specific risk assessment (see 5.1). Adequate measures shall be taken, e.g. fall protection or impact absorbing materials. Measures should take into account the dismount facilities. Impact attenuating materials suited for the fall of height may be used when the height of fall from a dismount facility is less than 3 000 mm to the floor surface. When the height of fall from a dismount facility is more than 3 000 mm to the floor surface usage of the dismount facility shall be made physically impossible; supervision is not an acceptable measure to prevent use.

4.6.4.2 Perimeter skirting

Inflatable impact attenuation systems shall be designed so that users cannot readily access space between the airbag and adjacent inflatable impact attenuation systems or constructions.

4.6.4.3 Anchoring

Inflatable impact attenuation systems shall incorporate an anchoring system to minimize displacement during operation.

The anchoring system shall conform with manufacturer's instructions.

Anchoring systems for inflatable impact attenuation systems shall be fixed to stationary objects, and installed or weighted in accordance with the manufacturer’s recommendations.

4.6.4.4 Airbag inner construction

4.6.4.4.1 General

An airbag should have a constantly inflated base chamber (the minimum air pressure inside the chamber shall conform to manufacturer's requirements) to absorb a user's impact and allow for simultaneous jumping from several jump lanes without a catapulting effect. To do so the pressure inside the airbag after the first jump shall remain above the minimum pressure level as advised by the supplier.

Pressure should be checked either regularly or continuously, including clear signalling for users before they enter the airbag if the airbag is not ready for use.

The airbag pressure should be measured directly. It is not sufficient to supervise the power supply.

An airbag system should have a base chamber and a top layer with air pillars and/or columns for all activities that result in a fall height of 1 000 mm or more.

The diagonal space between 4 columns shall not be greater than 400 mm to absorb a user's impact and allow for simultaneous jumping from several jump lanes without a catapulting effect. The distance between 2 adjacent columns shall not be greater than 150 mm.

4.6.4.4.2 Airbag fabrics

Fabrics, and joints in fabrics, shall be of adequate tear and tensile strength for the weight of the intended user and have sufficient air retention to enable the inflatable, when pressurized to the level specified in the operations manual, to resume its shape after distortion under load.

Fabrics of:

a) minimum tear strength 300 N (proof to be provided by the manufacturer);

b) minimum tensile strength 2 000 N (according to ISO 1421); and

c) minimum coating adhesion 100 N (according to ISO 2411),

shall be used in those structural parts of the inflatable where force or stress is applied by the user.

The top sheets of airbag shall be made from a low abrasion material.

4.6.4.4.3 Thread

Threads shall be non-rotting yarn and shall have tensile strength of at least 88 N. Stitching shall be lock-stitch. The length of individual stitches shall be a minimum of 3 mm and a maximum of 8 mm.

4.6.4.5 Blowers

The blower, including cabling and controls, shall not be readily accessible to the public.

4.6.5 Dimensions for dismount devices

Dismount devices with access from park trampolines and trampoline tracks with a maximum length of 4 000 mm shall have at least the dimensions as mentioned in the next paragraph (see also Figure 7).

For dismount devices with access from trampolines that allow for dismounts with higher energy (performance trampolines, longer trampoline tracks, etc.) these dimensions shall be increased based on the increased variation in landing situations due to the higher energy:

1. pits for challenge elements with likely horizontal displacement (e.g. slackline, battle beam, etc.) shall have a width of at least 3 000 mm on both sides;

2. pits for challenge elements with unlikely horizontal displacement (e.g. rope, twistladder, etc.) shall have a width of at least 1 500 mm on both sides.

When 2 or more elements are combined, an overlap of 1 000 mm is allowed (e.g. combination of 2 elements type 1 requires a distance of 5 000 mm, a combination of type 1 and 2 requires a distance of 3 500 mm, 2 type 2 elements require a distance of 2 000 mm).

Both types of elements shall have a maximum height of 3 000 mm.

NOTE Given that the dismount devices and airbag areas are supervised when in use they do not need to be so large as to accommodate all theoretical landing situations from users misusing the area by trying to jump over the pit and reach the end.

Dismount devices should be large enough to accommodate landing situations from skilled users who make a mistake in their directional placement (e.g. an over rotated back handspring).

Dimensions for dismount devices shall be at least:

a) length – from edge of trampoline bed to internal face of pit wall 6 000 mm;

b) width – as wide as is necessary to accommodate all the entry points plus at least 1 500 mm run-off at both sides, or a soft wall or containment netting that guides users to the dismount device. When an edge remains between the wall/containment netting and dismount device there shall be an added padding that guides users to the safe landing zone;

c) regular linear movements (park trampolines with limited length, platforms, etc.) shall have at least 2 400 mm between centre lines. Non regular movements (performance trampolines, trampolines angled perpendicular on the direction of movement, etc.) shall have an increased width based on the landing situations; and

d) depth – see 4.6.2 (foam pits) and 4.6.4 (air bags).

Dismount device and airbag sizes shall be determined based on accommodating normal activity with a safety margin.

Dismount device and airbag dimensions should be adjusted to take account of the following variables:

i) The type of entry points may change how long or how wide a dismount device or airbag should be designed:

   1) angled trampolines that project the user into the pit might require a longer and/or wider pit than a similar size horizontal trampoline;

   2) trampolines with run-ups may require longer pits than trampolines without run-ups as the former allows users to project themselves further into the pit or airbag; and

   3) longer tracks dismounting into a pit can result in users undertaking tumbling moves which would need a longer dismount device or airbag than otherwise.

ii) Dismount devices from performance trampolines might need to be longer and wider to accommodate the risk that a user bounces higher and potentially cast further to the side.

iii) Dismount devices from ceiling-suspended items such as a trapeze might need to be larger if the user can swing and project them further. Foreseeable user mistakes (such as releasing the trapeze at the wrong moment) should be taken into account.

iv) The user group: pits and airbags accessible only to younger children such as foam pits for toddlers to scramble in might be shorter and less deep than ones accessible to older users.

v) The activities taking place:

1) dismount devices for dismounting into would generally need to be longer than dismount devices for falling onto; or

2) dismount devices under battle beams or similar activities should accommodate the anticipated angle of fall of users;

3) the distance between activities, to accommodate safe landing zones or overlapping activities.

4.6.6 Dismount devices for jump platforms

If there are multiple means of access into the dismount device the fall height shall not exceed 2 000 mm.

The maximum jump height shall not be more than 2 000 mm above the level of the surface of the pit/air bag if no lower alternative jump platform of lower than 1 500 mm exists.

Jump platforms higher than 2 000 mm shall only be allowed if specific calculations/permits are supplied by the manufacturer and users instructed in accordance with manufacturer's instructions by a competent person.

NOTE Additional operational safety measures can be incorporated when drop height is more than 2 000 mm, e.g. a physical barrier that is only opened when a supervisor is present on the platform.

4.7 Sports equipment used in combination with trampolines

4.7.1 General

Any sports equipment shall be free of entrapment and collision risks up to a height of 2 400 mm. Acrobatic moves (e.g. flips) are prohibited on trampolines containing or adjacent to sports equipment. If any loose objects are used (e.g. balls) these should not pose risks for spraining when landed upon (e.g. use balls manufactured from a soft material).

4.7.2 Basketball

4.7.2.1 General

NOTE Trampoline parks can incorporate basketball lanes which are park trampolines with basketball backboards and rings at the end of the lane.

Stability of the steel construction shall be in accordance with EN 15312:2007+A1:2010, 5.2.1.4 in the play area the steel construction shall be padded.

See EN 15312:2007+A1:2010, 6.2, for special test methods for basketball equipment.

4.7.2.2 Frames and backboards

The frame and the lower edge and the side edges of basketball goals shall have rounded corners and shall be padded to a minimum height of 2 400 mm above the trampoline bed.

4.7.2.3 Basketball rings

The rings of basketball goals shall not pose risks (e.g. entrapment, unrounded edges) to users.

The rings of basketball goals shall be padded and hookless and shall not incorporate basketball netting, unless it is of a no-hold nature, in accordance with EN 15312.

NOTE 1 Basketball rings are not designed to be hung or swung from by users.

NOTE 2 Since users are aiming for the hoop, the hoop itself does need to be padded.

There shall be no padding or framework in the landing area below the basketball hoop.

NOTE 3 This to prevent spraining while landing.

4.8 Miscellaneous paddings

NOTE 1 Padding can give users some protection from impacts with hard obstacles around the trampoline park. Padding does not render the user safe from injury in the event of an impact, but it reduces the likely severity of injury.

All hard surfaces (floors, walls) and objects within 1 500 mm of a park trampoline bed shall be padded in accordance with Annex D. The distance shall be measured from the inner edge of the padding of the trampoline.

NOTE 2 The walk-the-wall feature is excluded from this requirement.

The padding shall be an impact absorbing material adapted to accept a fall from the joining trampolines. The most common impact absorbing materials are foam safety mats. When tested according to Annex D the critical falls height shall be not less than 1 500 mm. For other types of material such as rubber, vinyl etc. relevant standards for the selected material should be followed where applicable.

Any wall or similar obstacle that is within 1 500 mm of an area where trampolines can be dismounted shall be padded.

Any wall immediately adjacent to a horizontal park trampoline shall be padded.

4.9 Containment system

4.9.1 General

The top of any perimeter angled trampoline shall incorporate containment netting such that the top of the barrier is at least 4 000 mm above the level of surrounding horizontal trampolines.

The containment system shall be secured to the top of the angled trampoline framework.

If an angled trampoline is adjacent to or within 100 mm of a wall that extends at least 2 000 mm above the top of the angled trampoline then the containment netting shall not be required.

Nets shall fulfil the following load requirement:

— 1 000 N minimum for mesh breaking strength (tested in accordance with ISO 1806).

NOTE For additional information see EN 15312

Other materials such as full-surface tarpaulins shall have an initial tear resistance of at least 2 000 N/50 mm.

Nets shall be arranged so that

— the chance of flying objects reaching neighbouring areas is minimised (e.g. dodgeball and basketball);

— users cannot fall unintentionally (at positions not intended to jump off);

— they cushion persons and objects safely.

4.9.2 Safety requirements

Supporting structures shall be dimensioned in a way, that they stay dimensionally stable with the weight of the nets and relating loads.

4.10 Protection against entrapment

4.10.1 General

When choosing materials, the manufacturer shall take into account the entrapment hazards that can occur through distortion of materials during use.

NOTE Test methods for entrapments are given in 6.5.

Openings shall have no parts that converge in the downward direction at an angle of less than 60°.

4.10.2 Netting

One of the two options shall be followed:

— Option 1: The mesh size in jumping areas shall not exceed 8 mm, so that no one can be stuck in the net, e.g. with a ring on the finger.

— Option 2: The mesh size in jumping areas shall be between 25 mm and 50 mm, preferably between 45 mm and 50 mm, in order to ensure the best possible visibility for supervisors and users.

4.10.3 Entrapment

Equipment shall be constructed according to the requirements in EN 1176-1 so that any openings do not create possible and foreseeable entrapment hazards.

4.11 Capacity

4.11.1 General

NOTE The capacity of a trampoline park is the maximum number of people who can simultaneously be granted access to the activity areas and who are permitted to undertake those activities (i.e. observers without jumping rights do not affect the calculation of capacity). The capacity does not assume that all the people granted access to the activity areas are bouncing simultaneously but instead assumes that some potential bouncers are undertaking non-bouncing activities such as resting, watching, queuing, rehydrating, visiting toilets, etc.

Additional podium or ancillary (e.g. café) space does not increase the capacity of a trampoline park as capacity relates entirely to the number of people with simultaneous potential access to activity areas. For example, people sitting in a trampoline park's café or observing their children from the trampoline park's podium and walkways are part of its capacity if they are free to leave the café or podium to bounce, but are not part of its capacity if they are prevented from entering the activity areas to bounce. The capacity should be calculated for each activity area separately and summed. The operator or designer should calculate the theoretical capacity using the calculation in 4.11.2, but the resulting capacity might be reduced by the operator.

4.11.2 Capacity of park area

Trampoline capacity shall be calculated as total horizontal trampoline surface (m^2)/6,8 m^2. This calculation determines an upper limit on capacity. An appropriate operational capacity should be determined by risk assessment.

Other events as battle bridges, ramps, warped walls, etc. shall add to the capacity.

NOTE The capacity is the number of users excluding supervisors.

The total horizontal surface area of the trampoline park includes:

— horizontal park trampolines;

— padded rest areas within 1 500 mm of any park trampoline;

— padding;

— young children areas; and

— resi-pits.

The total horizontal surface area of the trampoline park does not include:

— any surface of walkway deemed not to be a rest area;

— any horizontal padded surface greater than 1 500 mm from any park trampoline;

— any unpadded horizontal surface;

— angled trampolines;

— performance trampolines;

— dismount pits;

— airbag pits;

— foam pits;

— novel activity area pits;

— café area;

— reception area;

— toilets/changing rooms;

— safety briefing area; and

— entrance walkway/steps.

The following factors affect the capacity, including but not limited to:

— rest areas;

— waiting areas;

— tumble tracks;

— type of user;

— type of activity; and

— number of trampolines.

Capacity of other park areas shall be calculated according to the result of hazard analysis.

4.11.3 Capacity of novel activity areas

When the risk assessment of a specific area allows for a number of persons that can overcrowd the regular trampoline areas additional measures to separate the group of persons are required.

If a trampoline park includes a novel activity area the manufacturer or designer of the novel activity area shall provide the operator with a calculation of its capacity, taking into account simultaneous users, users waiting and users observing.

Consideration shall be given in determining the capacity of a novel activity area to the impact on the overall capacity of the trampoline park.

NOTE 1 In particular, if the capacity of the novel activity area is material in relation to the capacity of the rest of the trampoline park, to ensure potential users of the novel activity area do not have the potential to overcrowd other areas of the park.

NOTE 2 The manufacturers' guidance and the number of users that can safely use the area at any one time are taken into consideration for the capacity of novel activity areas (non-trampoline area).

4.12 Lighting

Operators should be aware of legal requirements regarding the lighting levels of a trampoline park.

Strobing (e.g. no stutter effect) and fog, mist or smoke machines shall not be used in trampoline activity areas if it impedes the visual management of users, supervisors or the capture of CCTV footage.

4.13 Bungee

4.13.1 Bungee longe

The bungee longe is a flexible rope system attached to the ceiling or support structure with minimum two anchor points in combination with highly elastic latex cords. Safe jumps in extreme height on the trampoline are thus possible. Bungee longes/rigs can be operated either with mechanical hand winches or electrical winches.

Depending on the installation situation in the trampoline park installation is possible as a 2-point or 4-point system.

The 2-point system installation is only possible if the jumping height and the distance between the anchor points have the following distance:

Jumping height $H \times 0{,}8 \leq$ distance between the anchor points B.

Otherwise a 4-point system is needed.

The anchor points need a minimum break load of 13 kN.

All (spare) parts like harnesses, carabiners, elastics, winches, pulleys and all connecting parts need a break load of minimum 13 kN.

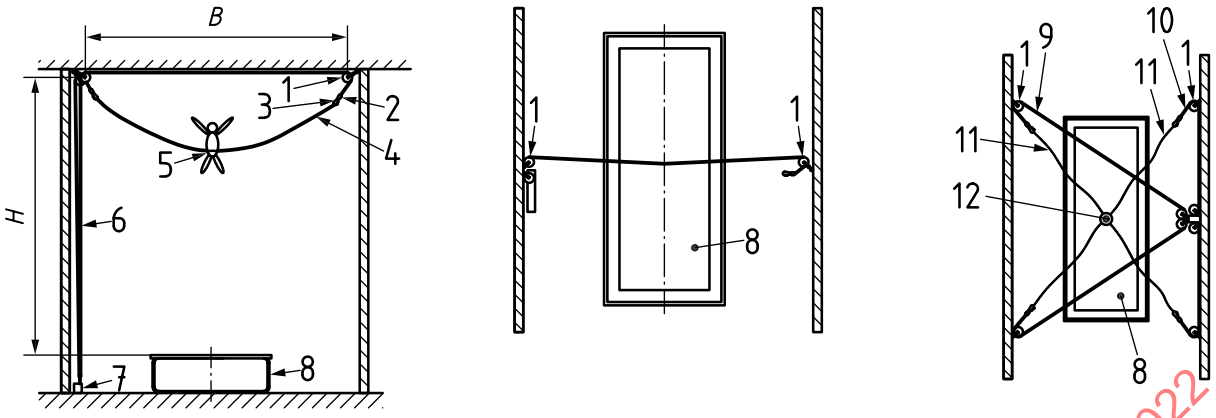
The length of the pulling ropes and the elastics shall be adjusted in order to make it impossible for the jumper to reach the ceiling or overhead support structure.

4.13.2 Bungee trampoline

The bungee trampoline is a trampoline which is used with a bungee longe. Safe jumps in extreme height on the trampoline are thus possible. Bungee trampoline can be operated either with mechanical hand winches or electrical winches.

All kind of bungee trampoline structures shall be produced in accordance with EN 13814-1.

a) **b)** **c)**



Key

H	height of anchor bove trampoine bed	4	bungee cords	9	rope
B	*distance between anchor points*	5	harness	10	swivel
1	pulley	6	rope	11	bungee cords
2	swivel	7	winch	12	harness
3	carabiner	8	trampoline		

Figure 9 — Bungee trampoline with bungee longe

5 Requirements of operation

5.1 Risk management

Risks shall be assessed in order to:

1) eliminate where possible, or reduce risks to a tolerable level;

2) inform the development of, and adjustment to, standard operating procedures (SOPs). See 5.3.

The operator shall inform users that there are risks associated with the activity and that users have to follow all safety rules (see also 5.9).

Landing on the head or neck is considered a critical risk.

Maliciously or negligently influencing other users bounce, often called 'double bouncing', is also considered high risk.

The operator shall establish a site-specific risk management process which shall cover at least the following parts:

a) risk identification;

b) risk analysis;

c) risk evaluation;

d) risk reduction;

e) risk reporting.

NOTE 1 Risk assessment is the overall process of risk identification, risk analysis and risk evaluation.

NOTE 2 Details and additional risk management sub-processes are described in ISO 31000 and ISO/IEC Guide 73. Some additional risk management references include: ISO/IEC 31010 and RAPEX Guideline Appendix 5. See also Annex A of this document.

The risk management process shall be 'site-specific' and address the individual risks presented by each facility - hereafter referred to as "site-specific risk management".

The site-specific risk management process aims to mitigate the residual risks that remain after the 'design risk assessment' has been completed, and 'design control measures' are in place. The site-specific risk management process shall take into account the expectations outlined in the U&M manual, as written by the supplier.

All risk management activities shall be conducted by competent persons.

The site-specific risk assessment shall, as a minimum, consider hazards related to the following;

i) facility;

ii) features on offer;

iii) layout of features;

iv) sessions on offer;

v) permitted actions;

vi) users (age, age mix, behaviour, accompanying person, maximum occupancy, maximum number of children per accompanying person, etc.);

vii) spectators (behaviour, location, etc.);

viii) external personnel (constructors, maintenance personnel, inspectors, etc.);

ix) staff (roles, skills etc.).

The site-specific risk assessment shall take careful consideration of the hazards presented by all kinds of dismount devices and features with performance trampolines.

The site-specific risk assessment shall identify the first aid needs of the facility, including the number of personnel on duty, the provision of rescue equipment and other first aid stock. See 5.12.

The risk reduction measures identified in the risk assessment process shall inform a set of standard operating procedures (SOPs).

NOTE 3 Informative Annex A presents one example of how the process of risk assessment might be carried out by an operator.

Employees shall be trained on aspects of the site-specific risk management process relevant to their role and responsibilities (see 5.7).

The site-specific risk assessment documentation shall be accessible by all employees.

The Site-specific risk assessment documentation shall be reviewed no less than once a year.

Factors that could lead to an early review are:

— changes in legislation;

— operational changes;

— the addition of, or changes to, an activity;

— management changes;

— changes to building conditions;

— where a trend of accidents or incidents occur (see 5.17); or

— when a significant accident or incident occurs.

5.2 Health and safety policy

A health and safety policy should, where necessary, be created and be reviewed no less than once a year.

Factors that could lead to an early review are:

a) changes in legislation;

b) changes in risk management;

c) operational changes;

d) the addition of, or changes to, an activity;

e) management changes;

f) changes to building conditions;

g) where a trend of accidents or incidents occur (see 5.17); or

h) when a significant accident or incident occurs.

The operator should not allow users to use the trampoline park equipment until:

— the U&M manual and design risk assessment has been received and the requirements contained within it have been implemented;

— the site-specific risk assessment documentation (see 5.1) and all applicable standard operating procedure (SOP) documentation (see 5.3) have been completed and applied;

— compliance with 5.11.2 a) 'Post-installation inspection' has been achieved.

5.3 Standard operating procedures and policies (SOP)

In order to operate the park safely, the operator shall put in place standard operating procedures (SOPs).

These procedures shall be developed by the operator and implemented in practice.

The standard operating procedures shall be developed in accordance with the outcomes of the site-specific risk assessment (see 5.1) and other relevant operational documentation, e.g. U&M manual, design risk assessment or this document.

Staff shall be trained in these procedures (see 5.7) and the operator shall adhere to the standards outlined therein. The practical operation of the business should reflect the documented standard operating procedures and vice versa.

In meeting the requirements in 5.3 the operator shall consider all activities available to all user groups.

The SOPs shall be determined in accordance with the outcomes of the site-specific risk management process (see 5.1).

The SOPs shall include, as a minimum, information on the following:

a) risk management process (see 5.1);

b) trampoline park design and layout (see 5.4);

c) equipment, features (see 3.9), activities (see 3.20) and sessions (see 3.19) on offer (see 5.5);

d) users, spectators, staff and external personnel (see 5.6);

e) staff information and training (see 5.7);

f) activity management (see 5.8);

g) safety information (see 5.9) including permitted actions (see 3.21);

h) inspection, maintenance and replacement parts (see 5.11);

i) inspections, including daily routine visual inspection (see 5.11.2 l);

j) first aid provision (see 5.12);

k) emergency action plans (see 5.13);

l) emergency evacuation (see 5.14);

m) documentation control (see 5.15);

n) documentation of accidents and Incidents (see 5.16);

o) injury statistics (see 5.17).

All SOPs shall be documented and training on them shall be provided to relevant employees (see 5.7).

Standard operating procedures shall be available to relevant parties and staff, and be reviewed no less than once a year.

Where a change to risk reduction measures has been identified in a risk management review, a review of standard operating procedures shall follow.

5.4 Trampoline park design and layout

The operator shall have as-built drawings of the facility as defined in 4.2.

The operator shall maintain a layout plan of the activity areas.

Individual features, emergency exits, placement of emergency alarms and safety equipment should be identifiable on the plan.

5.5 Features, activities and sessions on offer, and permitted actions

The SOP for all features, activities and sessions on offer shall be determined in accordance with the outcomes of the site-specific risk assessment (see 5.1) and the design risk assessment (see 4.4.1).

The SOP shall cover which actions are permitted/prohibited, and the circumstances under which actions may be permitted/prohibited.

When an area is designated as a young children area then access by all other users shall be prohibited other than the young children and their accompanying person(s).

Measures, such as access control and/or signage and/or supervision etc., shall be used to ensure that users are aware of which areas they are allowed and not allowed access.

5.6 Users, spectators, staff and external personnel

5.6.1 General

The SOP for users, spectators, staff, and external personnel shall be determined in accordance with the outcomes of the site-specific risk assessment (see 5.1). Staff on duty shall be in a uniform that is suitable for the activities on offer and identifiable.

5.6.2 Users

If a minimum skill level is deemed to be required by the site-specific risk assessment for any features, the SOP shall explain this requirement and how it shall be managed in practice.

The SOP shall include how to respond to declared medical conditions.

The SOP shall cover which user behaviours are acceptable in the trampoline park and the consequences if a user violates the rules.

The SOP shall include how to manage the behaviour of the various user groups.

The following special conditions should apply for young children:

— appropriate time limits;

— separate sessions or areas.

NOTE 1 The following guidelines can be used to support the development of procedures related to children's ages: ISO/IEC Guide 50, ISO/IEC Guide 51.

The operator shall ensure that users wear suitable attire for the activities.

NOTE 2 This includes, for example appropriate socks, no sharp objects etc.

5.6.3 Spectators

The standard operating procedures (SOPs) can cover where spectators can be located.

5.6.4 External personnel

The SOP shall cover how to ensure that external personnel don't interfere or introduce risks to ongoing activities.

The SOP shall cover how to ensure that inspectors and authority investigators get an accurate view of the trampoline park layout, equipment and the operation – both theoretically and in practice, during operational hours.

5.7 Staff information and training

The SOPs for employee information and training shall be determined in accordance with the outcomes of the site-specific risk assessments (see 5.1).

This SOP shall cover the process for appropriate staff selection and appointment.

Any minimum ages shall be specified for staff with certain activity management responsibilities.

All employees shall receive an induction and be trained to meet the standards identified in the SOPs relevant to their role and responsibilities.

All inductions, training and observations shall be documented and records held on each employee's personnel file.

Competent activity supervision is one of the most important requirements for the safe operation of a trampoline park. A supervisor shall be competent for their role and responsibilities. Therefore, a supervisor shall be given systematic and appropriate training, and periodic retraining.

The SOP for employee training shall, as a minimum, cover the following;

a) procedures for ensuring that all employees are trained and assessed to a level of competency for their role;

b) procedures for appointment of competent person responsible for training;

c) procedures for employee supervision;

d) description of performance criteria;

e) description of ongoing training;

f) maximum time limits for specific tasks and procedures for the rotation of employees between different tasks;

g) description of employee roles and responsibilities; in particular responsibilities in accident prevention, activity supervision, coaching (where coaching is offered) and in dealing with emergencies;

h) description of techniques and strategies for managing users, spectators and external personnel;

i) description of the rules that users are required to follow;

j) the location and use of the first aid equipment.

The staff shall also have appropriate skills for managing accompanying person(s).

Training content, particularly the content for the training of activity supervisors, should be revised according to changes made to the risk management process (see 5.1).

NOTE There are risks for employees to which users are not exposed (including but not limited to confined spaces, manual handling, control of substances hazardous to health, use of equipment, work at height and conflict resolution).

5.8 Activity management

The SOP for activity management shall be determined in accordance with the outcomes of the site-specific risk assessment (see 5.3).

The SOP for activity management should include, as a minimum, the following considerations;

a) blind spots and field of vision;

b) the risks presented by a feature as identified in the site-specific risk assessment; and

c) other environmental factors (e.g. light and noise levels).

Activity areas shall not be accessible to users before daily routine visual inspections have been completed (see 5.11.2).

All activity areas shall be managed while in use.

The activity areas shall be divided into supervision zones.

Each supervision zone shall be scanned constantly by the responsible supervisor.

NOTE 1 Scanning is the skill required by supervisors to constantly watch a particular supervision zone using a sweeping action.

The supervision ratio shall be determined by the operator according to a site-specific risk assessment for each activity, session and user group.

The ratio of supervisors to active users may vary according to the outcome of the risk assessment, the resulting supervision ratio for a specific supervision zone shall never exceed 1:32.

Where the risk assessment identifies that an increase in supervision is required to mitigate unacceptable risks, the operator shall increase the ratio of supervisors to active users accordingly dependent on the risks identified; other risk mitigation, and paying due consideration to advisory ratios from other

competent activity bodies which are specifically applicable to the particular activities or sessions being risk assessed.

NOTE 2 Competent activity bodies can be for example national governing bodies, regulating authorities and relevant sport federations.

When determining the supervision ratio, the risk assessment shall consider, at least the following factors:

— users including mix, age, behaviour and factors affecting their likely propensity to understand;

  — risks, and

  — their own skill level.

— layout of the equipment, as it relates to visibility and accessibility for intervention;

— permitted actions;

— measures to guarantee the ongoing supervision of users in the case of an incident.

This list is not exhaustive, other relevant factors may need to be considered that are not listed here. Please see 5.1.

In addition to the above, specific requirements for the supervision of dismount devices exist. See 4.6.

If CCTV is in operation, it shall not be used as a substitute for supervisors.

NOTE 3 CCTV can be useful for reviewing accidents and incidents, and for management and training purposes.

NOTE 4 Local legal requirements can apply.

Where an external coach is used, the SOP shall clearly specify the responsibilities of the external coach, and the group management responsibilities of internal staff.

The resulting supervision ratio for a specific supervision zone may vary, but shall never exceed 1:32.

5.9 Safety information

5.9.1 General

Before starting activities, every user (and their accompanying person(s), where applicable), shall be given safety information to promote the safe use of equipment, critical hazards and the potential consequences for himself/herself or a person or group of people which he/she is responsible for.

The content and communication of safety information shall be determined and organised in accordance with the outcomes of the site-specific risk assessment (see 5.1) and other applicable SOPs (see 5.3).

The operators shall inform the park user groups and accompanying persons(s) about serious hazards to allow users or their accompanying person(s) to assess whether features or activities are in the range of their abilities.

NOTE Safety information can be supplied to the users, including their accompanying person(s), in several ways for example; through safety briefing, information on web pages, leaflets, posters, video screens, speakers, signs, etc. These methods can be combined (see 5.9.2 and 5.9.3).

The safety information shall clearly state that all types of dismount areas are hazardous and include the risk of fatal and serious injuries if used incorrectly. The safety information shall also clearly state that landing on your head or shoulders in dismount areas is not permitted under any circumstances.

Where performance trampolines are offered, the difference between park trampolines and performance trampolines should be communicated to users prior to them accessing the park.

5.9.2 Safety briefing

A procedure shall be in place that all users, including accompanying person(s), receive a safety briefing, before taking part in activities in the trampoline park. The delivery method shall be tailored to meet the needs of the user group(s).

The contents of the briefing shall be developed from the outcomes of the site-specific risk assessment (see 5.1) and applicable SOPs (see 5.3).

The operator shall provide the user groups with information to allow them to make an informed decision about the suitability of the equipment, features, activities and sessions on offer, considering the risks presented and their own abilities/the abilities of the group for which they are responsible for.

Users shall be informed if there are features in the park not intended or permitted for them.

The safety briefing shall cover, as a minimum:

a) hazards related to features, activities, permitted actions and related potential injuries;

b) that the user shall not land on his/her head and neck;

c) general park rules;

d) where to find specific rules for certain features and activities;

e) actions generally permitted and prohibited in the park;

f) actions permitted and prohibited on certain features;

g) the importance of, and methods for, warming up;

h) how to control landings on beds and special landing areas;

i) take-offs and landings, including the use of no jump borders;

j) appropriate instructions for certain user groups.

NOTE 1 For regular repeat visitors, simplified, shortened risk information can be provided where deemed appropriate in the site-specific risk assessment.

Operators shall take all reasonable steps (including considering environmental conditions) to ensure that users have understood the safety briefing.

NOTE 2 For example a follow up question and answer session.

All users shall have the opportunity to raise questions after the safety briefing and/or before entering the activity areas.

Users who do not pay attention to the briefing or are observed repeatedly breaking the rules communicated in the safety briefing, shall be required to attend the safety briefing again.

The safety briefing procedure shall be documented in an appropriate SOP.

5.9.3 Safety signage

Throughout the trampoline park there shall be clear signage explaining the safety rules of each feature.

This signage shall be visible and located in the vicinity of each feature.

The safety signage is recommended to be in the local language(s).

NOTE The use of pictograms can be considered to avoid linguistic barriers and to guarantee a better understanding, namely by, children.

5.10 Cleanliness and hygiene

There shall be a scheduled cleaning programme for equipment and ancillary areas.

The cleaning procedure, including the disposal of any sharps or medical waste, and appropriate record keeping, shall be documented in an SOP.

5.11 Inspection and replacement parts

5.11.1 General

Individuals and organizations performing inspection, testing, repairs, maintenance, alterations and verification of a trampoline park shall be competent to perform the task that they are undertaking.

The frequency and level of inspection, testing, repairs and maintenance shall be determined by the U&M manual, the design risk assessment and the site-specific risk assessment including, but not limited to, the following:

a) frequency of use; and

b) history of wear and tear.

A minimum scheme of periodic inspection is outlined below in 5.11.2.

5.11.2 Inspection, testing and repairs

All equipment shall be inspected and tested in accordance with the U&M manual and this document. Inspections, testing, findings and actions shall be recorded.

If doubt exists as to the adequacy of an item, it shall be removed from service and advice sought from the manufacturer/supplier or a competent person(s).

A record of all inspections and the replacement of main parts, for example trampoline beds, frames etc., shall be maintained.

The procedures for inspection, testing and repairs shall be defined in a standard operating procedure.

Inspections shall be as follows:

a) **Post-installation inspection**

A post-installation inspection shall be conducted by an independent inspector.

This inspection should take place before the facility is open for operation (use).

In the exceptional circumstance that an independent inspector is not available prior to opening, and where the following two conditions are met:

— that the manufacturers, installers and operators have supplied a certificate of conformity to this document; and,

— a provisional inspection, checking conformity to this document has been executed by a competent person,

this post-installation inspection by an independent inspector can be delayed to within 3 months of the facility's opening date.

A post-installation inspection shall include, as a minimum, the following:

1) all test results contained in this document, such as proof load and impact attenuation tests;

2) SOP;

3) all materials and components;

4) all risk assessments.

NOTE 1 Any features of the park that fall outside of the scope of this document do not require a certificate of conformity to this document and are therefore exempt from this clause.

b) **Routine visual inspection — Daily**

A routine visual inspection shall be conducted daily and documented.

NOTE 2 Any features of the park that fall outside of the scope of this document do not require a certificate of conformity to this document and are therefore exempt from this clause.

The inspection shall check and ensure, as a minimum, the following:

1) all trampoline beds and spring protectors for deterioration, rips, tears, holes and other defects;

2) the full range of trampoline bed travel is not obstructed underneath e.g. no items have been stored beneath trampolines;

3) there are no tripping hazards;

4) there are no slipping hazards, including water, oil, detergents;

5) airbags shall have sufficient air pressure as specified by the manufacturer;

6) foam pits are aerated and the foam depth, including foam cubes and base foam, is sufficient to provide adequate user impact attenuation. In a high use pit, this inspection and confirmation shall be conducted at regular intervals during operation;

7) impact attenuating padding is not missing or displaced;

8) containment nets are in position and serviceable;

9) the functionality of CCTV;

10) bounce tests.

Abnormalities shall be addressed through maintenance.

NOTE 3 The routine visual inspection procedures can include an inspection of the trampoline park for visible pinch hazards, broken springs or other hazards that can result from use.

A daily inspection report shall be produced and retained.

c) **Equipment integrity inspection — Monthly**

The equipment integrity inspection is a more detailed inspection than the daily routine visual inspection and shall check the operation and condition of equipment and it's components, and make repairs where necessary.

The equipment integrity inspection procedure shall, as a minimum, check the following:

a) all daily routine visual inspection items in 5.11.2, b);

b) springs are not missing, broken or damaged;

c) foam cube deterioration;

d) permanent deformation of equipment;

e) signs of movement among structural members or connections;

f) signs of wear and tear to the trampoline impact attenuation padding and spring protectors;

g) movement of floor fixings;

h) airbags and base bags for deterioration, rips, tears, holes and other defects;

i) all emergency response equipment is serviceable.

An inspection report shall be produced and retained.

The equipment integrity inspection shall be conducted by a competent person(s) on a monthly basis.

The frequency may change based on the needs and/or risk assessments of the organisation.

d) **Comprehensive inspection — Annual**

A comprehensive inspection shall be conducted by a competent inspector in strict accordance with all appropriate documentation held by the operator.

The comprehensive inspection and repairs shall be carried out as follows:

a) as a minimum, annually;

b) following any major alterations of the trampoline park facility;

c) following a serious injury, the equipment and/or area causally linked to the accident and any similar equipment in the trampoline park facility shall be inspected and repaired/modified as directed by a competent person(s);

d) at the time of transfer of ownership;

e) an inspection and test plan shall be implemented throughout the annual period that has been determined by a competent person(s) to conform to the requirements for a comprehensive inspection. Such a plan shall

   — be authorized by a competent person(s);

   — have all regular inspections and tests supported by adequate documentation issued at the time of their occurrence;

   — not conflict with the manufacturer's/supplier's instructions (or those of a competent person(s) issued when the manufacturer's/supplier's instructions are not available); and

   — take consideration of the occurrence of regular peak operational periods to ensure the prior inspection of safety critical components.

The comprehensive inspection procedure shall evaluate the evidence of conformance to this document including but not limited to:

1) impact attenuating surfaces;

2) harnessing equipment;

3) cyclic loading and fatigue degradation;

4) component fatigue and effects of ageing;

5) rotting and corrosion;

6) standard operating procedures;

7) routine visual inspection procedures;

8) equipment integrity inspection procedures;

9) accident and incident reports, injury statistics data and recommendations;

10) staffing levels and staff skills;

11) equipment safety as a result of repairs, alterations and new or replaced components; and

12) welded connections are secure and undamaged, i.e. no cracks or corrosion.

Special attention shall be given to the dismount area depth, structural integrity of the frames and trampoline beds.

The comprehensive inspection shall cover all aspects of the trampoline park. If this inspection identifies omissions and/or deficiencies within the current operating procedures and/or equipment it shall specify remedial actions in the inspection report. Repairs shall be carried out in a timely manner.

The inspection report shall be retained.

e) **Biennial inspection**

The biennial inspection shall include a comprehensive inspection and the following additional requirement:

— all impact attenuation systems shall be tested in accordance with the minimum requirements contained within this document. A biennial inspection report shall be produced and retained.

5.11.3 Maintenance and modification

All maintenance and repairs shall be carried out by a competent person(s).

Items shall be maintained and repaired according to the instructions of the manufacturer/supplier or a competent person(s).

The standard operating procedures (SOPs) shall cover how to manage access to equipment for maintenance personnel. Where maintenance is performed during operational hours, the SOP shall identify how the risks of interaction between users, maintenance personnel and any tools used, will be mitigated effectively.

NOTE During inspection and maintenance, it can be necessary to close certain areas to guarantee safety for maintenance personnel and users (e.g. deflation of air bag, inspection of framework etc.).

Replacement parts shall conform to manufacturer's/supplier's specifications.

Alterations of the permanent structure of a trampoline park facility shall only be carried out with the advice of a competent person(s).

Modification shall be inspected according to applicable parts of 5.11.2 d).

Modifications will require a post-installation inspection in line with 5.11.2 a).

5.12 First aid provision

First aid provisions, including the required number of first aid personnel, may be enshrined in local law.

First aid provisions shall be in accordance with the outcomes of the site-specific risk assessment (see 5.1) and shall take into account the number and age of users, and the frequency and nature of injuries anticipated.

The operator shall ensure that sufficient first aid equipment and supplies are provided at the trampoline park to cover the requirements identified by the site-specific risk assessment.

Details of the first aid provision shall include:

a) first aider;

b) first aid training;

c) first aid supplies;

d) any specialist equipment required (location and checking regime).

Operators should consider the provision of a clearly-marked, identifiable first aid post or first aid room.

NOTE It can be engaged with local emergency response departments to create awareness of the location and layout of the site.

The location of the first aid point or equipment shall be sign posted and the duty first aider shall be known to all staff.

Evacuation from unstable surfaces shall be considered in the development of first aid procedures.

All accidents and incidents shall be recorded and reported in accordance with 5.16.

5.13 Emergency action plan

The operator shall have a documented site-specific emergency action plan for the operation of the trampoline park in the event of an emergency.

The emergency action plan shall give instructions on the action to be taken in the event of an emergency.

All employees shall be trained and competent in all aspects of the emergency action plan.

Any emergency equipment shall be accessible, and employees shall be trained in its use.

There shall be a standard operating procedure for summoning assistance from other employees and from emergency services.

Emergency action plans shall follow an ordered system of procedures.

NOTE The order in which procedures are followed can vary depending on the accident/incident and nature of any injury or emergency. An example for an order is:

a) initial awareness and assessment of the accident/ incident (e.g. spot the casualty);

b) initiation of the emergency action plan (e.g. radio/call/sound alarm for help, clear the area and ensure the rest of the unaffected area is supervised as appropriate);

c) dealing with the accident and calling the emergency services;

d) in the event of an emergency evacuation consideration of users' needs might be necessary in relation to outdoor climatic conditions;

e) notify relevant manager;

f) completion of relevant accident/near miss report forms;

g) return to normal operations (e.g. clear up any contamination, replace any first aid consumables used, return any equipment used and clean if necessary);

h) investigation and debriefing of accident/incident by the trampoline park management; and

i) apply learning points from the investigation and retrain, if appropriate.

5.14 Emergency evacuation

Emergency evacuation procedures, and the roles and responsibilities of personnel in an emergency, shall be clearly defined in a standard operating procedure (SOP).

NOTE This can consider, but is not limited to:

— users with additional needs;

— adverse weather, for example flooding caused by thunderstorm;

— personnel training;

— location of physical copies of procedures;

— user signage, including location of emergency exits;

— periodic checking of exit routes.

Special consideration should be given to maintaining clear and unlocked emergency exits.

Supporting evacuation materials, including signage will be available, in serviceable condition and inspected regularly (see 5.11.2).

NOTE Local laws and regulations can apply.

5.15 Documentation control

The operator shall have a standard operating procedure for the management and updating of all procedures. This shall include procedures for informing employees of changes and procedures for retraining, where necessary, before their implementation.

5.16 Documentation of accidents and incidents

All accidents and incidents shall be documented.

Employees shall be trained on how to complete relevant documentation.

Accident and incident documentation shall include:

— circumstances of the accident/incident;

— date and time of the accident/incident;

— location of the accident/incident;

— equipment used when accident/incident occurred;

— feature, activity, session and action performed when accident/incident occurred;

— details of the user if involved (e.g. name, age, address);

— apparent symptoms;

— any first aid intervention or advice given;

— if medical treatment is advised;

— estimated severity of injuries;

— witness statements, reports, comments or CCTV, where appropriate;

— details of the first aider, other involved staff members and the person completing the form; and

— details of any follow up or investigations.

NOTE 1 Careful recording is essential. Data protection regulations can apply.

It is advised to review with personnel, all accidents and incidents periodically, e.g. every 3 months.

A trend analysis of accidents may influence the early review of the site-specific risk assessment (see 5.1).

NOTE 2 Local market control authorities can require that certain accidents and incidents are reported to them.

5.17 Injury statistics

Injury statistics should be aggregated and reviewed for trends regularly, e.g. every 3 months.

NOTE To establish useful and comparable injury statistics, the trampoline parks can measure, estimate and record relevant operational data daily.

5.18 Insurance

The operator shall ensure they have appropriate insurance.

6 Test methods

6.1 General

If no specific methods are specified, conformity with the requirements of this document shall be examined by measurement, visual inspection and tactile examination.

6.2 Testing of strength and elastic properties of the trampoline

6.2.1 Principle

Test following the principles given in EN 13219:2008, 5.3.

6.2.2 Apparatus

Flat and rounded test body with a diameter of 200 mm ± 5 mm.

6.2.3 Procedure

Subject the centre point of the jumping zone(s) to a static downward vertical forces according to Table 2 applied for 65 s ± 5 s as shown in Figure 9.

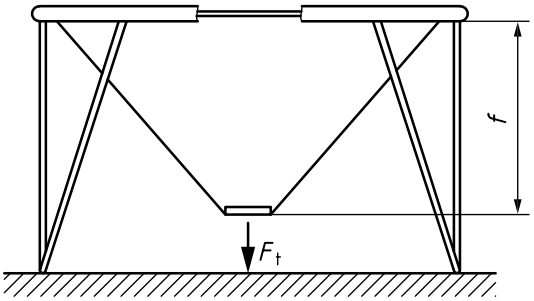
Table 2 — Test forces and used factors

Mass m_b kg	Dynamic factor C_d	Safety factor S	Test force F_t N
94	2,5	2	4 650

6.2.4 Expression of result

Express the strength by whether fracture or rupture has occurred.

Express the elasticity by reporting the indentation (f) as a percentage of the height of the centre of the trampoline bed (see Figure 10).



Key

f indentation

F_t static downward vertical force

Figure 10 — Testing of strength and elasticity

6.3 Padding

Padding shall be tested according to Annex D.

6.4 Bungee

Bungee longes shall be tested according to EN 13814-1.

6.5 Entrapment

Test in accordance with EN 913:2018+A1:2021 and EN 1176-1.

Annex A
(informative)

Risk assessment

A.1 General

This Annex provides informative guidance on conducting a risk assessment.

Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. Risk assessment is a component within the overall risk management process.

NOTE 1 Further details on risk management, risk assessment and references to related standards and guidelines can be found in 5.1.

Risk assessment provides an understanding of risks, their causes, consequences and their likelihood.

Risk assessment is a crucial process for trampoline parks and should be done by competent persons.

There are a number of risk assessment techniques. A common and simple risk assessment technique is the risk severity matrix. The severity (consequences) of a potential injury and the probability (likelihood) of the injury are independently assessed and then multiplied together to obtain a risk score. It is common to present the result graphically with the severity on the x-axis and probability on the y-axis (see Figure A.1).

NOTE 2 Further details on the consequence/likelihood matrix can be found in ISO 31010, Annex B.10.3.

The risk severity matrix can be used to communicate a common quantified understanding of risk exposure across the organization. The way the risk levels are set and the decision rules assigned to them should be aligned with the organization's risk appetite.

The following is an example of typical risk levels that are assigned within organizations that maintain and operate a trampoline park.

For each anticipated injury scenario, the severity and probability of the injury are assessed and estimated using the following indicators.

The severity of the injury is rated as follows:

Negligible or no injury = 1

Minor injury requiring first aid = 2

Moderate injury requiring medical assessment = 3

Serious injury with long-term consequences = 4

Death or major disability = 5

The probability of the injury scenario is rated as follows:

Highly unlikely (rare event) = 1

Unlikely (conceivable event) = 2

Possible (could occur event) = 3

Likely (almost certain event) = 4

Highly likely (will occur event) = 5

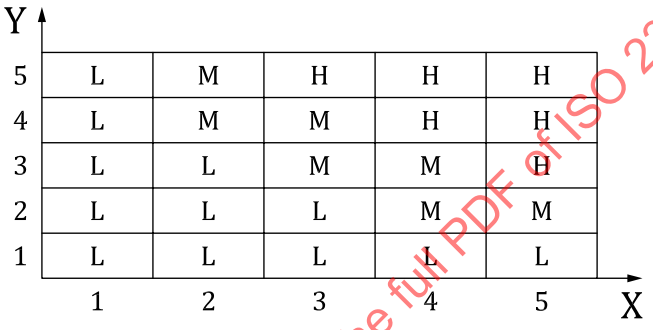
The risk score is calculated by multiplying the severity rating and the probability rating to quantify the risk event according to the following risk scoring system, namely:

Low risk = 1 to 6

Medium risk > 6 to 12

High risk > 12 to 25

The probability and severity of a particular risk cannot be mixed e.g. it is incorrect to say that a head impact will result in death (5) and it is highly likely (5) a user will trip and fall (5 × 5 = 25); a realistic risk assessment of this scenario would be either the probability of tripping is highly unlikely (1) in such a way that causes death (5) is 1 × 5 = 5, or the probability of tripping is highly likely (5) in such a way that causes a negligible injury (1) is 5 × 1 = 5.



Key

Y-axis probability

X-axis severity

L low risk

M medium risk

H high risk

Figure A.1 — Example of a risk severity matrix

Figure A.1 is an example of how a risk assessment and related risk reduction measures can be documented. The table can be extended for including required actions, person responsible for action, due date, status, etc.

ID	Injury scenario	Initial risk			Risk reduction measures	Residual risk		
		Sev	Prob	Score		Sev	Prob	Score

Table A.1 — Example of a risk log

Annex B
(informative)

Example format of a design risk assessment

Table B.1 — Two examples of risk identification, risk evaluation and risk reduction measures

Hazard	Scenario	Severity	Probability	Risk Score	Design Control (Mitigation)	Severity	Probability	Risk Score	Evidence required for IDR	Residual Risk
Impact injury as a result of a fall from height	A participant is jumping on the trampoline and lands on the steel support structure of the trampoline bed, which causes injuries ranging from broken bones, to paralysis and potentially death.	5	4	20	The steel structure is to be fitted with impact attenuating foam padding. The padding shall be tested in accordance with ISO 23659, Annex D at a 1 500 mm free height of fall. The participants shall be briefed prior to entering any trampolining area. The pre-jumping briefing shall explain the potential hazards and risks of undertaking the activity and the correct method for using the equipment. Appropriate numbers and competent supervisors shall observe all participants and recognize inappropriate behaviour and intervene in a timely manner, with appropriate action when necessary.	3	3	9	Drawings and documentation for the installation and specification of the impact attenuating foam padding. Test reports which demonstrates conformity with ISO 23659, Annex D.	The controller accepts that the activity of trampolining has inherent risks that cannot be designed out of the system and shall be managed by instructions for use, policy, procedures and supervision. The controller shall ensure the briefing to all participants is provided and that the supervisors are suitably trained and diligent in their duties.
Entanglement with moving elements (springs)	Different levels of the trampoline beds, coverall pads and surrounding matting could create a series of different floor heights resulting in a risk of a participant tripping.	2	4	8	As far as reasonably practical, recesses will be designed into the podium structure to result in floor levels that are the same where ever possible to reduce the number of level changes. Changes in colours will be used to identify interfaces between different materials. Steps will be conform to appropriate building regulations and codes and have hi-contrast nosing.	1	2	2	Cross section of the floor design showing the differing heights and positions.	—

Annex C
(informative)

Environmental aspects

The potential environmental impacts of materials used for trampoline parks can be reduced by taking into account environmental issues in product standards.

During the life-cycle of a given product, different environmental aspects can be determined.

The aim is to promote a reduction of potential adverse environmental impacts caused by products.

An environmental checklist is given in Table C.1. The purpose of the environmental checklist is to explain whether the document covers relevant product environmental aspects and, if so, how they are dealt with in the draft.

The basic health and safety requirements in the main text of this document are considered having a higher priority than the environmental aspects given in this Annex. In any case, the requirement of this document prevails any environmental aspect that might be related to this product.

The following environmental aspects should be considered:

a) materials should be selected to optimize product durability and lifetime and consideration should be made to avoiding the selection of rare or hazardous materials;

b) consideration should be made to using recycled or reused materials, and to the selection of materials which can then be subsequently recycled;

c) the possibility of marking components to aid to their sorting for disposal/recycling at end of life should also be reviewed;

d) packaging design should consider using recycled materials, and materials that need little energy for their manufacture, and should minimize waste;

e) packaging design should consider subsequent reuse and recycling;

f) the size and weight of packaging should be minimized whilst protecting the products to minimize waste through damage. Packaging should be designed to optimize capacity of transportation vehicles whilst facilitating safe loading and unloading;

g) test materials should be used and disposed of properly, according to their manufacturer instructions and to the enforced law in respect of environmental protection;

h) test facility, test equipment and tools are advised to be designed to minimize the risk of leak into the environment;

i) maximum use should be made of high efficiency motors, lighting and displays;

j) the design should facilitate the manufacturing of the product and packaging, using tools which minimize the generation of noise and vibration.

Table C.1 — Checklist on environmental aspects

Environmental Issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End-of-life			
	Raw materials and energy	Pre-manufactured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/material and energy recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials											
Water											
Energy											
Land											
Outputs											
Emissions to air											
Discharges to water											
Discharges to soil											
Waste											
Noise, vibration, radiation, heat											
Other relevant aspects											
Risk to the environment from accidents or unintended use											
Customer information											

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation.

NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

Table C.1 *(continued)*

Environmental Issue	Stages of the life cycle										All stages	
	Acquisition		Production			Use		End-of-life				
	Raw materials and energy	Pre-manufactured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/material and energy recovery	Incineration without energy recovery	Final disposal		Transportation
Comments:												
NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation. NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.												

Annex D
(normative)

Test method for determining the performance of impact attenuation surfacing used within a trampoline park

D.1 General

This annex specifies the test apparatus and the impact test methods for determining the impact attenuation of surfacing by measuring the acceleration experienced during impact.

Test apparatus in compliance with this annex are applicable for tests conducted in a laboratory (Method 1) or trampoline park (Method 2).

D.2 Components of the impact testing apparatus

D.2.1 General

The equipment comprises: a headform fitted with a tri-axial accelerometer, optionally a signal conditioner, a release system for the headform, means for measuring the effective free height of fall, a signal transmission system and an impact measuring equipment.

Uniaxial guided systems are not recommended for impact testing within trampoline parks. If using a uniaxial accelerometer, a guidance system for the headform shall be provided.

For principle of apparatus see Figure E.1.

D.2.2 Headform

The headform shall consist of either

a) an aluminium alloy ball, or

b) a hemispherical ended aluminium alloy missile.

The headform shall have a diameter of 160 mm ± 5 mm, a mass of 4,6 kg ± 0,05 kg, with a maximum deviation from the hemispheric surface of 0,5 mm.

If the alloy from which the headform is made is too soft, deformation of the surface of the aluminium can occur when testing loose particulate materials like gravel or any other hard and rigid elements in the impact attenuating surface. This will result in unquantifiable errors in the measurement of g_{max} and head injury criterion. When testing materials of this type, the impacting surface of the headform should be inspected frequently. If deformation of the headform surface is observed, the test is invalid.

In the case of a wired headform, the weight of any connector which is directly attached to or mounted on the headform and the weight of 1 500 mm of the wire or cable shall be included in the determination of the mass of the headform.

Accelerometer shall be aligned to measure 3 axes for free falling headform, mounted at the centre of gravity (±5 mm in the vertical or horizontal axis) of the headform.

The impacting portion of the headform below the mounting plane of the accelerometer shall be homogeneous and free from voids.

NOTE This is to avoid errors in measurement caused by vibrations.

D.2.3 Signal conditioner (optional)

Depending on the accelerometer technology employed, different methods of signal conditioning may be needed. Examples include: a charge amplifier, a Wheatstone bridge and amplifier, or an integrated electronic conditioner.

D.2.4 Fall height measuring equipment

The effective free height of fall of the headform when impacting the surface shall be either the physical measuring of the drop height or calculating the drop height from the measured time between release and contact of the headform with the surface.

When calculating the drop height from the measured time between release and contact of the headform with the surface, special attention should be paid to possible time differences between the start of time measurement and the effective release of the headform (e.g. caused by permanent magnetism in a magnetic release system). A comparison of the measured height of fall and the calculated height of fall may be needed.

The effective free height of fall shall be recorded.

D.2.5 Release system

The release system for the free-fall impact test shall not create a significant rotation moment or any other forces on the headform, when released.

NOTE A rotation moment or other forces on the headform can cause additional accelerations at impact in the accelerometer, leading to errors within the resultant for the vertical measurement.

D.2.6 Signal transmission system

When using a signal cable for transmission, it shall not cause any significant restraining, pushing forces or unsteadiness of the headform.

D.2.7 Impact measuring equipment

The impact measuring equipment shall consist of an accelerometer measurement system, a recording device and a calculation program for the head injury criterion.

The accelerometer measurement system shall be capable of measuring all signal frequencies in the range 20 Hz to 1 000 Hz and having a sufficient response at all frequencies to keep amplitude errors below 5 %. It shall be capable of measuring, recording and displaying the acceleration and time duration of each complete impact.

For piezoelectric accelerometers, to have a sufficient response at low frequencies, the −3 dB lower limiting frequency should be less than or equal to 0,3 Hz to reduce the errors resulting from signal droop, which is most obviously visible in the form of baseline overshoot after the impact. Signal droop also results in underestimation of g_{max} and as a result the head injury criterion value, particularly for longer pulse durations. Piezoelectric accelerometers with a time constant of 2 s or greater and appropriate signal conditioning will generally meet this requirement. Other accelerometers are not affected.

D.2.8 Recording device

The recording device shall be capable of capturing and recording the acceleration/time signals produced throughout an impact with a minimum sampling rate of at least 20 kHz, including the maximum acceleration (g_{max}) experienced during each impact. Signal conditioning and filtering shall be compatible with the accelerometer and the data channel specified.