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## Safety of toys - Part 14: Trampolines for domestic use

Sécurité des jouets - Partie 14: Trampolines à usage  
familialSicherheit von Spielzeug - Teil 14: Trampoline für den  
häuslichen Gebrauch

This European Standard was approved by CEN on 5 October 2018.

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<b>Contents</b>	<b>Page</b>
European foreword.....	5
<b>1 Scope</b> .....	<b>7</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms and definitions</b> .....	<b>8</b>
<b>4 Trampoline categories</b> .....	<b>10</b>
<b>5 General requirements</b> .....	<b>11</b>
5.1 Exemptions from certain requirements in EN 71-1 (see A.2).....	11
5.2 General requirements for the trampoline construction (see A.3).....	11
5.2.1 Requirements for mini trampolines (see Clause 4).....	11
5.2.2 Requirements for medium and large trampolines (see Clause 4).....	12
5.2.3 Requirements for all trampoline categories.....	13
5.3 Durability of materials (see A.4).....	14
5.3.1 Metallic parts.....	14
5.3.2 Non-metallic parts.....	14
5.4 Entrapment (see A.5).....	15
5.4.1 Finger entrapment.....	15
5.4.2 Head and neck entrapment.....	15
5.4.3 Foot entrapment.....	16
5.5 Pinching and crushing hazards (see 7.7 and A.6).....	16
5.6 Sharp edges, sharp points and protruding parts.....	16
5.6.1 General.....	16
5.6.2 Sharp edges and sharp points.....	16
5.6.3 Protruding parts.....	17
5.7 Access devices.....	17
5.8 Padding (see 7.7 and A.7).....	17
5.8.1 Padding coverage.....	17
5.8.2 Impact resistance of the frame padding and the suspension system.....	18
5.8.3 Protection of the poles.....	18
5.8.4 Protection of the handrails (for mini trampolines).....	18
5.9 Strength (see A.8).....	18
5.9.1 Vertical strength of the enclosure.....	18
5.9.2 Frame strength.....	18
5.9.3 Dynamic strength of enclosures.....	18
5.9.4 Strength of the fixations of the padding to the frame.....	18
5.9.5 Static strength of access devices.....	18
5.9.6 Strength of mat, suspension system and frame.....	18
5.10 Mat deflection (see A.9).....	18
5.10.1 <i>Non-buried trampolines</i> .....	18
5.10.2 <i>Buried trampolines</i> .....	19
5.11 Stability.....	19
5.12 Tool for assessing a correct hole depth for <i>buried trampolines</i> .....	19
<b>6 Warnings, markings and instructions (see A.10)</b> .....	<b>19</b>
6.1 Warnings.....	19
6.1.1 General.....	19
6.1.2 Warning regarding domestic use.....	19

6.1.3	Warning regarding trampolines not intended for children under 36 months .....	19
6.2	Warnings and markings on the product (see A.10) .....	20
6.2.1	General .....	20
6.2.2	Marking of the centre of the mat .....	20
6.3	Warnings and markings on the packaging .....	21
6.4	Warnings and information in the instructions for use .....	22
6.4.1	Warnings .....	22
6.4.2	Information .....	23
6.4.3	Assembly and maintenance instructions .....	23
7	Test methods .....	24
7.1	Dynamic tests .....	24
7.1.1	Padding impact test (see 5.8.2) .....	24
7.1.2	Enclosure and poles impact strength test (see 5.2.3.1 and 5.9.3) .....	24
7.2	Strength .....	26
7.2.1	Vertical strength of the enclosure (see 5.9.1) .....	26
7.2.2	Frame strength (see 5.9.2) .....	27
7.2.3	Strength test of mat, suspension system and frame (see 5.9.6) .....	29
7.2.4	Strength of the padding fixations to the frame (see 5.9.4) .....	29
7.2.5	Static strength of access devices (see 5.9.5) .....	29
7.3	Stability (see 5.11) .....	29
7.3.1	Stability of the frame .....	29
7.3.2	Enclosure and poles impact stability test .....	30
7.4	Testing of the assembly (see 5.2.3.1 and 5.2.3.2) .....	31
7.5	Durability tests (see 5.3) .....	32
7.5.1	Metallic parts (see 5.3.1) .....	32
7.5.2	Non-metallic parts .....	32
7.6	Mat deflection test (see 5.10) .....	33
7.6.1	<i>Buried trampolines</i> .....	33
7.6.2	<i>Non-buried trampolines</i> .....	33
7.7	Test for padding and pinching and crushing hazards (see 5.5 and 5.8.1) .....	35
7.8	Test for retaining wall system (see 5.2.2.3) .....	35
	<b>Annex A (informative) Rationale .....</b>	<b>36</b>
A.1	Scope (see Clause 1) .....	36
A.2	General (see 5.1 and 5.2.3) .....	36
A.3	Enclosure and soft surface (see 5.2) .....	37
A.4	Durability of materials (see 5.3) .....	38
A.5	Entrapment (see 5.4) .....	39
A.6	Pinching and crushing hazards (see 5.5) .....	39
A.7	Padding (see 5.8) .....	39
A.8	Strength test (see 5.9) .....	39
A.9	Mat deflection (see 5.10) .....	40
A.10	Warnings and markings on the product (see 6.2) .....	41
A.11	Skirt to prevent children, animals or objects to end up under the mat .....	41
	<b>Annex B (informative) Significant technical changes between this European Standard and the previous version .....</b>	<b>42</b>

<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2009/48/EC aimed to be covered .....</b>	<b>44</b>
<b>Bibliography .....</b>	<b>45</b>

## European foreword

This document (EN 71-14:2018) has been prepared by Technical Committee CEN/TC 52 “Safety of toys”, the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 71-14:2014+A1:2017.

This document has been prepared under mandate M/445 given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2009/48/EC.

For relationship with EU Directive 2009/48/EC, see informative Annex ZA, which is an integral part of this document.

This European Standard constitutes the 14<sup>th</sup> part of the European Standard on safety of toys and needs to be read in conjunction with Part 1.

This European Standard, *Safety of toys*, consists of the following parts:

- *Part 1: Mechanical and physical properties;*
- *Part 2: Flammability;*
- *Part 3: Migration of certain elements;*
- *Part 4: Experimental sets for chemistry and related activities;*
- *Part 5: Chemical toys (sets) other than experimental sets;*
- *Part 7: Finger paints — Requirements and test methods;*
- *Part 8: Activity toys for domestic use;*
- *Part 9: Organic chemical compounds — Requirements;*
- *Part 10: Organic chemical compounds — Sample preparation and extraction;*
- *Part 11: Organic chemical compounds — Methods of analysis;*
- *Part 12: N-Nitrosamines and N-nitrosatable substances;*
- *Part 13: Olfactory board games, cosmetic kits and gustative games;*
- *Part 14: Trampolines for domestic use [this document].*

NOTE 1 In addition to the above parts of EN 71, the following guidance documents have been published: the CEN Technical Report, CEN/TR 15071, *Safety of toys — National translations of warnings and instructions for use in EN 71*, and the CEN Technical Report, CEN/TR 15371 (all parts), *Safety of toys — Interpretations*.

NOTE 2 Words in italics are defined in Clause 3 (Terms and definitions). Additional information on the background and rationale for various requirements is given in Annex A.

NOTE 3 Different legal requirements may exist in non-EU countries.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This document specifies requirements and test methods for trampolines for domestic use, their *access devices* and their *enclosures*, intended for outdoor and/or indoor use by one person at a time.

The scope of this document excludes:

- trampolines used as gymnastic equipment, covered by EN 13219:2008;
- floating inflatable trampolines, covered by the EN ISO 25649:2017 series;
- trampolines used in public playgrounds;
- inclined *mat* trampolines;
- inflatable trampolines;
- fitness trampolines, including trampolines for medical use;
- trampolines with additional features, e.g. tents, basketball hoop.

## 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 71-1:2014+A1:2018, *Safety of toys — Part 1: Mechanical and physical properties*

EN 71-8:2018, *Safety of toys — Part 8: Activity toys for domestic use*

EN 913:2008, *Gymnastic equipment — General safety requirements and test methods*

EN 1176-1:2017, *Playground equipment and surfacing — Part 1: General safety requirements and test methods*

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

EN ISO 4892-3:2016, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3:2016)*

EN ISO 9227:2017, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2017)*

EN ISO 13934-1:2013, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method (ISO 13934-1:2013)*

EN ISO 25649:2017 (all parts), *Floating leisure articles for use on and in the water (ISO 25649:2017)*

### 3 Terms and definitions

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

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

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

#### 3.1 access device

equipment used for access to, or egress from, the *mat* of a trampoline including, but not limited to, ladders

#### 3.2 bouncing

action considered as normal use of a trampoline consisting of continuous, vertical jumping in which each landing is in close proximity to the previous landing

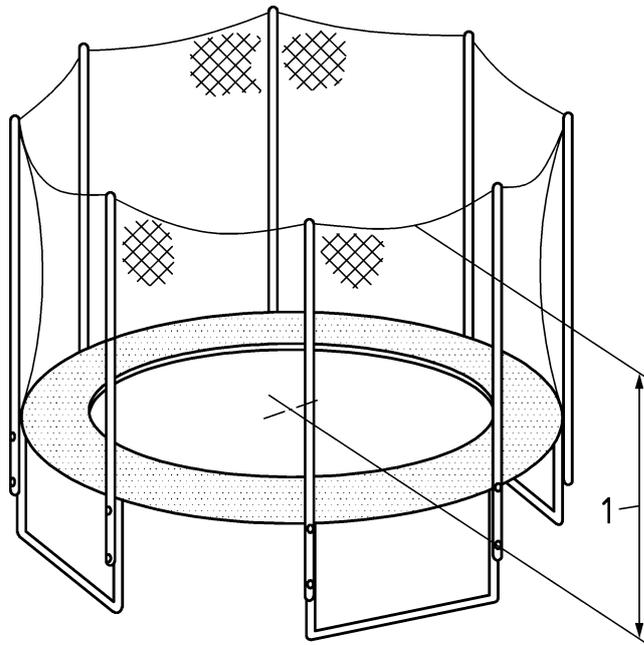
#### 3.3 enclosure

flexible barrier (constraint) surrounding the trampoline

#### 3.4 enclosure height

distance from the surface of the *mat* to the lowest point of the brim of the *enclosure*

Note 1 to entry: The *enclosure height* is illustrated in Figure 1:



#### Key

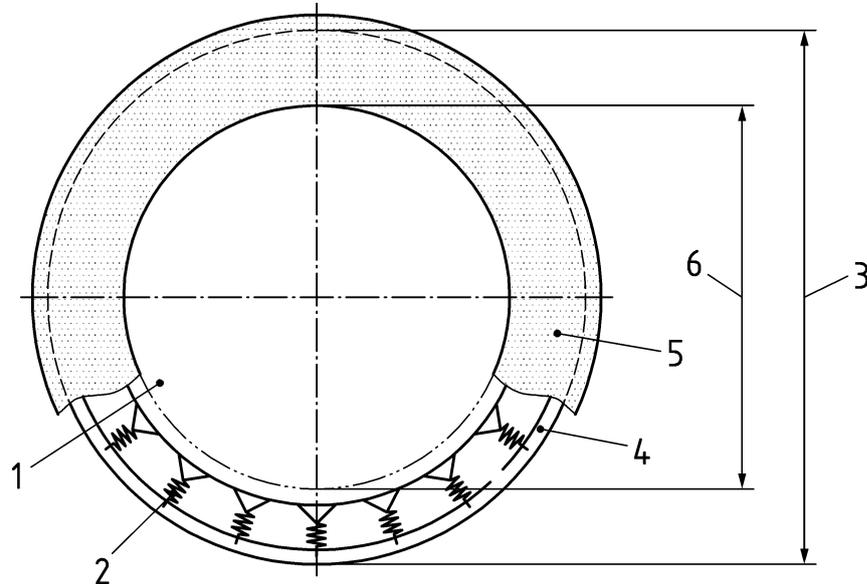
- 1 enclosure height

Figure 1 — Enclosure height

### 3.5 frame

construction of rigid supportive materials from which the *mat* is suspended

Note 1 to entry: See Figure 2 for an example of domestic trampoline including trampoline *frame* and *mat*.



#### Key

- 1 *mat*
- 2 *suspension system*
- 3 *frame size* (in case of a non-circular trampoline the *frame size* is the maximum distance between two opposite points of the *frame*)
- 4 *frame*
- 5 *padding*
- 6 *jumping area*

**Figure 2 — Example of trampoline frame and mat**

### 3.6 legs

part of the framework, constructed of rigid materials which support the *frame*

### 3.7 mat

predominantly flexible surface which the user contacts in the course of *bouncing* on the trampoline

Note 1 to entry: See Figure 2 for an example of domestic trampoline including trampoline *frame* and *mat*.

### 3.8 maximum user weight

mass, in kilograms, indicated by the manufacturer as the maximum weight of a user

### 3.9 padding

shock-attenuating protective system attached to the *frame* to cover the *frame* and the *suspension system*

Note 1 to entry: See Figure 2 for an example of domestic trampoline including trampoline *frame* and *mat*.

### 3.10

#### **suspension system**

mechanism that supports the *mat*, consisting of flexible devices that connect the *mat* to the *frame*

Note 1 to entry: Steel extension springs are a typical example of a *suspension system*.

### 3.11

#### **buried trampoline**

trampoline which according to the manufacturer's instructions requires a hole to be dug as part of the installation process

### 3.12

#### **raised buried trampoline**

*buried trampoline* with the *frame* levelled above the ground

### 3.13

#### **ground-levelled trampoline**

*buried trampoline* with the *frame* levelled with the ground

### 3.14

#### **non-buried trampoline**

trampoline which according to the manufacturer's instructions does not require a hole to be dug as part of the installation process

### 3.15

#### **skirt**

device intended to prevent the user to enter the area below the trampoline

### 3.16

#### **jumping area**

area of the *mat* accessible for *bouncing*

Note 1 to entry: See Figure 2 for an example of domestic trampoline including trampoline *frame* and *mat*.

### 3.17

#### **collapse**

sudden or unexpected folding of a structure

[SOURCE: EN 71-1:2014+A1:2018, 3.12]

## 4 Trampoline categories

Trampolines shall be classified by the *frame* size, *maximum user weight* and *frame* height according to Table 1.

**Table 1 — Trampoline frame size, frame height and maximum user weight**

	<b>Mini</b>	<b>Medium</b>	<b>Large</b>
<b>Frame size</b> in mm	< 1 500	< 2 500	≥ 2 500
<b>Maximum user weight</b> in kg	≤ 25	≤ 50	Manufacturer defined
<b>Frame height of non-buried trampolines</b> in mm	< 350	< 500	≥ 500

The *frame size* for a circular trampoline is equal to the diameter (see Figure 2) while for non-circular trampolines it is equal to the maximum distance between two opposite points of the outside of the *frame* (e.g. the largest diagonal in the case of a rectangular trampoline).

If at least one of the measurements in Table 1 is exceeded, the trampoline shall be classified in the closest higher category.

## 5 General requirements

### 5.1 Exemptions from certain requirements in EN 71-1 (see A.2)

The requirements in EN 71-1 are applicable to trampolines for domestic use with exemptions for the requirements under the following headings in EN 71-1:

- edges (EN 71-1:2014+A1:2018, 4.7);
- points and metallic wires (EN 71-1:2014+A1:2018, 4.8);
- protruding parts (EN 71-1:2014+A1:2018, 4.9);
- toys which a child can enter (EN 71-1:2014+A1:2018, 4.14.1).

The above-mentioned requirements from EN 71-1 are not exempted for trampolines intended for children under 36 months.

**NOTE** This European standard specifies specific requirements for edges, sharp points and protruding parts for trampolines for domestic use (see 5.6.2, sharp edges and sharp points and 5.6.3) which is why the corresponding requirements of EN 71-1 do not apply to trampolines (for children of 36 months and over).

### 5.2 General requirements for the trampoline construction (see A.3)

#### 5.2.1 Requirements for mini-trampolines (see Clause 4)

Mini-trampolines shall be provided with anti-slip feet. Such trampolines shall not slip when tested according to EN 13219:2008, 5.2.

Mini-trampolines may be equipped with handrails to assist the balance of the user. Mini-trampolines may be equipped with an *enclosure*. If mini-trampolines are equipped with handrails, they shall not be equipped with an *enclosure*.

**NOTE** See 5.2.3.2 for requirements on *enclosures*.

## 5.2.2 Requirements for medium and large trampolines (see Clause 4)

### 5.2.2.1 Non-buried trampolines

Non-buried large trampolines shall have a *frame* height of  $\geq 500$  mm.

Non-buried medium and large trampolines shall be equipped with an *enclosure* but shall not be equipped with a handrail.

NOTE See 5.2.3.2 for requirements on *enclosures*.

### 5.2.2.2 Raised buried trampolines

Raised buried medium and large trampolines shall be equipped with an *enclosure* but shall not be equipped with a handrail.

NOTE See 5.2.3.2 for requirements on *enclosures*.

If any part of a *raised buried trampoline* is located below ground level a retaining wall system as specified in 5.2.2.3 shall be provided.

### 5.2.2.3 Ground-levelled trampolines

The *frame* of *ground-levelled trampolines* shall be levelled with the ground. A tolerance of  $\pm 50$  mm is acceptable.

*Ground-levelled* medium and large *trampolines* shall not be equipped with a handrail. They shall

- either be equipped with an *enclosure*; or
- be provided with means of ensuring a soft surface (e.g. impact absorbing material) of 1,0 m measured from the edge of the *jumping area*. The soft surface on and outside the *frame* shall comply with EN 1176-1:2017, 4.2.8.5 (Protection against injuries from the surface of the impact area) with a critical fall height of 1,5 m. The soft surface shall be flat. A tolerance of  $\pm 50$  mm is acceptable.

NOTE 1 See 5.2.3.2 for requirements on *enclosures*.

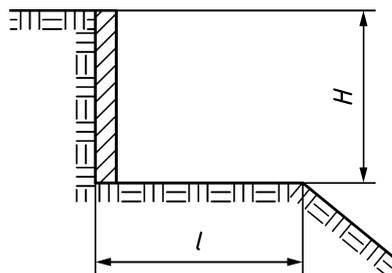
NOTE 2 The soft surface may consist of e.g. impact absorbing material. It can be the same material as the *padding* if the material complies with the requirements in 5.2.2.3 and 5.8.

*Ground-levelled trampolines* shall be provided with a retaining wall system to avoid soil or other substances from falling beneath the structure.

When tested according to 7.8, the retaining wall system shall not:

- break;
- deform in such a way that it enters the safety zone (see Figure 13); or
- permanently deform.

If the *frame* of the *ground-levelled trampoline* is resting on a ledge the height of the retaining wall system ( $H$ ) shall be equal or more than the lengths of the ledge ( $l$ , see Figure 3).



**Key**

$H$  height of the retaining wall system

$l$  length of the ledge

**Figure 3 — Height of retaining wall system**

### 5.2.3 Requirements for all trampoline categories

#### 5.2.3.1 General requirements

The construction of the trampoline shall ensure that during play (or movement of the trampoline) the assembled joints cannot become dislodged.

NOTE 1 This requirement can be fulfilled by the use of pit pins or bolts.

NOTE 2 In order to reduce the risk of injuries related to turnings in the assembled joints of the *frame*, manufacturers are strongly recommended to design the assembled joints of the *frame* covered by this clause such that dynamic forces applied in intended and foreseeable use do not result in the product becoming deformed (see A.2 for further information).

After being tested according to 7.4 (testing of the assembly), the *legs* and the *frame* shall remain in their initial connection position without apparent movement.

The assembled joints of the trampoline and *enclosure*, if any, shall stay connected when tested according to 7.1.2 (enclosure and poles impact strength test).

*Non-buried trampolines* may be equipped with a *skirt* in the zone between the *mat* and ground. Any *skirt* shall allow observation underneath any point of the periphery of the trampoline.

A *skirt* may have an opening and shall in that case allow the access for an adult and the opening force needed shall be 50 N or more in the most onerous direction.

For *raised buried trampolines*, access under the trampoline shall not be free and the zone between the *mat* and ground shall be enclosed. It shall not be possible to enter the area under the trampoline *mat* with the whole body, i.e. it shall not be possible to insert probe C specified in EN 71-8:2018, Figure 17.

#### 5.2.3.2 Enclosures

*Enclosures* shall prevent the user from falling off a trampoline.

The opening of the *enclosure* shall also allow access for an adult.

Any *enclosure* shall allow supervision of the child during play on any point of the periphery of the trampoline.

It shall be possible to open the opening in the *enclosure* from the inside and from the outside independently.

NOTE 1 This requirement can be fulfilled by having a double-tagged slider on a zip-fastener.

If buckles are used for the opening, the opening force needed for opening each (single) buckle shall be 50 N or less.

If a zip is used for the opening, the opening-direction of the zip shall be from bottom to top.

The opening for access through any *enclosure* shall be easy to distinguish from the rest of the *enclosure*. The slider of any zip or any other means of opening shall be of a colour which contrasts with the colour of the teeth and ribbons of the zip, unless a conspicuous handle of a different colour is attached to the slider.

NOTE 2 EN 71-1:2014+A1:2018, A.33 contains Good practices for visibility and legibility for warnings. Some of the recommendations given in this annex could also be applied for distinguishing the opening for access from the rest of the *enclosure*.

The *enclosure height* shall be:

- at least 1,5 m for mini and medium trampolines;
- at least 1,8 m for large trampolines.

NOTE 3 For trampoline classification, see Clause 4.

When tested according to 7.4 (testing of the assembly), no element supporting the *enclosure* (e.g. poles, liaison tubes, caps) shall dismantle.

### 5.3 Durability of materials (see A.4)

#### 5.3.1 Metallic parts

This requirement does not apply to:

- mini-trampolines (see Clause 4, trampoline categories), if designed for indoor use only;
- stainless metals (aluminium alloy or copper or stainless steel); and
- hot-galvanized parts
  - with a surface treatment thickness  $\geq 50 \mu\text{m}$  or
  - treated according to the requirements of EN ISO 1461.

When tested in accordance with 7.5.1 (durability test, metallic parts), all structural metallic parts as well as metal fasteners and fixing mechanisms, coated or non-coated, shall present less than 1/10th of red-rusted surface area. White rust is accepted.

#### 5.3.2 Non-metallic parts

Before and after being tested according to 7.5.2 (durability test, non-metallic parts), the outermost material of the *padding* system for the *frame* and the material of the *enclosure* shall have a 'maximum force' (as defined in EN ISO 13934-1:2013) of at least 150 N. Before and after being tested according to 7.5.2, the *mat* shall all retain at least 80 % of their maximum force (as defined in EN ISO 13934-1:2013). The requirement applies to two sets of test specimens (one in the warp and one in the weft direction) as specified in EN ISO 13934-1:2013.

## 5.4 Entrapment (see A.5)

### 5.4.1 Finger entrapment

This requirement applies to any rigid openings located 1 m or more above the *mat* measured from the centre of the *mat* accessible during *bouncing*.

Accessible holes, slots and gaps in any rigid material that are within the reach of a child during use of the toy when the body of the child is in a forced movement, shall not allow a 7 mm diameter rod to be inserted to a depth of 10 mm or more, unless a 12 mm diameter rod can also be inserted.

If a trampoline is intended for children under 36 months, the accessible holes, slots or gaps in any rigid material that are within the reach of a child during use of the toy when the body of the child is in a forced movement, shall not allow a 5 mm diameter rod to be inserted to a depth of 10 mm or more unless a 12 mm diameter rod can also be inserted.

### 5.4.2 Head and neck entrapment

Trampolines shall be constructed so that no openings create head and neck entrapment hazards either by head first or feet first passage. When choosing materials, the manufacturer shall also take into account the entrapment hazards that can occur due to distortion of material during use.

Hazardous situations in which this type of entrapment can be encountered include the following:

- completely bound openings through which a user can slide head first or feet first;
- partially bound or V-shaped openings;
- other openings (e.g. shearing or moving openings).

Any such openings shall comply with the following requirements:

- a) accessible completely bound openings with a lower edge of more than 600 mm above any surface which is of such a size that it will support a child, shall be tested in accordance with EN 71-8:2018, 6.5.1 (head and neck entrapment in accessible completely bound openings). Probes C or E shall not pass through any opening unless it also allows the passage of the large head probe D;
- b) accessible completely bound openings that allow the free passage of probe C, when tested according to EN 71-8:2018, 6.5.1 (head and neck entrapment in accessible completely bound openings), shall have no parts that converge in the downward direction at an angle of less than 60° if the lower edge is 600 mm or more above the ground (V-shaped opening);
- c) partially bound and V-shaped openings with a lower edge of 600 mm or more above the ground, or above any other surface which is of such a size that it will support a child, shall be constructed so that either:
  - 1) the opening is not accessible as defined in EN 71-8:2018, Figure 22, when tested according to EN 71-8:2018, 6.5.2.3 a) (head and neck entrapment in partially bound and V-shaped openings); or
  - 2) if the opening is accessible at a position of 600 mm or more above ground when tested in accordance with EN 71-8:2018, 6.5.2.3 a), depending on the angular orientation range of the opening (see EN 71-8:2018, Figure 20), it shall conform to the following:
    - i) Range 1: (probe F centre line  $\pm 45^\circ$  from vertical); when the probe F apex contacts the base of the opening, the depth of the opening shall be less than the length of probe F to the underside of the shoulder section.

- ii) Range 2: (probe F centre line from horizontal to + 45°); when the probe F apex contacts the base of the opening, the depth of the opening shall be less than the 'A' portion of probe F. If the depth of the opening is greater than the 'A' portion of probe F all parts of the opening above the 'A' portion shall also allow insertion of the shoulder section of probe F or probe D.
- iii) Range 3: No probe test requirements.

### 5.4.3 Foot entrapment

Surfaces intended for *bouncing* and standing shall not contain any gaps greater than 30 mm measured in one direction (see Figure 4).

This requirement does not apply to junctions between two consecutive sections of the *padding*.

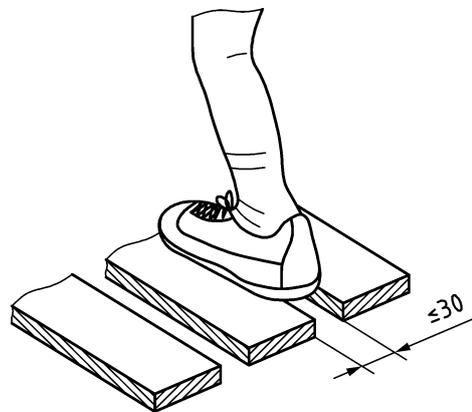


Figure 4 — Measurement of surface gap on bouncing and walking levels

### 5.5 Pinching and crushing hazards (see 7.7 and A.6)

When tested according to 7.7 (test for padding and pinching and crushing hazards), *suspension systems* shall not be accessible if the gap between two consecutive moving parts is greater than 3 mm (e.g. between two consecutive springs spirals).

NOTE This requirement can be fulfilled by making the springs inaccessible during *bouncing* or by using elastic materials other than springs.

The accessibility of a part shall be tested in accordance with EN 71-1:2014+A1:2018, 8.10 (accessibility of a part or component).

### 5.6 Sharp edges, sharp points and protruding parts

#### 5.6.1 General

The accessibility of a part shall be tested in accordance with EN 71-1:2014+A1:2018, 8.10 (accessibility of a part or component).

#### 5.6.2 Sharp edges and sharp points

After assembly in accordance with the instructions for use, there shall be no sharp edges or sharp points on the accessible parts of the trampoline when tested according to EN 71-1:2014+A1:2018, 8.11 (sharpness of edges) and EN 71-1:2014+A1:2018, 8.12 (sharpness of points).

### 5.6.3 Protruding parts

After assembly according to the instructions for use, protruding parts on trampolines and *enclosures* shall comply with EN 71-8:2018, 4.1.5 (protruding parts).

### 5.7 Access devices

When provided together with the trampoline, any *access device* shall comply with EN 71-8:2018, 4.2.2 (ladders and similar means of access to activity toys).

The *access device* shall be capable of being fixed to the trampoline, when in use, to prevent it from slipping. It shall be possible to remove the *access device* from the trampoline without the use of a tool.

The requirements of 5.7 apply also to *access devices* sold separately. For *access devices* sold separately, information regarding which type and size of trampoline the *access device* is intended for shall be visible at the point of sale.

### 5.8 Padding (see 7.7 and A.7)

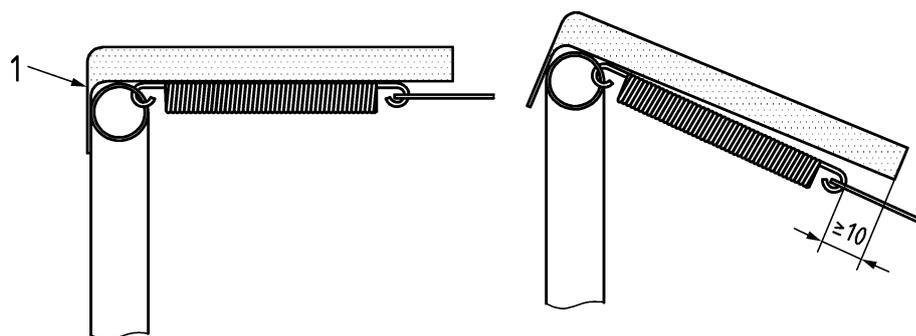
#### 5.8.1 Padding coverage

Every surface (apart from the *mat* and *access device*) where a child could stand or sit shall be covered by *padding*.

The *padding* shall cover the entire top surface of the *frame*. After being loaded according to 7.7 (test for padding and pinching and crushing hazards), the *padding* shall cover the entire top surface of the *frame*, and shall overlap the *mat* with a minimum of 10 mm (if applicable), and the entire top surface of the *frame* shall remain covered by the *padding* (see Figure 5).

The distance between any two adjacent shock absorbing pieces of material within the *padding* shall not be greater than 40 mm.

Either the *padding* shall be of a colour which contrasts with the colour of the *mat*, or the borderline between the *mat* and the *padding* shall be clearly marked with a 50 mm wide border in a contrasting colour. This requirement does not apply to trampolines where the protective *padding* is entirely outside the *enclosure*.



#### Key

1 upper frame protection

Figure 5 — Example of padding coverage

*Ground-levelled trampolines* provided with soft surface also fulfilling the requirements in 5.8.1 (padding coverage), may replace the *padding* covering the *frame* and the *suspension system*.

### 5.8.2 Impact resistance of the frame padding and the suspension system

The requirement in 5.8.2 does not apply to *padding* which complies with EN 1176-1:2017, 4.2.8.5 (protection against injuries from the surface of the impact area) with a critical fall height of 1,5 m.

When tested according to 7.1.1 (padding impact test), the impact on the *frame padding* and on the *suspension system*, shall not show a peak acceleration exceeding 500 m/s<sup>2</sup>.

### 5.8.3 Protection of the poles

Rigid poles shall be protected with a resilient and flexible material (e.g. textile, ethylene vinyl acetate (EVA) or flexible rubber).

### 5.8.4 Protection of the handrails (for mini-trampolines)

Handrails (if any) shall be protected with a resilient and flexible material (e.g. textile, ethylene vinyl acetate (EVA) or flexible rubber).

For mini-trampolines with a handle, the *padding* shall cover the entire top surface of the handle.

## 5.9 Strength (see A.8)

### 5.9.1 Vertical strength of the enclosure

The trampoline shall not *collapse* when tested according to 7.2.1 (vertical strength of the enclosure).

### 5.9.2 Frame strength

Trampolines shall not *collapse* when tested according to 7.2.2 (frame strength).

### 5.9.3 Dynamic strength of enclosures

When tested according to 7.1.2 (enclosure and poles impact strength test), all parts of the trampoline shall continue to conform to the relevant requirements of this standard.

### 5.9.4 Strength of the fixations of the padding to the frame

After assembly of the *padding* according to the instructions for use, and tested according to 7.2.4 (strength of the padding fixations to the *frame*) the fixations system of the *padding* shall not break or become detached.

### 5.9.5 Static strength of access devices

When tested according to 7.2.5 (static strength of access devices), the *access devices* shall not *collapse* so that they do not conform to relevant requirements of this European Standard.

### 5.9.6 Strength of mat, suspension system and frame

When tested according to 7.2.3 (strength test of mat, suspension system and frame):

- the *mat* material, and any sewn, welded or glued joints, as well as subsidiary attachment items (usually but not exclusively triangular or “D”-shaped metal rings), shall show no sign of tearing, splitting or cracking. The requirement is checked by visual inspection;
- the material of the *mat* and attachment system shall not present any failure or rupture.

## 5.10 Mat deflection (see A.9)

### 5.10.1 Non-buried trampolines

When tested according to 7.6 (mat deflection test):

- the maximum deflection shall not exceed 80 % of the distance between the *mat* (at rest) and the ground;
- in addition, for all trampolines, the distance from the ground to the *mat* shall be at least 100 mm.

### 5.10.2 Buried trampolines

When tested according to 7.6 (mat deflection test):

- the central area of the hole with a diameter of  $(330 \pm 10)$  mm shall have a distance of at least 200 mm to the *mat*; and
- the distance of any point of the ground of the hole (as defined in the instructions for use by the manufacturer) to the *mat* shall be at least 50 mm.

## 5.11 Stability

The trampoline shall not tip over when tested according to 7.3 (stability).

Trampolines which have fixation devices that, according to the instructions for use are not intended to be permanently fixed (e.g. in concrete), shall be tested with the fixation devices anchored in the ground or surface according to the instructions for use.

The requirement in 5.11 does not apply to trampolines which have fixation devices which according to the instructions for use shall be permanently fixed (e.g. in concrete).

## 5.12 Tool for assessing a correct hole depth for buried trampolines

*Buried trampolines* shall be provided with a tool to assess the correct hole depth during installation and maintenance.

# 6 Warnings, markings and instructions (see A.10)

## 6.1 Warnings

### 6.1.1 General

The warnings shall be preceded by the word: “Warning” or “Warnings”, as appropriate (i.e. instead of repeating the word “Warning” before each warning when several of the required warnings are present, the word “Warnings” may be used once), and be clearly visible to the consumer before the purchase. The word “Warning” or “Warnings” may be followed by punctuation, e.g. an exclamation mark.

### 6.1.2 Warning regarding domestic use

The trampoline and its packaging shall carry the following warning which shall be clearly visible at the point of sale:

“Warning. Only for domestic use”.

### 6.1.3 Warning regarding trampolines not intended for children under 36 months

When applicable, trampolines for domestic use shall comply with the warning requirement in EN 71-1:2014+A1:2018, 7.2. As indicated in EN 71-1:2014+A1:2018, a brief indication of the specific hazard calling for the restriction (i.e. the warning) shall also be given.

## 6.2 Warnings and markings on the product (see A.10)

### 6.2.1 General

In addition to applicable warnings in 6.1, the following warnings shall be visible on the trampoline when in use:

- “Warning. Max xx kg”;
- “Warning. Only one user. Collision hazard”;
- “Warning. Adult supervision required”;
- “Warning. No somersaults”;
- “Warning. Read the instruction”.

If the trampoline is supplied with *enclosure*, the following additional warnings shall be visible:

- “Warning. Always close the net opening before jumping”;
- “Warning. The net should be replaced every (\*) year(s)”.

(\*) The time is to be specified by the manufacturer.

For *non-buried trampolines* which are intended only for outdoor use, the following additional warning shall be visible on the trampoline when in use:

- “Warning. For outdoor use only”.

For trampolines which are intended only for indoor use, the following additional warning shall be visible on the trampoline when in use:

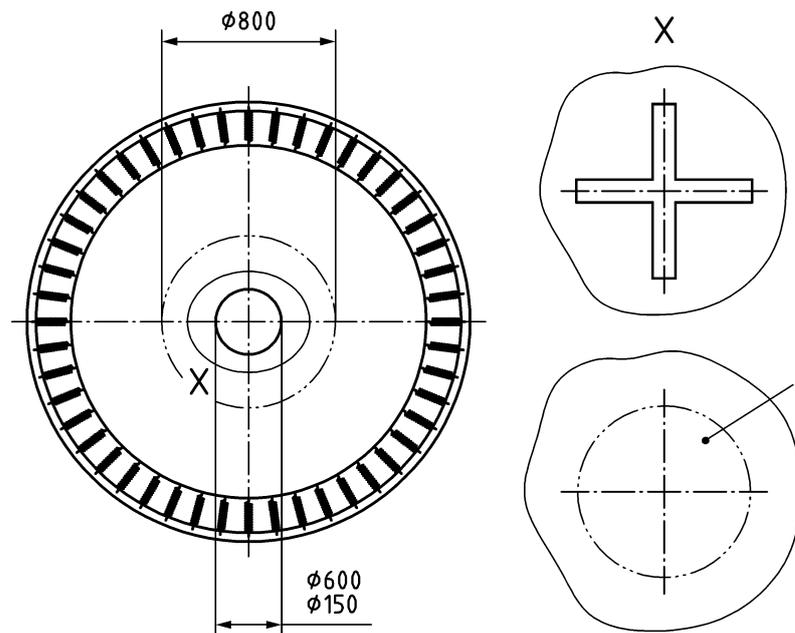
- “Warning. For indoor use only”.

For trampolines supplied with *enclosure* all warnings shall be clearly visible when the user is standing in front of the entrance/*access device*. If the trampoline is supplied without *enclosure* the relevant warnings shall be clearly visible by the user and the supervising adult.

The warnings shall be in a colour which contrasts with the material they are marked on.

### 6.2.2 Marking of the centre of the mat

The centre of the *mat* of a medium or large trampoline shall be clearly marked in a colour contrasting to the *mat* and the mark used shall have a minimum size of 150 mm and a maximum size of 600 mm (see example in Figure 6). It is acceptable to use the manufacturer’s logotype to mark the centre of the *mat*. In cases where the shape of the logotype is irregular and does not have a clear centre-point, the logotype shall be positioned as centred as possible and fully inside a fictive circle which has a diameter of 800 mm and is centred over the geometric centre of the *mat* (see example in Figure 6).



**Key**

1 logo

**Figure 6 — Example of marking of the centre of the mat on a circular trampoline**

**6.3 Warnings and markings on the packaging**

In addition to applicable warnings in 6.1, the following warnings shall be marked on the packaging and be clearly visible at the point of sale:

- “Warning. Max xx kg”;
- “Warning. Only one user. Collision hazard”;

If the trampoline is supplied with *enclosure*, the following additional warning shall be marked on the packaging and be clearly visible at the point of sale:

- “Warning. The net should be replaced every (\*) year(s)”.

(\*) The time is to be specified by the manufacturer.

For *buried trampolines* the following warning shall in addition be marked on the packaging and be clearly visible at the point of sale:

- “Warning. Installation of the trampoline requires a hole to be dug in the ground. If you are not sure about the ground work, please contact a professional”.

For *non-buried trampolines* which are intended only for outdoor use, the following additional warning shall be marked on the packaging and be clearly visible at the point of sale:

- “Warning. For outdoor use only”.

For trampolines which are intended only for indoor use, the following additional warning shall be marked on the packaging and be clearly visible at the point of sale:

- “Warning. For indoor use only”.

In addition, the main dimensions of the assembled product and the free space required around the trampoline shall be clearly indicated on the packaging and be clearly visible at the point of sale. For *buried trampolines* the dimensions of the hole to be dug shall also be clearly indicated on the packaging and be clearly visible at the point of sale.

## 6.4 Warnings and information in the instructions for use

### 6.4.1 Warnings

The following warnings shall as a minimum be included in the instructions for use:

- “Warning. Max xx kg”;
- “Warning. The trampoline shall be assembled by an adult in accordance with the assembly instructions and thereafter checked before the first use”;
- “Warning. Only one user. Collision hazard”;
- “Warning. Jump with/without shoes [as decided by the manufacturer]”;
- “Warning. Do not use the mat when it is wet”;
- “Warning. Empty pockets and hands before jumping”;
- “Warning. Always jump in the middle of the mat”;
- “Warning. Do not eat while jumping”;
- “Warning. Do not exit by a jump”;
- “Warning. Limit the time of continuous usage (make regular stops)”.

For trampolines equipped with an *enclosure* the following warning shall additionally be included in the instructions for use:

- “Warning. Always close the net opening before jumping”.

For trampolines which are intended for outdoor use and which have an *enclosure* the following warning shall additionally be included in the instructions for use:

- “Warning. Do not use in strong wind conditions and secure the trampoline”.

For *buried trampolines* the following warning shall additionally be included in the instructions for use:

- “Warning. Installation of the trampoline requires a hole to be dug in the ground. If you are not sure about the ground work, please contact a professional.”

For *non-buried trampolines* which are intended only for outdoor use the following warning shall additionally be included in the instructions for use:

- “Warning. For outdoor use only”.

For trampolines which are intended only for indoor use the following warning shall additionally be included in the instructions for use:

- “Warning. For indoor use only”.

## 6.4.2 Information

In addition to the warnings in 6.4.1, the following information shall be included in the instructions for use, if applicable:

- instructions that the trampoline is intended to or not intended to be buried into the ground;
- an indication of product dimensions;
- jumping instructions;
- instructions on how to move the trampoline;
- a recommendation to place the trampoline on a level surface at least 2 m from any structure or obstruction such as a fence, garage, house, overhanging branches, laundry lines or electrical wires;
- instructions that trampolines shall neither be installed over concrete, asphalt or any other hard surface nor at proximity of other conflicting installations (e.g. paddling pools, swings, slides, climbing frames);
- instructions that modifications made by the consumer to the original trampoline (e.g. the adding of an accessory) shall be carried out according to the instructions of the manufacturer.

## 6.4.3 Assembly and maintenance instructions

In addition to the warnings in 6.4.1 and the instructions in 6.4.2, the instructions for use shall include detailed instructions for assembly as well as maintenance instructions.

The maintenance instructions shall draw attention to the need to carry out checks and maintenance of the main parts (*frame, suspension system, mat, padding, and enclosure*) at the beginning of each season and also at regular intervals, pointing out that if these checks are not carried out, the trampoline could become dangerous.

In addition, the maintenance instructions shall, as appropriate, include the following recommendations:

- check all nuts and bolts for tightness and tighten when required;
- check that all spring-loaded (pit pin) joints are still intact and cannot become dislodged during play;
- check all coverings and sharp edges and replace when required;
- retain the maintenance instruction manual;
- outdoor trampolines should be equipped with a device that in strong wind conditions avoid displacement due to wind (e.g. steel bars in the ground or loads like sand bag or water bags) and/or items catching wind like net and *mat* should be removed;
- in certain countries during winter period, the snow load and the very low temperature can damage the trampoline. It is recommended to remove the snow and store the *mat* and the *enclosure* indoor;
- check that *mat, padding, enclosure* and soft surface are without defects;

NOTE 1 Sunlight, rain, snow and extreme temperatures reduce the strength of these parts over time.

- replace the net and /or *enclosure* after (\*) year(s) of use.

(\*) The time is to be specified by the manufacturer.

The manufacturer shall provide information on how to secure the trampoline at strong wind conditions, e.g. removing items (net etc.) and/or fixing the trampoline to the ground.

For *buried trampolines*, the manufacturer shall provide detailed information on how to construct the hole when mounting the trampoline (depth/shape/inclination of hole etc.) including an illustration describing the shape of the hole.

For *buried trampolines* the instructions for use shall in addition include the following information:

- the hole should not accumulate water (so drainage is necessary) and it should be possible to clean during maintenance;
- how to avoid foot entrapment if the trampoline is provided with a retaining wall system and, in particular, how to avoid gaps between the ground/retaining wall system/frame.

NOTE 2 See 5.4.3 and, in particular, Figure 4 for requirements on foot entrapment.

For *ground-levelled trampolines* provided with means of ensuring a soft surface, the manufacturer shall provide detailed information on how to prepare and assess the ground under the soft surface, including an illustration describing the shape of the prepared area. This information shall include the area from where the soft surface ends out to 1,0 m measured from the edge of the *jumping area*.

## 7 Test methods

### 7.1 Dynamic tests

#### 7.1.1 Padding impact test (see 5.8.2)

Install the trampoline and *padding* according to the instructions for use.

Apply the test method specified in EN 913:2008, 5.5 (shock absorption of top padding).

The drop height of the impactor shall be  $(200 \pm 5)$  mm.

This falling test shall be performed once at 10 different positions which represent the most onerous positions.

Discard the two extreme recorded values and average the eight remaining values.

Determine whether the average value exceeds  $500 \text{ m/s}^2$ .

#### 7.1.2 Enclosure and poles impact strength test (see 5.2.3.1 and 5.9.3)

See Figure 7 for illustration of the test method.

Ensure that the trampoline is fixed, at ground level, on the side opposite to the point of impact at one or two feet, e.g. by clamping. The entrance shall be closed during testing.

The test shall be performed with a pendulum device.

The bag shall have a height of  $(900 \pm 50)$  mm and a diameter of  $(330 \pm 30)$  mm with a sand filling (e.g. sand with grain size (0-4) mm, specific gravity of approximately  $1\,540 \text{ kg/m}^3$ ). The mass of the sand filled bag shall be  $(120 \pm 1)$  kg. The centre of gravity of the sand filled bag shall be in the geometrical centre of the bag (with a tolerance in all directions of 50 mm).

NOTE 1 Humidity can affect the weight of the sand filled bag.

Suspend the bag from a chain or wire. The pivot point (see key 1 of Figure 7) of the pendulum created by the load and chain or wire shall be positioned directly above the impact point of the bag with the

*enclosure*. Then the pivot point shall be displaced towards the centre of the *mat* with the distance corresponding to half of the diameter of the bag (see Figure 7). Fix the pivot point at a height of  $(500 \pm 50)$  mm above the *enclosure height*.

The pendular movement shall be such that the centre of gravity of the bag drops from a height  $h_2$  calculated with Formula (1) vertically from the release position of the bag to the position where it impacts the *enclosure*.

$$h_2 = \frac{m_{\text{muw}} \cdot 300 \text{ mm}}{120 \text{ kg}} \quad (1)$$

where

$h_2$  is the height which the centre of gravity drops, in mm;

$m_{\text{muw}}$  is the *maximum user weight*, in kg.

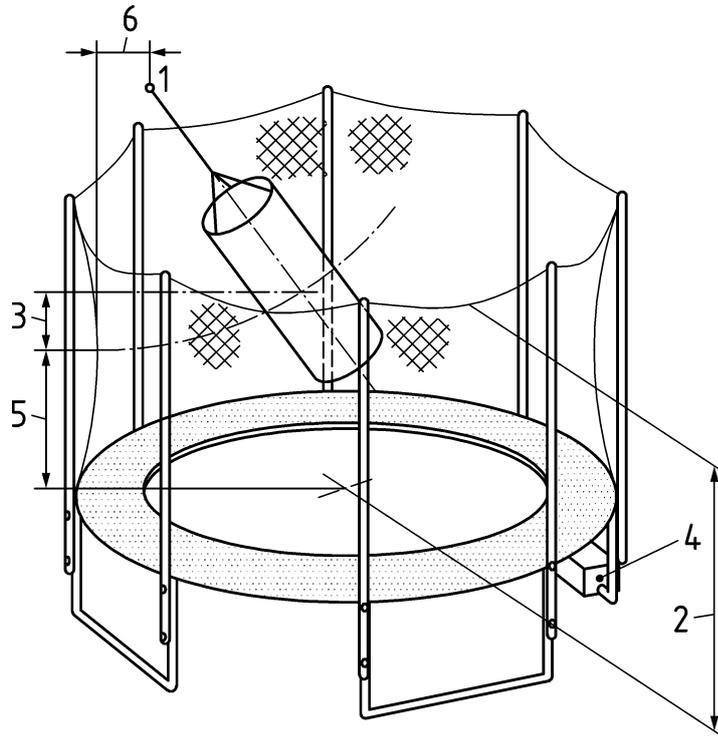
NOTE 2 A.3 contains a table of calculated heights  $h_2$  for commonly used *maximum user weights*.

The impact points shall be at three different locations along the vertical centre of the *enclosure* (i.e. the mid-point of the *enclosure height*):

- in the most onerous position between 2 poles;
- on a pole;
- at the vertical centre of the *enclosure* opening (door).

The test shall be performed twice at each impact point.

Determine whether the assembled joints of the trampoline and *enclosure* are still connected and whether all parts of the trampoline continue to conform to the relevant requirements of this European Standard.



**Key**

- 1 pivot point of the pendulum
- 2 enclosure height ( $h_e$ )
- 3 vertical distance  $h_2$  that any fixed point of the bag drops during the test
- 4 fixation
- 5 mid-point of enclosure height ( $h_e/2$ )
- 6 (horizontal) distance of the pivot point to the enclosure (corresponds to half the diameter of the bag)

**Figure 7 — Enclosure and pole impact strength test**

**7.2 Strength**

**7.2.1 Vertical strength of the enclosure (see 5.9.1)**

For trampolines designed with a rigid top *frame* of the enclosure, load the *frame* in the most onerous position with a  $(50 \pm 0,5)$  kg mass fixed with a  $(500 \pm 10)$  mm spaced bracket for a duration of 1 min (see Figure 8).

Determine whether the *frame collapses*.

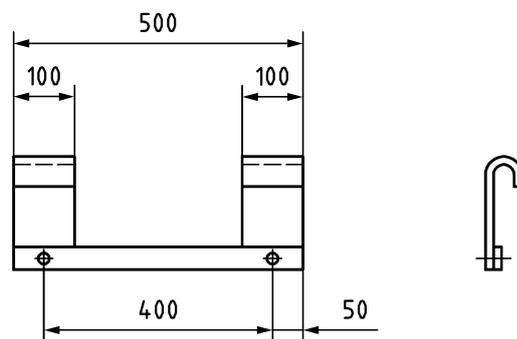
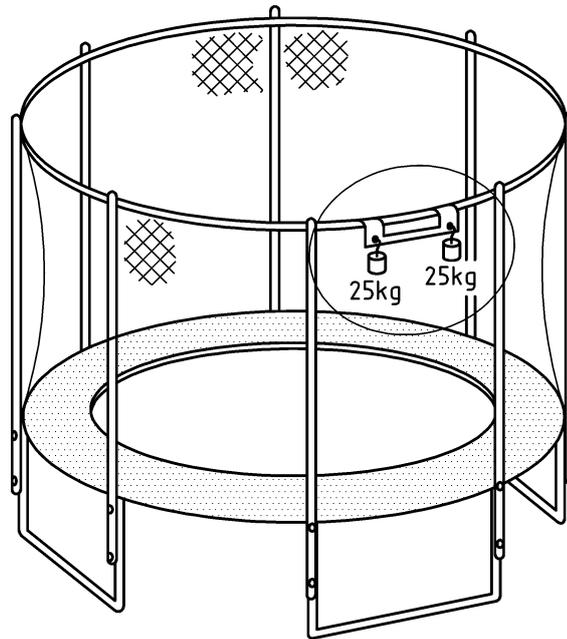


Figure 8 — Example of suspended mass

### 7.2.2 Frame strength (see 5.9.2)

Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface. Position the test load on a  $(330 \pm 10)$  mm diameter rigid disc at the most onerous position of the *frame* (see example in Figures 10 and 11).

- For a medium or large trampoline (see Clause 4 (trampoline categories)), pre-load the *frame* at the most onerous position with a mass of  $(30 \pm 0,5)$  kg for 1 min.
- For a mini-trampoline (see Clause 4 (trampoline categories)), pre-load the *frame* at the most onerous position with a mass of  $(10 \pm 0,2)$  kg for 1 min.

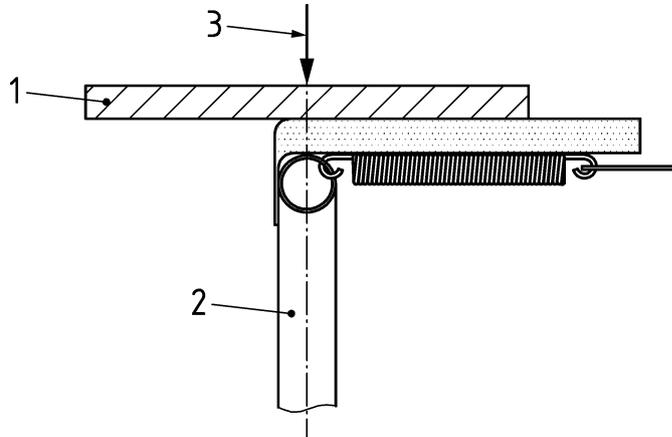
NOTE The most onerous position is generally the centre point of the *frame* between two adjacent *legs*.

The centre of gravity of the load shall be in line with the geometric centre of the rigid disc.

Gradually increase the load to 1,5 times the indicated *maximum user weight*, with a tolerance of  $-0\%$  /  $+5\%$ .

Maintain the load for 5 min.

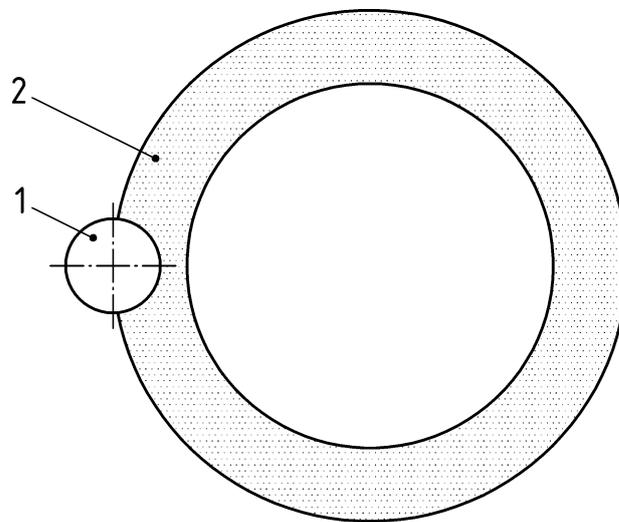
Determine whether the trampoline *collapses*.



**Key**

- 1 330 mm rigid disc
- 2 trampoline *frame*
- 3 test load

**Figure 9 — Position of the load (side view)**



**Key**

- 1 330 mm rigid disc
- 2 trampoline *padding*

**Figure 10 — Top view of the loading test**

### 7.2.3 Strength test of mat, suspension system and frame (see 5.9.6)

Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface. Calculate the test load ( $t$ ) according to Formula (2):

$$t = 4 \cdot m_{\text{muw}} \quad (2)$$

where

- $t$  is the mass of the test load, in kg;  
 $m_{\text{muw}}$  is the *maximum user weight*, in kg.

Load the geometric centre of the *mat*, on a  $(330 \pm 10)$  mm diameter rigid disc, with a mass to the nearest 0,5 kg equal to the calculated value. The centre of gravity of the load shall be in line with the geometric centre of the rigid disc.

Inspect (visually) whether the *mat* material, and any sewn, welded or glued joints, as well as subsidiary attachment items show any sign of tearing, splitting or cracking. Determine whether the *mat* and attachment system present any failure or rupture.

### 7.2.4 Strength of the padding fixations to the frame (see 5.9.4)

Apply a horizontal force of  $(150 \pm 2)$  N in line with the fixation(s) of the *padding* to the *frame* toward the geometrical centre of the *mat*.

Apply this force gradually over a 5 s period.

Maintain the force during 10 s.

Determine if the fixation system breaks or can be detached.

### 7.2.5 Static strength of access devices (see 5.9.5)

Position the test load (1,5 times the indicated *maximum user weight*) on a  $(330 \pm 10)$  mm diameter rigid disc in the most onerous position of the tread or rung.

NOTE The most onerous position is generally the centre point of the tread or the rung.

The centre of gravity of the load shall be in line with the geometric centre of the rigid disc.

Maintain the load for 5 min.

Determine whether the *access device collapses* so that it does not conform to the relevant requirements of this European Standard.

## 7.3 Stability (see 5.11)

### 7.3.1 Stability of the frame

Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface.

Position the test load on a  $(330 \pm 10)$  mm diameter rigid disc at the most onerous position of the *frame*.

- For a medium or large trampoline (see Clause 4, trampoline categories), pre-load the *frame* in the most onerous position with a mass of  $(30 \pm 0,5)$  kg for 1 min.
- For a mini-trampoline (see Clause 4), pre-load the *frame* in the most onerous position with a mass of  $(10 \pm 0,2)$  kg for 1 min.

NOTE The most onerous position is generally the centre point of the *frame* between 2 adjacent *legs*.

The centre of gravity of the load shall be in line with the geometric centre of the rigid disc.

Gradually increase the load to 1,5 times the indicated *maximum user weight*, with a tolerance of -0 % / + 5 %.

Maintain the load for 5 min.

Determine whether the trampoline tips over during the test.

### 7.3.2 Enclosure and poles impact stability test

See Figure 11 for illustration of the test method.

For a trampoline without fixation devices, stops shall be used to prevent it from slipping on the surface during the test. However, stops shall not prevent the trampoline from overturning.

The test shall be performed with a pendulum device.

The bag shall have a height of  $(900 \pm 50)$  mm and a diameter of  $(330 \pm 30)$  mm with a sand filling (e.g. sand with grain size (0-4) mm, gravity of approximately  $1\,540\text{ kg/m}^3$ ). The mass of the sand filled bag shall be  $(120 \pm 1)$  kg. The centre of gravity of the sand filled bag shall be in the geometrical centre of the bag (with a tolerance in all directions of 50 mm).

NOTE 1 Humidity can affect the weight of the sand filled bag.

Suspend the bag from a chain or wire. The pivot point (see key 1 of Figure 11) of the pendulum created by the load and chain or wire shall be positioned directly above the impact point of the bag with the *enclosure*. Then the pivot point shall be displaced towards the centre of the *mat* with the distance corresponding to half of the diameter of the bag (see Figure 11). Fix the pivot point at a height of  $(500 \pm 50)$  mm above the *enclosure height*.

The pendular movement shall be such that the centre of gravity of the bag drops from a height  $h_2$  calculated with Formula (3) vertically from the release position of the bag to the position where it impacts the *enclosure*.

$$h_2 = \frac{m_{\text{muw}} \cdot 300\text{ mm}}{120\text{ kg}} \quad (3)$$

where

$h_2$  is the height which the centre of gravity drops, in mm;

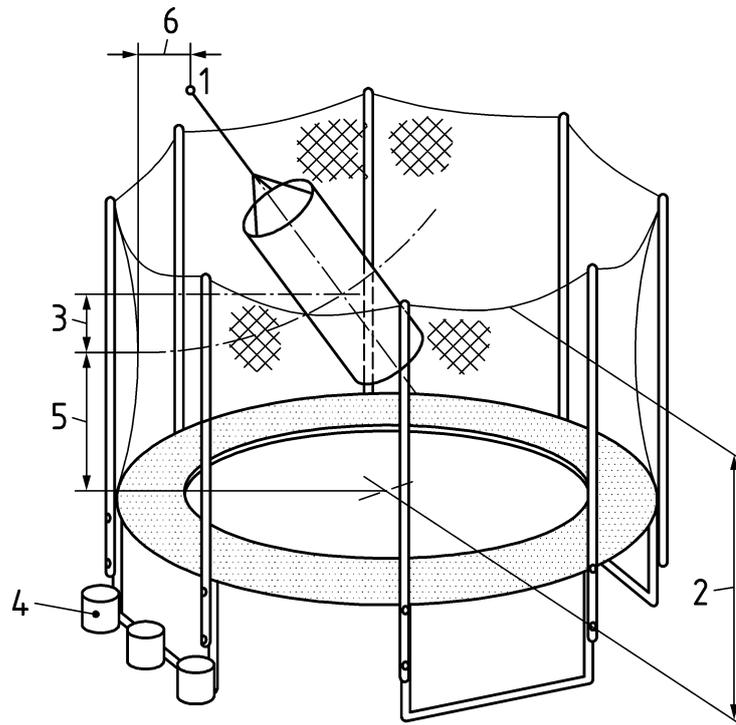
$m_{\text{muw}}$  is the *maximum user weight*, in kg.

NOTE 2 A.3 contains a table of calculated heights  $h_2$  for commonly used *maximum user weights*.

The impact points shall be at three different locations along the vertical centre of the *enclosure* (i.e. the midpoint of the *enclosure height*):

- in the most onerous position between 2 poles;
- on a pole;
- at the vertical centre of the *enclosure* opening (door).

Determine whether the trampoline tips over.



**Key**

- 1 pivot point of the pendulum
- 2 enclosure height ( $h_e$ )
- 3 vertical distance  $h_2$  that any fixed point of the bag drops during the test
- 4 stops
- 5 mid-point of enclosure height ( $h_e/2$ )
- 6 (horizontal) distance of the pivot point to the enclosure (corresponds to half the diameter of the bag)

**Figure 11 — Enclosure and poles impact stability test**

**7.4 Testing of the assembly (see 5.2.3.1 and 5.2.3.2)**

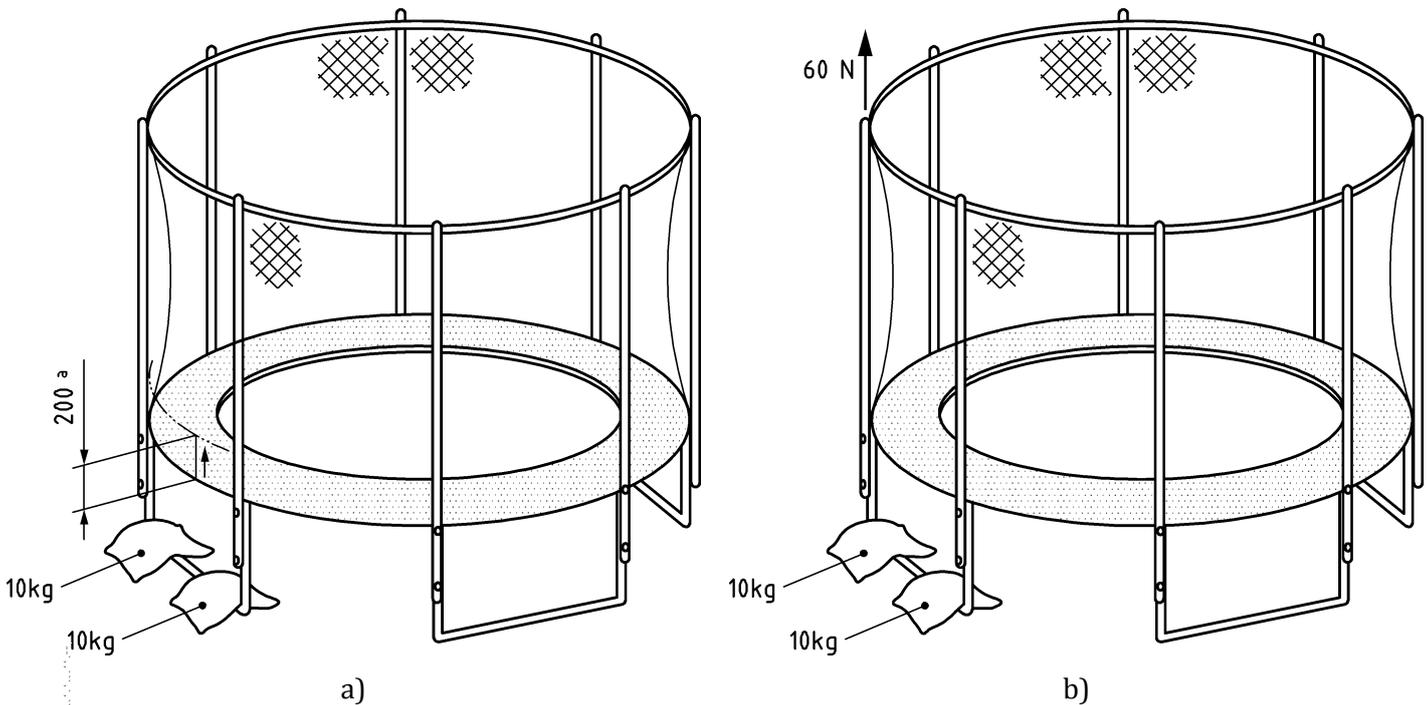
Load two adjacent *legs* with a mass of  $(10 \pm 0,1)$  kg per leg (see Figure 12).

Slowly, lift up the *frame* at the side where the loads are installed to a vertical distance of  $(200 \pm 10)$  mm from the initial position and maintain this position for 30 s before returning to the initial position (see Figure 12 a)).

Determine whether the *legs* and the *frame* remain in their initial connection position without apparent movement.

Apply a tension force in the direction of the poles of 60 N during 30 s on each junction of each element supporting the *enclosure* (e.g. poles, tubes, caps) (see Figure 12 b)).

Determine whether any element supporting the *enclosure* (e.g. poles, liaison tubes, caps) dismantles.



**Key**  
 a vertical distance of  $(200 \pm 10)$  mm which the frame at the side where the loads are installed is lifted

**Figure 12 — Example of loading of the legs**

## 7.5 Durability tests (see 5.3)

### 7.5.1 Metallic parts (see 5.3.1)

Subject the parts covered by the requirements in 5.3.1, to a 48 h neutral salt spray test (5 % sodium chloride solution) in accordance with EN ISO 9227:2017. Determine the percentage of the surface area which is red-rusted. For *buried trampolines*, subject the parts in contact with soil covered by the requirements in 5.3.1, to a 72 h (instead of 48 h) neutral salt spray test (5 % sodium chloride solution) in accordance with EN ISO 9227:2017.

### 7.5.2 Non-metallic parts

Subject the parts covered by the requirements in 5.3.2, to fluorescent UV-radiation in accordance with EN ISO 4892-3:2016, using Method A, Cycle No. 1, for a total of 400 h.

Before and after subjecting materials covered by 5.3.2 to the test in 7.5.2 (durability test, non-metallic parts), determine their 'maximum force' in accordance with EN ISO 13934-1:2013, using a clamp with a width of  $(50 \pm 2)$  mm. Apply the test to the two sets of test specimens (cut in two different directions) specified in EN ISO 13934-1:2013.

Determine whether the 'maximum force', is at least 150 N (before and after testing to 7.5.2).

If a sample during a test has been materially affected by a clamp or similar test equipment, a new test shall be performed on a new sample.

## 7.6 Mat deflection test (see 5.10)

### 7.6.1 Buried trampolines

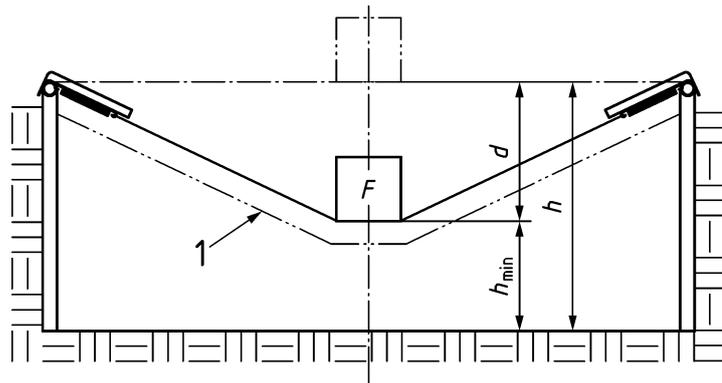
Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface. Calculate the test load ( $m$ ) according to Formula (4):

$$m = 5 \cdot m_{\text{muw}} \quad (4)$$

where

- $m$  is the mass of the test load applied for the *mat* deflection test for medium and large trampolines, in kg;
- $m_{\text{muw}}$  is the *maximum user weight*, in kg.

Load the geometric centre of the *mat*, on a  $(330 \pm 10)$  mm diameter rigid disc, with a mass to the nearest 0,5 kg equal to the calculated value. The centre of gravity of the load shall be in line with the geometric centre of the rigid disc. After 10 min, measure the deflection of the *mat* ( $d$ ) to the nearest 5 mm (see Figure 13).



#### Key

- $F$  test load
- $d$  *mat* deflection
- $h$  *mat* height
- $h_{\text{min}}$  distance between the central area of the hole with a diameter of  $(330 \pm 10)$  mm and the *mat* (at least 200 mm)
- 1 safety zone (distance to *mat* 50 mm)

Figure 13 — Maximum deflection of the mat for *buried trampolines*

### 7.6.2 Non-buried trampolines

Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface. Measure, to the nearest 5 mm, the vertical distance between the hard surface and the unloaded *mat* ( $h$ ) (see Figure 14).

Calculate the test load ( $m_{\text{mini}}$ ) for mini trampolines according to Formula (5):

$$m_{\text{mini}} = 2,5 \cdot m_{\text{muw}} \tag{5}$$

where

$m_{\text{mini}}$  is the mass of the test load applied for the *mat* deflection test for mini trampolines, in kg;

$m_{\text{muw}}$  is the *maximum user weight*, in kg.

Calculate the test load ( $m$ ) for medium and large trampolines according to Formula (6).

$$m = 5 \cdot m_{\text{muw}} \tag{6}$$

where

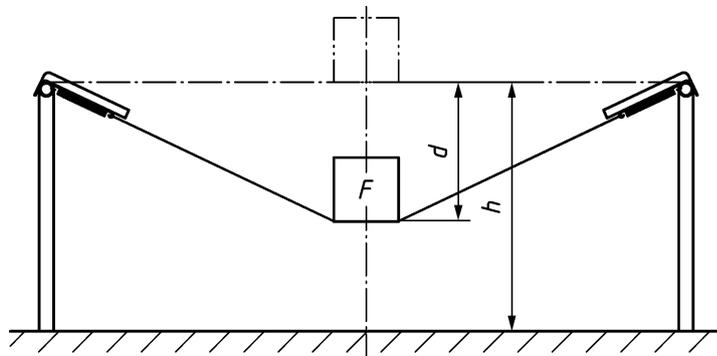
$m$  is the mass of the test load applied for the *mat* deflection test for medium and large trampolines, in kg;

$m_{\text{muw}}$  is the *maximum user weight*, in kg.

Load the geometric centre of the *mat*, on a  $(330 \pm 10)$  mm diameter rigid disc, with a mass to the nearest 0,5 kg equal to the calculated value. The centre of gravity of the load shall be in line with the geometric centre of the rigid disc. After 10 min, measure the deflection of the *mat* ( $d$ ) to the nearest 5 mm (see Figure 14).

Calculate the percentage deflection ( $d$ ) using Formula (7):

$$d (\%) = 100 \times d/h \tag{7}$$



**Key**

- $F$  test load
- $d$  *mat* deflection
- $h$  *mat* height

**Figure 14 — Maximum deflection of the mat**

### 7.7 Test for padding and pinching and crushing hazards (see 5.5 and 5.8.1)

Assemble the trampoline according to the instructions for use and place it on a hard horizontal surface.

Calculate the test load ( $m_p$ ) according to Formula (8):

$$m_p = 2,5 \cdot m_{muw} \quad (8)$$

where

$m_p$  is the test load applied for the tests for *padding* and for pinching and crushing hazards, in kg;

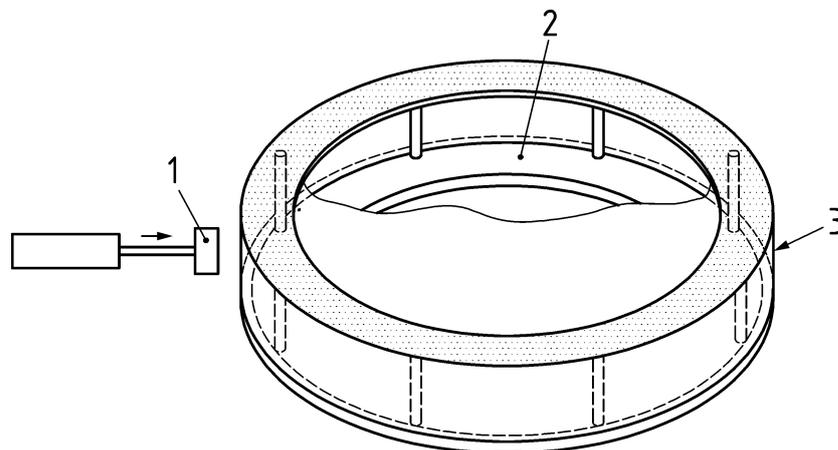
$m_{muw}$  is the *maximum user weight*, in kg.

Load the geometric centre of the *mat* for 10 min, on a  $(330 \pm 10)$  mm diameter rigid disc, with a mass to the nearest 0,5 kg equal to the calculated value. The centre of gravity of the load shall be in line with the geometric centre of the rigid disc. After 10 min, check whether the requirements of 5.5 and 5.8.1 are met.

### 7.8 Test for retaining wall system (see 5.2.2.3)

Assemble the trampoline according to the instructions for use, fix it and place it on a hard horizontal surface.

Gradually apply a rigid cylindrical object, 100 mm in diameter, having a smooth hard surface and rounded edge with radius of 12 mm with a force of  $(400 \pm 5)$  N to the most onerous part of the retaining wall system. The force shall be applied from the outside of the retaining wall system simulating the pressure of the soil on the retaining wall system (see Figure 15). Maintain the force for about 5 min.



#### Key

- 1 test cylinder
- 2 ledge
- 3 retention wall

Figure 15 — Retaining wall system test

## Annex A (informative)

### Rationale

#### A.1 Scope (see Clause 1)

Trampolines for domestic use often have properties similar to those classified as sports equipment. However, only trampolines intended for domestic use, regardless of size, are covered by the scope of this standard.

This standard covers the hazards associated with trampolines that are buried. The hazards associated with the use of such trampolines are different from those associated with the use of trampolines that are not buried, and have been assessed and addressed.

The requirements in this standard take into account the presence of a parent or adult carer in charge of the surveillance of the user of the trampoline.

#### A.2 General (see 5.1 and 5.2.3)

Some of the requirements in EN 71-1 do not apply to trampolines for domestic use since the hazards addressed by these requirements are instead covered by detailed requirements in EN 71-14.

The scope of EN 71-8 does not cover “toy trampolines”. However, for practical reasons certain requirements in this European standard refer to specific requirements in EN 71-8:2018 (e.g. regarding “entrapment” and “means of access”).

Clause 5 sets basic requirements intended to address, for example, the hazards associated within adequate strength and children falling from trampolines. In addition, certain requirements for construction and assembly are specified.

Note 2 advises manufacturer to address potentially unexpected hazards associated with dynamic forces related to turnings in the assembled joints of the *frame*. This should take into account that dynamic forces applied in intended and foreseeable use do not result in the product becoming deformed as in Figure A.1.

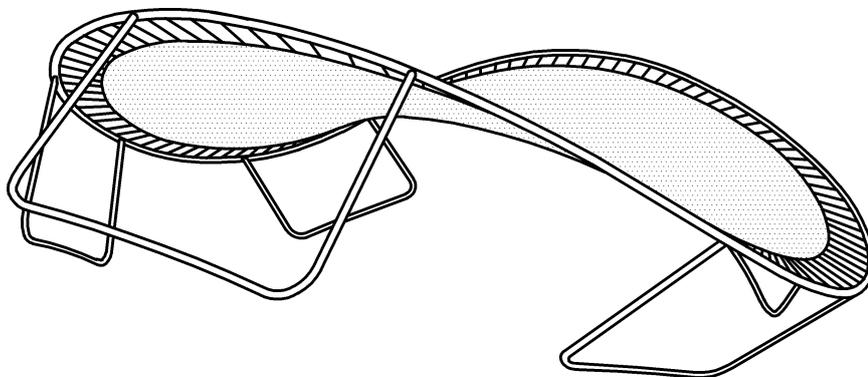


Figure A.1 — Deformed trampoline

The requirements in Clause 5 refer to different sizes of trampolines and the corresponding *maximum user weight*, since the risk for injury is related to the type of trampoline.

Accident data indicates that one of the main causes of injury is falling from the *mat* onto the ground (see also A.3). Another common source of injury is poor quality and insufficient resistance of the connections in the *frame*. For this reason, Clause 5 sets requirements for both static and dynamic strength on *frames* and *enclosures*.

If a child enters the area under the *mat* there is a risk of the child being injured for example by the impact of another child *bouncing* on the *mat* or due to entrapment of the head between two springs. It is therefore important that a parent or adult carer can easily observe that no child is under the *mat*.

The weights of 2 x 10 kg placed on one *leg* as in 7.4 (testing of the assembly) shall increase the tare weight of the *legs* properly.

These weights do not need to be heavier to fulfil the requirements of 5.2.3.1, as this test is only intended to guarantee a secure connection of the *legs* with the other parts.

### A.3 Enclosure and soft surface (see 5.2)

The requirement for a mandatory *enclosure* for non-buried and *raised buried trampolines* is intended to address the hazard associated with falling off medium and large trampolines during *bouncing*. The *enclosure* is not mandatory for a *ground-levelled trampoline* (medium and large size) as it may be provided with a soft surface as an alternative to the *enclosure*. The required minimum *enclosure height* is linked to the *frame* size of the trampoline since the potential *bouncing* height is related to the diameter of the *mat* and to the *maximum user weight*.

For mini trampolines, an *enclosure* is not mandatory due to the low potential *bouncing* height and/or the low potential fall height.

The hazard associated with falling off a *ground-levelled trampoline* is considered to be reduced due to the low *frame* height. The soft surface is intended to address the hazard associated with a more rigid design, the tolerance in height between the *frame* (including the area with the retaining wall system) and the natural surface. The soft surface is also intended to address the hazard associated with falling outside the *frame* as the natural surface (e.g. soil, sand, grass etc.) surrounding a trampoline may become very hard due to dry or cold conditions. The requirements of EN 1176-1:2017, 4.2.8.5 apply to the soft surface on and outside the *frame*. To ensure that natural surface under the soft surface at least corresponds to the properties required when tested according to in EN 1176-1:2017 information should be given on how to prepare and assess the natural surface under the soft surface. The size of the soft surface, 1,0 m corresponds approximately to the length of the spinal including the head of a child of 14 years.

EN 71-1 specifies requirements for “Toys which a child can enter”. For such toys, EN 71-1 requires that, even if ventilation is ensured, it is possible for the child to escape easily from the confinement without help from the outside. Also, for such toys having a door, lid or similar device, EN 71-1, requires that it shall be possible to open the toy from the inside. This requirement notably precludes the use of zips.

Since in the case of trampolines for domestic use, the main cause of injury is falling off the *mat*, it has been considered important to have a requirement for an *enclosure* with specified properties, on certain types and sizes of trampolines and to provide an easy handling of these by the use of a zip. Therefore, EN 71-14 exempts trampolines for domestic use from the EN 71-1 requirement in question.

In order to facilitate for a parent or adult carer to assist a child playing within the *enclosure*, it is specified that the opening of the *enclosure* can be used by an adult.

In order to specify a reproducible test set up the sandbag for the pendulum tests (see 7.1.2, enclosure and poles impact strength test and 7.3.2, enclosure and poles impact stability test) has been defined in regards of its weight, filling and measures. The given formula allows the use of one and the same test set up by only varying the height from which the standard sandbag swings to the *enclosure*. Table A.1 shows some results of that formula as in 7.1.2 and 7.3.2 for common *maximum user weights* and also the

energy which is equal to the energy if the sandbag would have the weight of the *maximum user weight* and  $h_1$  would be fixed to 300 mm.

**Table A.1 —  $h_2$  in dependence of the maximum user weight**

User weight/mass of the pendulum ( $m_1$ ) [kg]	$h_1$ [m]	Potential energy $E_{pot}$ [J]	$h_2^a$ [m]
75	0,300	221	0,188
80	0,300	235	0,200
85	0,300	250	0,212
95	0,300	280	0,238
100	0,300	294	0,250
105	0,300	309	0,262
110	0,300	324	0,275
115	0,300	339	0,288
120	0,300	353	0,300
125	0,300	368	0,313
130	0,300	383	0,325
135	0,300	397	0,337
140	0,300	412	0,350
145	0,300	427	0,363
150	0,300	442	0,375

<sup>a</sup> Height required in order to achieve the same potential energy when fixing the mass of the sand bag to 120 kg (instead of using a height of 0,300 m ( $h_1$ ) and a sand bag with a mass corresponding to the *maximum user weight*).

#### A.4 Durability of materials (see 5.3)

The standard specifies that the instructions for use shall include information highlighting that the consumer shall make regular checks and maintenance of the main parts of the trampoline. In addition, the standard addresses the hazards associated with deterioration of materials by specifying requirements for corrosion of certain metal parts, and light- and UV-stability of certain non-metal parts. These requirements are not intended to specify a certain lifetime of the products but aim at ensuring a basic level of durability.

The requirement regarding corrosion resistance refers to EN ISO 9227:2017 and a 48 h test (and a 72 h test for parts in contact with soil of *buried trampolines*). This requirement is intended to provide a minimum level of protection against premature corrosion in average weather conditions.

The requirement regarding UV-stability refers to EN ISO 4892-3:2016 and a 400 h cycle. The decision to define a 400 h test was a compromise solution based on lengthy discussions during which several other options were also discussed. When unambiguous data becomes available, showing a clear link between the duration of the test and the resistance of critical parts of a trampoline to UV-exposure during practical use, the specified duration of the test will be revisited.

Due to the variations in climate between different parts of Europe, trampolines will be subject to different climatic conditions depending on where in Europe they are used. It is therefore recommended that manufacturers consider whether the durability requirements specified in this standard are sufficient to ensure the product remains functional after several seasons of use in the geographical area where the trampoline is expected to be sold.

### **A.5 Entrapment (see 5.4)**

Trampolines like all other activity toys should be designed so as not to present a risk of entrapment to the user.

Fatal strangulations accidents are known to have occurred due to head entrapment. Therefore, openings are required to either be of a size that prevents the head from passing through, or of a size that allows the head and the torso to pass through.

The clause also includes requirements for entrapment of fingers as well as other parts of the body.

Injuries can occur when one or more fingers are trapped in holes, slots or gaps of rigid materials, while the remainder of the body is moving or continues in movement.

Dimensions have been decided taking into account available anthropometric data on little finger's breadth and length at the distal joint, and the age range considered appropriate for the use of the trampoline.

The accessibility of holes, slots or gaps should be assessed during use of the trampoline, considering the definition and test methods given in EN 71-1. In particular, holes inside larger holes should be considered as accessible if they can be reached by the accessibility probes.

In order to ensure the reproducibility of the test method on head and neck entrapment, in particular of elastic materials, a force of 222 N (adapted from EN 1176-1) for applying the probes has been specified.

### **A.6 Pinching and crushing hazards (see 5.5)**

Most trampolines for domestic use are fitted with springs for the connection between the *mat* and the *frame*. In order to minimize the risk for pinching and crushing hazards, such springs are required to be protected.

### **A.7 Padding (see 5.8)**

The *mat* is the intended surface for *bouncing*. However, accidents have occurred when children have unintentionally jumped, or fallen, on springs or the *frame*. It is therefore required that all such parts are protected with *padding* which contrasts with the *mat* and that has sufficient impact resistance. The requirements for the *padding* are based on requirements in EN 13219:2008. In cases where the *enclosure* is fixed between the *mat* and the *padding*, it is obvious where the intended area for *bouncing* ends and therefore the requirement for contrasting colour or a border does not apply.

### **A.8 Strength test (see 5.9)**

The requirements in 5.9.1 (vertical strength of the enclosure) base on the idea of foreseeable misuse of children by using the standard weight of 50 kg.

It is considered that the user of the trampoline will stand on the *frame* and the *access device*. The requirements in 5.9.2 (frame strength) and 5.9.5 (static strength of access device) cover such static loads with the coefficient of 1,5.

The intention of the requirement in 5.9.6 (strength of mat, suspension system and frame) is to ensure that trampolines are designed in such a way that during *bouncing* no part of the *mat* can touch the

*frame* or *legs*. When testing the strength of the *mat* it is necessary to consider both static and dynamic forces. For this reason, a coefficient is used when calculating the mass to be used in the test of 5.9.6. During the elaboration of this standard, validating tests were made to ensure that this factor takes into account the average weight of the users and their rebound capacity. It was validated that a coefficient of 4 covers the dynamic effect. The coefficient also takes into account that endurance testing is not part of the requirements.

It was taken into account that EN 13219:2008 operates with higher coefficients which reflect the professional user ability to jump higher.

## A.9 Mat deflection (see 5.10)

The intention of the requirement in 5.10 is to ensure that the distance of the *mat* to the ground or floor is sufficient in order to prevent the *mat* from contacting the ground or floor while the user is *bouncing*. Both static and dynamic forces are taken into account. For this reason a coefficient is used when calculating the mass to be used in the test of 5.10. During the elaboration of this standard, validating tests were made to ensure that this factor takes into account the average weight of the users and their rebound capacity.

The choice of applying a factor of 5 times the *maximum user weight* for the measurement of the *mat* deflection was based on:

- the European standards for gymnastic equipment EN 913:2008 and EN 13219:2008 and the Australian standard AS 4989:2015 “Trampolines for domestic use” which all apply this coefficient,
- the design of existing toy trampolines which, for the “large and medium trampoline” category, usually have a minimum *frame* height of 600 mm.

It should be noted that using *frame* heights below 600 mm while complying with the *mat* deflection test specified in this standard can induce hardening of *suspension systems* to the detriment of flexibility of the *mat*.

A tightening of rebounds area can, however, lead to musculoskeletal disorders of the joints of the lower limbs, pelvis and spine for the lightest users (children under 12 years).

Manufacturers shall therefore integrate this data as part of their safety assessment.

For mini trampolines a factor of 2,5 times the *maximum user weight* for the measurement of the *mat* deflection is considered to be sufficient. The mini trampoline will allow the child to bounce softly up and down until the child eventually - supported by the contraction of the spring sheet - will be able to lift the feet from the *mat*. *Bouncing* up and down will stimulate the development of the vestibular sense while the intermittent support from the *mat* challenges tactile sensing. Through the stimulation of these primary senses baby trampolines strengthen small children’s development of sensory integration.

When performing the *mat* deflection test on a *non-buried trampoline* the distance from the ground to the *mat* shall be at least 100 mm. Since it is foreseeable that the depth of the hole created to locate a *buried trampoline* could be reduced by debris falling back into the hole, the requirements are more stringent. For a *buried trampoline* the distance of the central area of the hole [(330 ± 10) mm], from the ground to the *mat* shall be at least 200 mm in order to allow for the possible back fill from debris. The distance to any point of the ground of the hole to the *mat* shall be at least 50 mm, since most holes have a parabolic profile and the deflection of the *mat* in the outer area is much smaller than in the central area.

## A.10 Warnings and markings on the product (see 6.2)

A common cause of injury is when trampolines are used by two or more users since the users can then collide. Therefore, a warning is required to clarify that only one user at a time should jump on the trampoline.

This standard considers trampolines for use by children with a *maximum user weight* specified by the manufacturer. Since different types of trampoline are intended for different age groups, and thereby *maximum user weights*, the manufacturer shall indicate the *maximum user weight* for the trampoline, respecting the limitations given in Table 1.

It is important that warnings and markings on the product are legible during lifetime. Manufacturers should consider that outdoor trampolines are much more affected by weather conditions than other toys and consider the durability of warnings and markings on the trampoline. Stickers in direct sunlight can fade and their glue can melt and dissolve. Shadowed places, waterproof covers and different means of fixation for example sewing can be simple solutions to keep warnings and markings legible during the life time.

Hazardous situations might occur if the user does not see the warnings before every use and does not follow the instructions. Therefore, it is important to keep all the warnings visible as requested in 6.2 which might mean design drawbacks for the manufacturer. Due to the fact that the toy trampoline requires adult supervision signs acceptable for children instead of written warnings have not been created as such are likely to be misunderstood. ISO signs have not been available for most of the warnings. The warnings need to be visible in the language of the adult carer who is responsible for the complete instruction of the (young) user. Good positions for warnings are at the *enclosure* left or right of the entrance in a manner not easy to be detached, like stitched on.

Certain information is important for the consumer already at the point of sale to ensure safe use of the product e.g. the warning “Warning. Only for domestic use”. As many consumers buy products also via the Internet it is important that they will get the same information as required in the physical shops. This means that if the standard requires information to be visible at the point of sale as stated in 6.1.2 (warning regarding domestic use) and 6.3 (warnings and markings on the packaging) and the product is sold via the Internet, the point of sale is the web page where the product is sold.

## A.11 Skirt to prevent children, animals or objects to end up under the mat

If a toddler or an animal runs under the *mat* while another child is jumping on a *non-buried trampoline* both the toddler/animal and the child on the trampoline might be severely injured. If an object, like a ball, roll under the *mat* while a child is jumping on the trampoline the child on the trampoline might be injured. The ball itself might increase the risk that a child ends up under the *mat* trying to “save the ball”.

Manufacturer might, on a voluntary basis, provide a *skirt* to put around the trampoline to lower the risk for incidents described above to happen. In this respect the following should be considered:

- The *skirt* should be transparent to make sure full supervision always is possible, like for *enclosures*.
- The *skirt* should not have any play value. E.g. no bright or funny colours, shape/patterns that leads the thought to a cave/tent, or anything similar.
- The *skirt* should be designed in such way that it prevents a child from entering the area below the *mat*.
- Instructions how to install and maintain the *skirt* should be included.

**Annex B**  
(informative)

**Significant technical changes between this European Standard and the previous version**

Clause/paragraph/table/figure	Change
1	<i>Buried trampolines</i> have been included in the scope and, consequently, “trampolines for domestic use buried at ground level” have been removed from the exclusion list.
3	The definitions of “enclosure” has been modified and the terms “ <i>buried trampoline</i> ”, “ <i>raised buried trampoline</i> ”, “ground-levelled trampoline”, “ <i>non-buried trampoline</i> ”, “skirt”, “jumping area” and “collapse” have been added.
4	A new clause “Trampoline categories” (based on the former subclause 4.2) has been added.
5.2.1 (former 4.3.1)	All kinds of mini trampolines (and not as previously only those for indoor use) shall now be provided with anti-slip feet.
5.2.2 (former 4.3.2)	Requirements for <i>raised buried trampolines</i> (5.2.2.2) and <i>ground-levelled trampolines</i> (5.2.2.3) have been added.
5.2.3 (former 4.3.3)	<i>Skirts</i> are now permitted for <i>non-buried trampolines</i> and requirements for such <i>skirts</i> have been specified. For <i>raised buried trampolines</i> the zone between the <i>mat</i> and the ground shall be enclosed.
5.3 (former 4.4)	“Hot-galvanized parts with a surface treatment thickness $\geq$ 50 microns or treated according to the requirements of EN ISO 1461” have been excluded from the requirements in 5.3.1.
5.4 (former 4.5)	The finger entrapment requirements have been limited to rigid openings located 1 m or more above the <i>mat</i> measured from the centre of the <i>mat</i> accessible during <i>bouncing</i> . The head and neck entrapment requirements have been aligned to EN 71-8:2018.
5.10 (former 4.11)	The requirements for <i>mat</i> deflection have been revised.
5.12	New requirements for a tool for assessing a correct hole depth for <i>buried trampolines</i> have been added.
6 (former 5)	The requirements on warnings, markings and instructions have been revised.
7.1.2 (former 6.1.2)	A clarification that the entrance shall be enclosed during testing has been added and Figure 6 has been modified.
7.4 (former 6.4)	The testing of assembly has been revised and Figure 12 has

Clause/paragraph/table/figure	Change
	been replaced by two figures (Figure 12 a) and b)).
7.5 (former 6.5)	For metallic parts in contact with soil a duration of 72 h for the neutral salt spray test has been specified for <i>buried trampolines</i> .
7.6 (former 6.6)	The <i>mat</i> deflection test has been revised and in particular a test for <i>buried trampolines</i> has been added.
7.8	A new test method for retaining wall systems has been added.
Annex A	The rationales on scope (A.1), general (A.2), <i>enclosures</i> (A.3), durability of materials (A.4), <i>mat</i> deflection (A.9) and warnings and markings on the product (A.10) have been revised and a new rationale on <i>skirt</i> to prevent children, animals or objects to end up under the <i>mat</i> (A.11) have been added.
Annex ZA	Annex ZA has been revised.
Bibliography	Additional literature ([1]) has been added in the bibliography.

NOTE The technical changes referred to include the significant technical changes from the EN revised but are not an exhaustive list of all the modifications from the previous version.

**Annex ZA**  
(informative)

**Relationship between this European Standard and the Essential Requirements of EU Directive 2009/48/EC aimed to be covered**

This European Standard has been prepared under a Commission’s standardization request M/445 to provide one voluntary means of conforming to essential requirements of Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

**Table ZA.1 — Correspondence between this European Standard and Directive 2009/48/EC**

<b>Essential Requirements of Directive 2009/48/EC</b>	<b>Clause(s)/subclause(s) of this EN</b>	<b>Remarks/Notes</b>
Article 10, 2 (General)	Clause 1; Clause 5; Clause 6	
Article 11 (General)	Clause 6	
Annex II, I, 1 (Particular)	5.2; 5.3; 5.9, 5.11	
Annex II, I, 2 (Particular)	5.6; 5.8	
Annex II, I, 3 (Particular)	5.5	
Annex II, I, 11 (Particular)	Clause 4; 5.2; 5.4; 5.7; 5.8; 5.10, 5.12	
Annex V, Part A	Clause 6	
Annex V, Part B	Clause 6	

**WARNING 1** — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

**WARNING 2** — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

## Bibliography

- [1] AS 4989:2015, *Trampolines for domestic use — Safety aspects*