

INTERNATIONAL STANDARD

ISO 8124-1

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Safety of toys —

Part 1: Safety aspects related to mechanical and physical properties

Sécurité des jouets —

*Partie 1: Aspects de sécurité relatifs aux propriétés mécaniques et
physiques*



Reference number
ISO 8124-1:2014(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 8124-1 was prepared by Technical Committee ISO/TC 181, *Safety of toys*.

This fourth edition cancels and replaces the third edition (ISO 8124-1:2012), of which it constitutes a minor revision. It also incorporates the amendments ISO 8124-1:2012/Amd.1:2014 and ISO 8124-1:2012/Amd.2:2014.

ISO 8124 consists of the following parts, under the general title *Safety of toys*:

- *Part 1: Safety aspects related to mechanical and physical properties*
- *Part 2: Flammability*
- *Part 3: Migration of certain elements*
- *Part 4: Swings, slides and similar activity toys for indoor and outdoor family domestic use*
- *Part 6: Certain phthalate esters in toys and children's products*
- *Part 8: Age determination guidelines (Technical Report)*

The following parts are under preparation:

- *Part 5: Determination of total concentration of certain elements in toys*
- *Part 7: Finger paints – Requirements and test methods*

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Introduction

This part of ISO 8124 is largely based upon existing standards in the European Union (EN 71-1 and in the United States of America (ASTM F963).

However, it should not be construed that a toy manufactured in compliance with this part of ISO 8124 will be in full compliance with relevant national toy safety requirements in the market where the product is intended to be distributed. The user of this part of ISO 8124 is therefore advised to be aware of relevant national requirements.

Compliance with the requirements of this part of ISO 8124 will minimize potential hazards associated with toys resulting from their use in their intended play modes (normal use) as well as unintended play modes (reasonably foreseeable abuse).

This part of ISO 8124 will not, nor is it intended to, eliminate parental responsibility in the appropriate selection of toys. In addition, this part of ISO 8124 will not eliminate the need for parental supervision in situations where children of various ages may have access to the same toy(s).

Although Annexes A, B, C, D, E and F are for information purposes only, they are crucial for the correct interpretation of this part of ISO 8124.

The safety of electric toys is described in IEC 62115.

When age indications are required for safety labelling purposes, they may be given in either months or years.

Safety of toys —

Part 1: Safety aspects related to mechanical and physical properties

1 Scope

The requirements in this part of ISO 8124 apply to all toys, i.e. any product or material designed or clearly intended for use in play by children under 14 years of age. They are applicable to a toy as it is initially received by the consumer and, in addition, they apply after a toy is subjected to reasonably foreseeable conditions of normal use and abuse unless specifically noted otherwise.

The requirements of this part of ISO 8124 specify acceptable criteria for structural characteristics of toys, such as shape, size, contour, spacing (e.g. rattles, small parts, sharp points and edges, and hinge-line clearances) as well as acceptable criteria for properties peculiar to certain categories of toy (e.g. maximum kinetic energy values for non-resilient-tipped projectiles and minimum tip angles for certain ride-on toys).

This part of ISO 8124 specifies requirements and test methods for toys intended for use by children in various age groups from birth to 14 years. The requirements vary according to the age group for which a particular toy is intended. The requirements for a particular age group reflect the nature of the hazards and the expected mental and/or physical abilities of a child to cope with them.

This part of ISO 8124 also requires that appropriate warnings and/or instructions for use be given on certain toys or their packaging. Due to linguistic problems which may occur in different countries, the wording of these warnings and instructions is not specified but given as general information in [Annex B](#). It should be noted that different legal requirements exist in many countries with regard to such marking.

This part of ISO 8124 does not purport to cover or include every conceivable potential hazard of a particular toy or toy category. Except for labelling requirements indicating the functional hazards and the age range for which the toy is intended, this part of ISO 8124 has no requirements for those characteristics of toys which represent an inherent and recognized hazard which is integral to the function of the toy.

EXAMPLE 1 An example of such a hazard is the sharp point necessary for the proper function of a needle. The needle is a hazard which is well understood by the purchaser of a toy sewing kit, and the functional sharp-point hazard is communicated to the user as part of the normal educational process of learning to sew as well as at the point of purchase by means of cautionary labelling on the product's packaging.

EXAMPLE 2 As a further example, a two-wheeled toy scooter has inherent and recognized hazards associated with its use (e.g. instability during use, especially while learning). The potential hazards associated with its structural characteristics (sharp edges, pinch hazards, etc.) will be minimized by compliance with the requirements of this part of ISO 8124.

Products not included within the scope of this part of ISO 8124 are:

- a) bicycles, except for those considered to be toys, i.e. those having a maximum saddle height of 435 mm (see [E.1](#), general);
- b) slingshots;

NOTE "Slingshots" are also known as "catapults" and are usually held in the hand; examples are given in [Figure 1](#). Toy versions of medieval catapults and trebuchets are not exempt from this part of ISO 8124; an example is given in [Figure 2](#).

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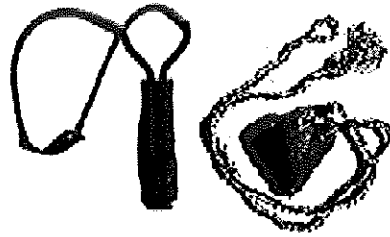


Figure 1 — Examples of slingshots (not within the scope of this part of ISO 8124)

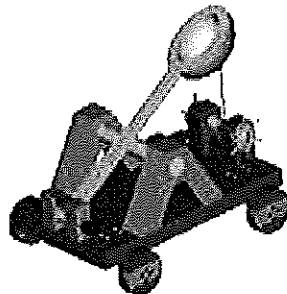


Figure 2 — Medieval toy catapult (within the scope of this part of ISO 8124)

- c) darts with metal points;
- d) home and public playground equipment;
- e) compressed air- and gas-operated guns and pistols (see E.1);
- f) kites (except for the electric resistance of their strings, which is included);
- g) model kits, hobby and craft items, in which the finished item is not primarily of play value;
- h) sporting goods and equipment, camping goods, athletic equipment, musical instruments and furniture; however, toys which are their counterparts are included.

It is recognized that there is often a fine distinction between, for example a musical instrument or a sporting item and its toy counterpart. The intention of the manufacturer or distributor, as well as normal use and reasonably foreseeable abuse, determines whether the item is a toy counterpart or not;

- i) models of aircraft, rockets, boats and land vehicles powered by combustion engines; however, toys which are their counterparts are included (see E.1);
- j) collectible products not intended for children under 14 years of age;
- k) holiday decorations that are primarily intended for ornamental purposes;
- l) aquatic equipment intended to be used in deep water, swimming-learning devices and flotation aids for children such as swim-seats and swim-aids;
- m) toys installed in public places (e.g. arcades and shopping centres);
- n) puzzles having more than 500 pieces or without a picture, for specialists;
- o) fireworks including percussion caps, except percussion caps specifically designed for toys;

- p) products containing heating elements intended for use under the supervision of an adult in a teaching context;
- q) steam engines;
- r) video toys that can be connected to a video screen and operated at a nominal voltage greater than 24 V;
- s) babies' pacifiers (dummies);
- t) faithful reproduction of firearms;
- u) electric ovens, irons or other functional products operated at a nominal voltage greater than 24 V;
- v) bows for archery with an overall relaxed length exceeding 120 cm;
- w) fashion jewellery for children (see E.1).

2 Normative references

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

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11202, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections*

ISO 11204, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

IEC 61672-2, *Electroacoustics — Sound level meters — Part 2: Pattern evaluation tests*

3 Terms and definitions

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

NOTE The requirements in this part of ISO 8124 are applicable to certain age ranges. For interpretation of these age ranges, see E.43 (age-break terminology).

3.1

accessible

(part or component) any area of the toy that can be contacted by any portion forward of the collar of the accessibility probe as described in 5.7 (accessibility of a part or component)

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3.2

aquatic toy

article, whether inflatable or not, intended to bear the mass of a child and used as an instrument of play in shallow water

Note 1 to entry: Bathroom toys and beach balls are not considered aquatic toys.

3.3

arrow

projectile in the form of a shaft with a length of 150 mm or more, intended to be discharged from a bow held by the user

3.4

backing

material adhering to flexible plastic sheeting

3.5

ball

spherical, ovoid or ellipsoidal object, usually but not always designed or intended to be thrown, hit, kicked, rolled, dropped or bounced

Note 1 to entry: This definition includes balls attached to a toy or article by a string, elastic cord or similar tether and also any multi-sided object formed by connecting planes into, and any novelty item of, a generally spherical, ovoid or ellipsoidal shape designed or intended to be used as a ball.

Note 2 to entry: This definition does not include dice, or balls permanently enclosed inside pinball machines, mazes or similar outer containers. A ball is permanently enclosed if, when tested according to 5.24 (reasonably foreseeable abuse), it is not removed from the outer container.

3.6

battery-operated toy

toy having at least one function dependent on electricity and powered by batteries

3.7

burr

roughness caused by not cleanly severing or finishing the material

3.8

close-to-the-ear toy

toy that is intended to be used close to the ear, i.e. the sound-emitting part of such a toy is normally put against the ear of a child

EXAMPLE Toy cellphones or toy telephones that emit sounds from the handpiece.

3.9

collapse

sudden or unexpected folding of a structure

3.10

continuous sound

any steady-state sound or group of variable sounds greater than one second in duration

3.11

cord

length of slender, flexible material

EXAMPLE Monofilaments, woven and twisted cord, rope, plastic textile tapes, ribbon and those fibrous materials known as string.

Note 1 to entry: Doll hair is not considered a cord.

3.12

crushing

injury to part of the body resulting from compression between surfaces

3.13

C-weighted peak sound pressure level

L_{pCpeak}

peak sound pressure level obtained when using standardized C-weighting

3.14

dart

projectile in the form of a shaft less than 150 mm in length that is intended to be thrown or blown

3.15

discharge mechanism

component of the toy, separate from the projectile, which releases or propels the projectile into free flight

3.16

driving mechanism

assembly of linked parts or components (e.g. gears, belts and winding mechanisms), at least one of which moves, powered by a source (e.g. electrical or mechanical means) independent of a child

3.17

edge

line, formed at the junction of two surfaces, whose length exceeds 2,0 mm

3.17.1

curled edge

edge in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle of less than 90° with the base sheet

Note 1 to entry: See [Figure 3](#).

3.17.2

hemmed edge

edge in which the portion of the sheet adjacent to the edge is folded back on the sheet itself through an angle of approximately 180°, so that the portion of the sheet adjacent to the edge is approximately parallel to the main sheet

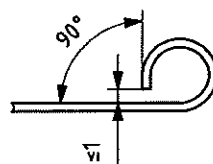
Note 1 to entry: See [Figure 3](#).

3.17.3

rolled edge

edge in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle between 90° and 120° with the main sheet

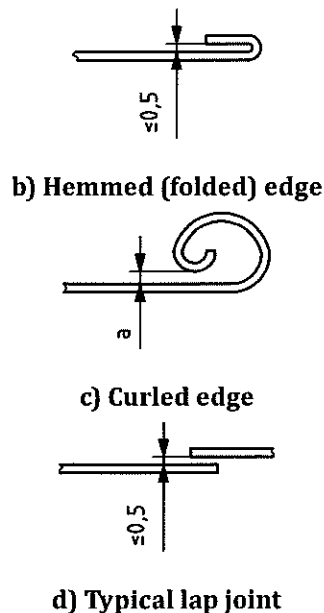
Note 1 to entry: See [Figure 3](#).



Dimensions in millimetres

a) Rolled edge

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a No limit.

Figure 3 — Edges

3.18
equivalent sound pressure level

L_{pAeq}
level of a steady-state sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound

3.19
expanding material

material whose volume expands when exposed to water

3.20
explosive action

sudden release of energy characterized by the rapid expansion or bursting of a material

3.21
fastener

mechanical device which attaches two or more elements together

EXAMPLE Screws, rivets and staples.

3.22
feathering

beveling of an edge (or decrease in thickness moving toward the edge) caused during shearing or cutting of material

3.23
flash

excess material that escapes between the mating parts of a mould assembly

3.24
folding mechanism

hinged, pivoted, folding or sliding assembly which could crush, scissor, pinch or shear during operation

EXAMPLE Toy ironing boards, toy pushchairs.

3.25

free flight

unconstrained travel through the air

Note 1 to entry: This includes projectiles that are ultimately restrained by means of a non-rigid tether (e.g. a pop-gun).

3.26

functional magnet in electrical or electronic components of toys

any magnet necessary for the function of motors, relays, speakers and other electrical or electronic components in a toy where the magnetic properties are not part of the play pattern of the toy

3.27

functional toy

toy which performs and is used in the same way as, and is often a scale model of, a certain product, appliance or installation intended for adults

EXAMPLE Stove with heating properties.

3.28

fuzz

bits of fibrous-type material which can be readily removed from toys with a pile surface

3.29

glass

hard, brittle, amorphous substance produced by fusion, usually consisting of mutually dissolved silica and silicates which also contain soda and lime

3.30

hand-held toy

toy that is intended to be used or operated while being held in the hand

EXAMPLE Toy tools, small electronic games, stuffed animals, dolls, musical toys and cap-firing toys.

3.31

harm

physical injury or damage to the health of people or damage to property or the environment

3.32

hazard

potential source of harm

Note 1 to entry: The term hazard can be qualified in order to define its origin or the nature of the expected harm (i.e. electric shock hazard, crushing hazard, cutting hazard, toxic hazard, fire hazard or drowning hazard).

3.33

hazardous projection

projection that, because of its material or configuration or both, may present a puncture hazard should a child step on or fall onto it

Note 1 to entry: Excluded from this definition are puncture hazards to the eyes and/or mouth, because of the impossibility of eliminating puncture hazards to those areas of the body by product design.

Note 2 to entry: If the projection is on a small toy which topples over when pressure is applied to the end of the projection, it is unlikely to present a hazard.

3.34

hazardous sharp edge

accessible edge of a toy which presents an unreasonable risk of injury during normal use and reasonably foreseeable abuse

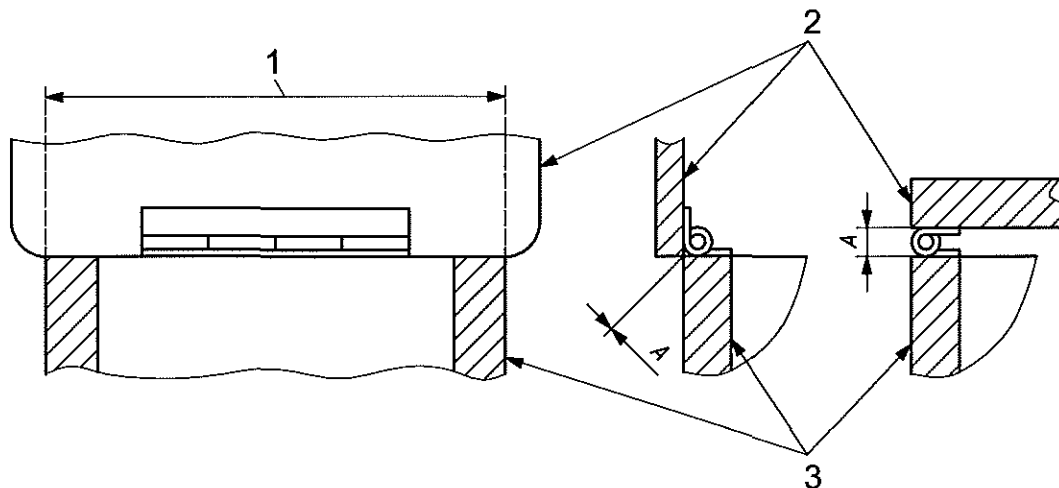
ISO 8124-1:2014(E)**3.35****hazardous sharp point**

accessible point of a toy which presents an unreasonable risk of injury during normal use or reasonably foreseeable abuse

3.36**hinge-line clearance**

distance between the stationary portion of a toy and the movable portion along or adjacent to a line projected through the axis of rotation

Note 1 to entry: See [Figure 4](#).

**Key**

- 1 hinge line
- 2 lid
- 3 box
- A hinge-line clearance between assembled edges

Figure 4 — Hinge-line clearance

3.37**impulsive sound**

sound that is characterized by a brief excursion of sound pressure significantly exceeding the ambient noise, typically less than one second in duration

3.38**lap joint**

joint in which an edge overlaps a parallel surface but is not necessarily mechanically attached to it at all points along the length

Note 1 to entry: See [Figure 6](#).

3.39**large and bulky toy**

toy that has a projected base area of more than 0,26 m² or a volume of more than 0,08 m³ calculated without regard to minor appendages

Note 1 to entry: The base area for toys having permanently attached legs is measured by calculating the area enclosed by straight lines connecting the outermost edge of each leg of the perimeter.

3.40

leading edge

area of the projectile (e.g. tips, edges or protrusions) which would be expected to make contact with the eyeball in the event of launching towards the eye

Note 1 to entry: This includes all areas on projectiles that travel in unpredictable orientations (e.g. tumbling) that could reasonably be expected to strike the eyeball.

3.41

marble

sphere made of hard material, such as glass, agate, marble or plastic, which is used in various children's games, generally as a playing piece or marker

3.42

magnetic component

any part of a toy which contains an attached or fully or partially enclosed magnet

3.43

magnetic/electrical experimental set

toy containing one or more magnets intended for carrying out educational experiments involving both magnetism and electricity

3.44

maximum A-weighted sound pressure level

L_{pAmax}

maximum sound pressure level obtained when using standardized A-weighting

3.45

metal

material comprising elemental metal and/or metal alloys

3.46

normal use

play modes that conform to the instructions which accompany the toy, and which have been established by tradition or custom, or which are evident from an examination of the toy

3.47

packaging

material accompanying the toy when purchased, but having no intended play function

3.48

paper

material, marketed as either paper or paperboard, with a maximum mass per unit area of 400 g/m²

3.49

play furniture

furniture intended for use by a child and intended to, or likely to, support the mass of a child

3.50

pompom

lengths or strands of fibre, yarn or thread clamped or secured and tied in the centre, and brushed up to form a substantially spherical, ovoid or ellipsoidal shape

Note 1 to entry: This definition includes substantially spherical-, ovoid-, and ellipsoidal-shaped attachments made of stuffed materials (see [Figure 7](#)).

Note 2 to entry: Tassels with long strands are not considered pompoms (see [Figure 8](#)).

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Figure 5 — Regular and rounded pompoms



Figure 6 — Tassel with long strands

3.51

projectile

object without capacity for self-propulsion, intended to be launched into free flight

Note 1 to entry: The definition does not include self-propelled flying toys such as remote control helicopters and wind-up airplanes unless the capacity for self-propulsion is from self-contained compressed gas and/or liquid (e.g. rockets)

3.52

projectile toy with stored energy

toy with a projectile launched by means of a discharge mechanism capable of storing energy independent of the user and incorporating a release mechanism

Note 1 to entry: Release mechanisms should operate following at least one single discrete activation by the user.

Note 2 to entry: Toy rockets and similar toys propelled by a chemical reaction or compressed gases (e.g. air) where the energy can be stored independent of the user are considered as projectile toys with stored energy. For example, in a rocket propelled by a mixture of vinegar and baking soda, the user initiates the reaction by mixing the two substances but no longer has control of the actual launching. The rocket will launch when the pressure build up overcomes the force that holds the rocket onto the launch platform.

3.53

projectile toy without stored energy

toy with a projectile propelled by energy imparted by the user or by means of a discharge mechanism incapable of storing energy independent of the user

3.54

protective cap, protective cover or protective tip

component that is attached to a potentially hazardous edge or projection to reduce the risk of injury

3.55

pull toy

toy that is intended to be pulled along the floor or ground

Note 1 to entry: Toys intended for children aged 36 months and over are not regarded as pull toys.

3.56

rattle

toy that is clearly designed to emit sound when shaken, typically intended for children who are too young to sit up unaided

3.57

reasonably foreseeable abuse

use of a toy under conditions or for purposes not intended by the supplier, but which can happen, induced by the toy in combination with, or as a result of, common behaviour in a child

EXAMPLE Deliberate disassembly, dropping or use of a toy for a purpose for which it was not intended.

Note 1 to entry: Tests simulating reasonably foreseeable abuse are given in 5.24 (reasonably foreseeable abuse tests).

3.58

reference box

hypothetical surface, which is the smallest rectangular parallelepiped that can enclose the toy without regard to minor appendages

3.59

removable component

part or component that is intended to be removed from the toy without the use of tools

3.60

resilient material

any material having a hardness value of less than 70 Shore A, measured in accordance with ISO 868

3.61

rigidity

hardness of material exceeding 70 Shore A, measured in accordance with ISO 868

3.62

risk

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

3.63

simulated protective equipment

toys designed to mimic products which infer some sort of physical protection to the wearer

EXAMPLE Protective helmets and visors.

3.64

soft-filled toy

stuffed toy

toy, clothed or unclothed, with soft body surfaces and filled with soft materials or a combination of soft and non-soft materials (e.g. pellets), allowing compression of the main part readily with the hand

Note 1 to entry: A soft-filled toy may only be filled with a combination of soft and non-soft material if the main part of the toy can still be readily compressed with the hand.

3.65

splinter

sharp pointed fragment

3.66

springs

3.66.1

helical spring

spring in the form of a coil

Note 1 to entry: See [Figure Z](#).

3.66.1.1

compression spring

helical spring which essentially returns to its initial state after compression

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3.66.1.2

extension spring

helical spring which essentially returns to its initial state after tension

3.66.2

spiral spring

clockwork-type spring

Note 1 to entry: See [Figure 8](#).



Figure 7 — Helical spring



Figure 8 — Spiral spring

3.67

squeeze toy

hand-held pliable toy, usually incorporating a noise-making feature activated by forcing air through an opening when flexed or squeezed and which usually recovers its original shape when released

3.68

table-top, floor and crib toy

toys intended to be played with while attached to or resting on a table top, floor or crib

3.69

teether

toy designed for oral use and intended primarily for symptomatic relief of teething discomfort

3.70

tool

screwdriver, coin or other object which may be used to operate a screw, clip or similar fixing device

3.71

toy

any product or material designed or clearly intended for use in play by children under 14 years of age

3.72

toy bicycle

two-wheeled vehicle, with or without stabilizers, with a maximum saddle height of 435 mm and which is propelled solely by the muscular energy of a child on that vehicle, in particular by means of pedals

3.73

toy chest

container with a hinged lid enclosing a volume greater than 0,03 m³, specifically designed for storing toys

3.74

toy scooter

ride-on toy which is propelled by the muscular action of the user or other means and may be foldable or not, intended for children with a body mass of 50 kg or less and comprised of at least one platform for standing, at least two wheels, and a steering system equipped with an adjustable or fixed-length steering tube

Note 1 to entry: The definition includes foldable and non-foldable toy scooters.

4 Requirements

4.1 Normal use

See [E.2](#).

All toys shall be tested in accordance with the relevant tests in [5.1](#) (general) to [5.22](#) (folding or sliding mechanisms) in order to ensure that risks as a result of normal wear and/or deterioration are minimized.

Toys labelled as washable shall be subjected to washing in accordance with [5.23](#) (washable toys).

After testing, the toy shall continue to conform to the relevant requirements of [Clause 4](#) (requirements).

4.2 Reasonably foreseeable abuse

See [E.3](#).

After normal use tests, toys intended for children under 96 months, unless otherwise stated, shall be tested in accordance with the relevant tests in [5.24](#) (reasonably foreseeable abuse tests) to ensure that risks as a result of reasonably foreseeable abuse are minimized.

After testing, the toy shall continue to conform to the relevant requirements of [Clause 4](#) (requirements).

4.3 Material

4.3.1 Material quality

See [E.4](#).

All materials shall be visually clean and free from infestation. The materials shall be assessed visually by normal corrected vision rather than under magnification.

4.3.2 Expanding materials

See [E.5](#).

Toys, removable components of toys, and components liberated from toys during testing in accordance with [5.24](#) (reasonably foreseeable abuse tests), which fit entirely in the small-parts cylinder when tested in accordance with [5.2](#) (small parts test), shall not expand by more than 50 % in any dimension when tested in accordance with [5.21](#) (expanding materials).

This requirement does not apply to seeds in growing kits.

4.4 Small parts

See [E.6](#).

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4.4.1 For children under 36 months

Toys intended for children under 36 months, removable components thereof and components liberated during testing in accordance with 5.2.4 (reasonably foreseeable abuse tests) shall not fit entirely, whatever their orientation, into the small parts cylinder when tested in accordance with 5.2 (small parts test).

The requirement also applies to fragments of toys, including, but not limited to, pieces of flash, slivers of plastics and pieces of foam or shavings.

The following are exempted before and after subjecting the toy to the tests according to Clause 5 (test methods):

- paper books and other articles made of paper and pieces of paper;
- writing materials such as crayons, chalk, pencils and pens;
- modelling clay and similar products;
- fingerpaints, water colours, paint sets and paint brushes;
- fuzz;
- balloons;
- textile fabric;
- yarn;
- elastic and string;
- audio and/or video discs which are not themselves small parts.

Guidance on categories of toys which can be considered as intended for children under 36 months is given in A.4.2 (toys appropriate for children under 3 years of age).

4.4.2 For children 36 months and over but under 72 months

Toys and toys containing removable components, intended for children 36 months and over but under 72 months, which fit entirely in the small parts cylinder when tested in accordance with 5.2 (small parts test), shall carry a warning (see B.2.3, small toys and toys containing small parts for guidance). See E.6 (small parts).

If the toy presents more than one of the following hazards:

- Small part(s), Small ball(s), or Marbles

it is sufficient if the toy or its packaging carries one of the relevant statements in B.2.3 or B.2.5 or a statement combining the multiple hazards present.

4.5 Shape, size and strength of certain toys

See E.7.

4.5.1 Squeeze toys, rattles, fasteners, and certain other toys and components of toys

4.5.1.1 General

Soft-filled (stuffed) toys or soft-filled parts of toys or parts made entirely of fabric are exempted from the requirements of 4.5.1.

4.5.1.2 Squeeze toys, rattles, and certain other toys and components of toys

The requirements of [4.5.1.2](#) apply to the following types of toys:

- squeeze toys intended for children under 18 months;
- rattles;
- teethingers and teething toys intended for children under 18 months;
- legs of baby gyms intended for children under 18 months;
- the following toys if they have a mass less than 0,5 kg and are intended for children under 6 months:
 - removable components of toys intended to be strung across a crib, playpen, or perambulator;
 - removable components of baby gyms.

The toys and components of toys listed above shall be designed so that no part of the toy protrudes past the base of test template A when tested in accordance with [5.3](#) (test for shape and size of certain toys).

The toys and components of toys listed above shall, if they have nearly spherical, hemispherical, or circular flared ends, be designed so that such ends do not protrude past the base of the supplemental test template B when tested in accordance with [5.3](#).

4.5.1.3 Other toys or components of toys with nearly spherical, hemispherical, circular flared, or dome-shaped ends of toys having a mass less than 0,5 kg and intended for children under 18 months

See [E.7](#).

The requirements of [4.5.1.3](#) apply only to toys or components of toys where the nearly spherical, hemispherical, circular flared, or dome-shaped end adjoins a shaft, handle, or support that has a smaller cross section.

Nearly spherical, hemispherical, circular flared, or dome-shaped ends of toys or components of toys shall be designed so that such ends do not protrude past the base of the supplemental test template B when tested in accordance with [5.3](#) (test for shape and size of certain toys).

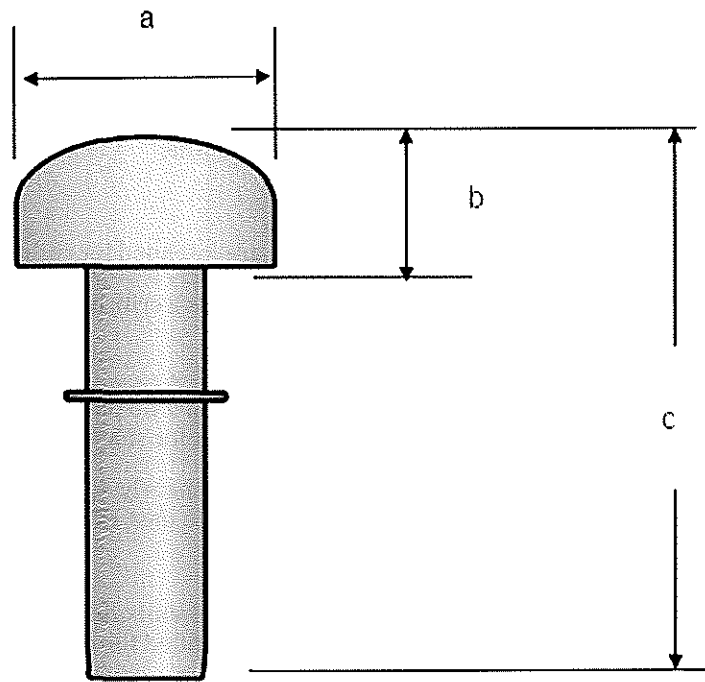
4.5.1.4 Toy fasteners (e.g. nails, bolts, screws, and pegs) with nearly spherical, hemispherical, or dome-shaped ends intended for children 18 months and over but under 48 months

See [E.7](#).

The requirements of [4.5.1.4](#) apply only to toy fasteners that meet all of the following criteria (see [Figures 9](#) and [10](#)):

- The nearly spherical, hemispherical, or dome-shaped end has a diameter of 15 mm or more.
- The distance from the apex of the toy fastener to the undercut is 44,4 mm or less.
- The overall length is 57,1 mm or more.

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Key

- a diameter of nearly spherical, hemispherical, or dome-shaped end, ≥ 15 mm
- b distance from the apex of the toy fastener to the undercut, $\leq 44,4$ mm
- c overall length, $\geq 57,1$ mm

Figure 9 — Dimensions of toy fasteners

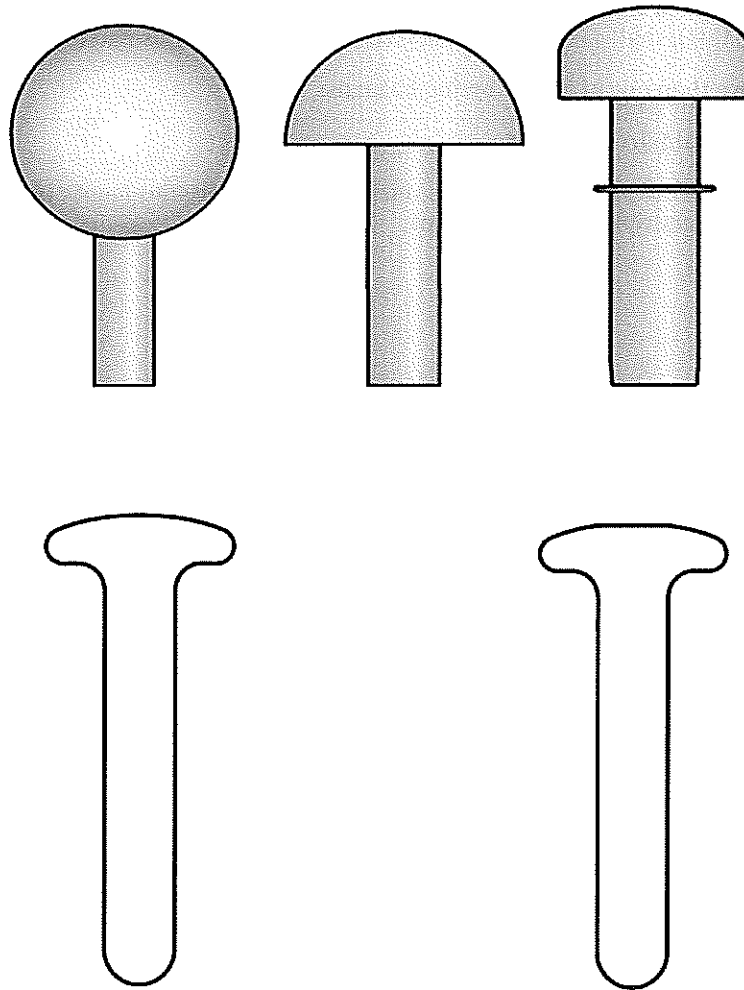


Figure 10 — Examples of toy fasteners

The requirements of [4.5.1.4](#) do not apply to toy fasteners

- with non-rigid ends or
- that are tethered to a toy where the weight of the combined toy/fastener is more than 0,5 kg and the length of the tether is less than 300 mm.

Nearly spherical, hemispherical, or dome-shaped ends of toy fasteners (e.g. nails, bolts, screws, and pegs) shall be designed so that such ends do not protrude past the base of the supplemental test template B when tested in accordance with [5.3](#) (test for shape and size of certain toys).

4.5.2 Small balls

A small ball is any ball that passes entirely through the template when tested in accordance with [5.4](#) (small balls test).

- a) Toys intended for children under 36 months shall not be small balls or contain removable small balls.

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- b) Toys intended for children 36 months and over, but under 96 months, which are small balls or contain removable small balls or small balls liberated after testing in accordance with 5.24 (reasonably foreseeable abuse test), shall carry a warning [see B.2.5 a), small balls and marbles for guidance].

If the toy presents more than one of the following hazards:

- Small part(s), Small ball(s), or Marbles

it is sufficient if the toy or its packaging carries one of the relevant statements in B.2.3 or B.2.5 or a statement combining the multiple hazards present.

4.5.3 Pompoms

See E.8.

Pompoms intended for children under 36 months, which become detached when tested in accordance with 5.24.6.3 (tension test for pompoms) shall not pass entirely through the test template when tested in accordance with 5.5 (test for pompoms). Any components, pieces or individual strands that are detached from the pompom during the torque or tension tests shall not be subjected to the test in 5.5.

4.5.4 Pre-school play figures

See E.9.

Except for soft play figures made of textiles, pre-school play figures intended for children under 36 months having

- a) a round, spherical or hemispherical end with tapered neck attached to a simple cylindrical shape without appendages, and
- b) an overall length not exceeding 64 mm (see Figure 11),

shall be designed so that the rounded end shall not be capable of entering and penetrating past the full depth of the cavity of the test template when tested in accordance with 5.6 (test for pre-school play figures). The requirement applies to figures with added or moulded features such as hats or hair, which retain the rounded shape of the end.

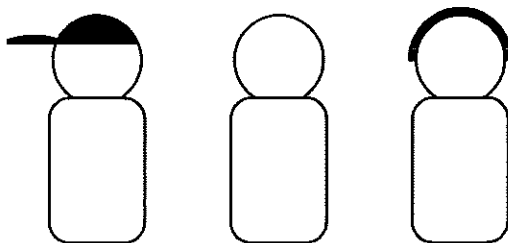


Figure 11 — Examples of pre-school play figures

4.5.5 Toy pacifiers

Toy pacifiers attached to or sold with toys intended for children under 36 months shall have a nipple length no longer than 16 mm. This dimension shall be measured from the nipple side of the shield to the end of the nipple.

NOTE Real pacifiers attached to or sold with toys shall comply with national regulations for real pacifiers.

4.5.6 Balloons

See also 4.10 (plastic film or plastic bags in packaging and in toys), 4.26 d) (mouth-actuated toys) and E.10 (balloons).

Balloons made of rubber latex shall carry a warning (see B.2.4, balloons for guidance).

4.5.7 Marbles

Toys intended for children 36 months and over, but under 96 months, which are marbles or contain removable marbles or marbles liberated after testing according to 5.24 (reasonably foreseeable abuse tests), or their packaging, shall carry a warning [see B.2.5 b) for guidance].

If the toy presents more than one of the following hazards:

- Small part(s), Small ball(s), or Marbles

it is sufficient if the toy or its packaging carries one of the relevant statements in B.2.3 or B.2.5 or a statement combining the multiple hazards present.

4.5.8 Hemispheric-shaped toys

See E.41.

The requirements for hemispheric-shaped toys apply to cup-shaped, bowl-shaped or one-half-of-an-egg-shaped toys having a nearly round, oval or elliptical opening with the dimensions of minor and major axes between 64 mm and 102 mm, a volume of less than 177 ml, a depth greater than 13 mm, and intended for children under 36 months.

Cup-shaped, bowl-shaped or one-half-of-an-egg-shaped toys shall, as a minimum, comply with at least one of the requirements in 4.5.8 a), b), c) or d) (hemispheric-shaped toys).

- a) The object shall have at least two openings which are at least 13 mm from the rim as measured along the outside contour:
 - if the openings are placed in the base of the object, at least two of the openings shall be at least 13 mm apart; see Figure 12 a);
 - if the openings are not placed in the base of the object, at least two of the openings shall be placed at least 30° but not more than 150° apart; see Figure 12 b).
- b) The plane of the opening to the cup shape shall be interrupted at the centre by some type of divider which extends to 6 mm or less from the plane of the opening. An example of an interruption includes a rib through the centre of the opening; see Figure 12 c).
- c) The object shall have three openings located between 6 mm and 13 mm from the rim and at least 100° degrees apart as measured along the outside contour.
- d) The object shall have a repeated scalloped-edge pattern around the entire rim. The maximum distance between centrelines of adjacent peaks shall be 25 mm and the minimum depth shall be 6 mm. See Figure 12 d) for examples of scalloped-edge patterns.

For the purpose of these requirements, an opening is defined as a hole of any shape with a minimum dimension of 2 mm.

The above-mentioned requirements apply before and after testing in accordance with 5.24 (reasonably foreseeable abuse test).

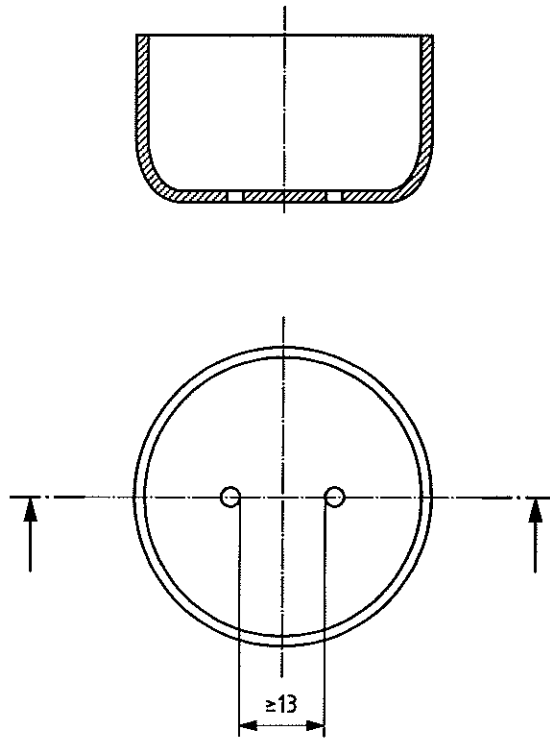
The following toys are exempt from these requirements:

- objects intended to hold liquids in products appropriate for children of 24 months and over (e.g. pots and pans);

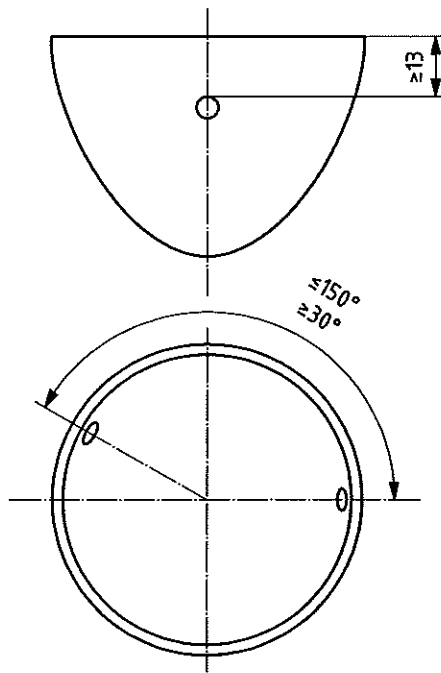
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- containers which must be airtight so that the contents can maintain their functional integrity (e.g. modelling clay containers);
- components of larger products which do not become detached when tested in accordance with 5.24 (e.g. a bowl-shaped smoke stack which is permanently attached to a toy train, or a swimming pool which is moulded into a larger toy playscape);
- containers that are part of packaging intended to be discarded once the toy is removed from the packaging.

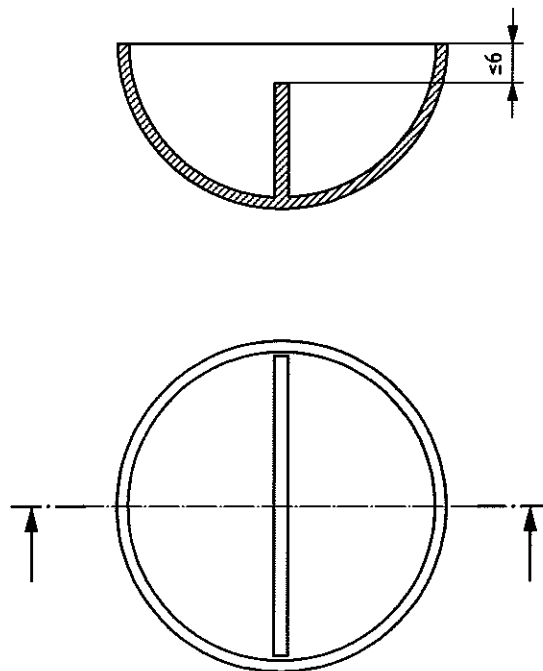
Dimensions in millimetres



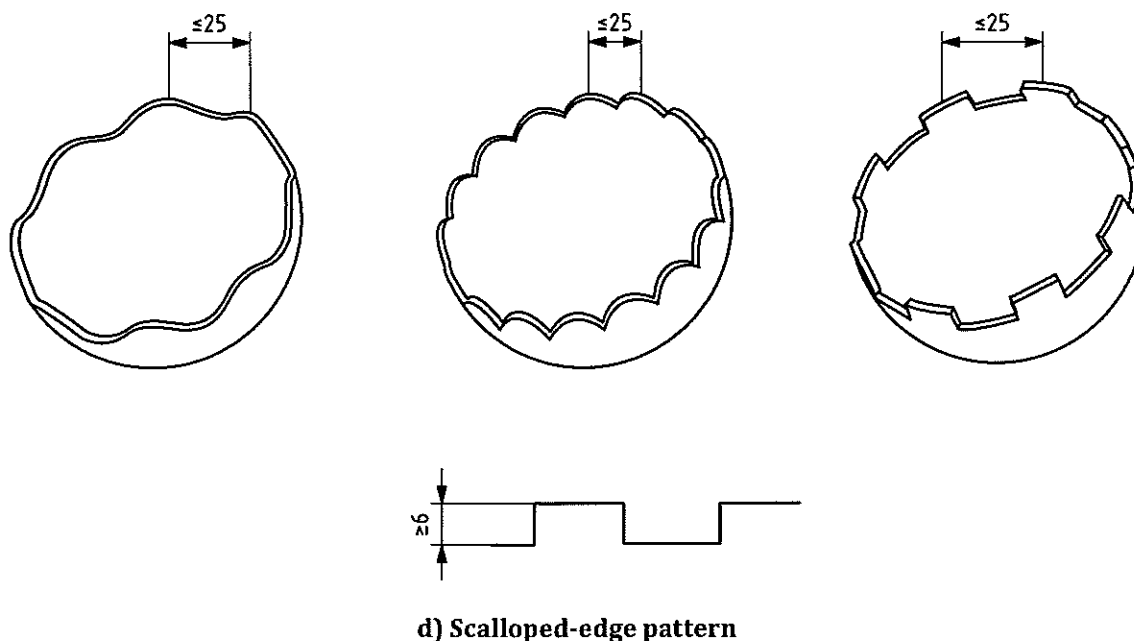
a) Openings in the base of the bowl



b) Opening placement



c) Rib-through-cup centre

ISO 8124-1:2014(E)**Figure 12 — Examples of hemispheric-shaped toys****4.6 Edges**

See E.11.

4.6.1 Accessible sharp edges of glass or metal

The accessible sharp edges of glass or metal on toys shall fulfil the following requirements.

- a) Accessible edges on toys intended for children under 96 months shall not be hazardous sharp edges of glass or metal when tested in accordance with 5.8 (sharp-edge test).

If an accessible edge fails the sharp-edge test as given in 5.8, the edge shall be assessed to determine whether it presents an unreasonable risk of injury, taking into account the foreseeable use and intended age grade of the toy.

- b) Potentially sharp glass or metal edges shall be considered non-accessible if they lie adjacent to a surface of the test sample, and any gap between the edge and the adjacent surface does not exceed 0,5 mm (e.g. in lap joints and hemmed edges, see Figure 3).
- c) Edges of pieces intended to serve as electrical conductors and microscope slides and cover slips are considered as functional edges and do not require a warning.

4.6.2 Functional sharp edges

The requirements below apply to toys which include functional sharp edges.

- a) Toys intended for children under 36 months shall not have accessible hazardous functional sharp edges.
- b) Toys intended for children 36 months and over but under 96 months, which by reason of their function (e.g. functional toy scissors and functional toy tool kits) necessarily include a sharp edge and which do not include any non-functional sharp edges are exempt from 4.6 (edges) provided the packaging carries a warning (see E.2.12, toys with functional sharp edges and functional sharp points for guidance).

4.6.3 Edges on metal toys

Accessible metal edges, including those of holes and slots, on toys intended for children under 96 months shall be free of hazardous burrs and feathering or shall be hemmed, rolled or curled (see [Figure 3](#)) or shall incorporate a permanently affixed protective equipment or finish.

Regardless of the manner in which edges are finished, they shall be subject to the sharp-edge test as given in [5.8](#) (sharp-edge test).

4.6.4 Edges on moulded toys

Accessible edges, corners or mould parting areas of moulded toys intended for children under 96 months shall be free of hazardous sharp edges produced by burrs and flash or so protected that hazardous sharp edges are not accessible.

4.6.5 Edges on exposed bolts or threaded rods

Accessible ends of threaded bolts or threaded rods shall be free of sharp edges and burrs, or the ends shall be covered by smooth protective caps so that sharp edges and burrs are not accessible. Any protective caps used shall be subjected to the compression test in [5.24.7](#) (compression test), regardless of whether or not the protective cap is accessible to flat-surface contact during the appropriate test(s) in [5.24](#) (reasonably foreseeable abuse tests). Protective caps shall also be subjected to [5.24.5](#) (torque test) followed by [5.24.6.1](#) (tension test).

4.7 Points

See [E.12](#).

4.7.1 Accessible sharp points

These requirements apply to toys having accessible sharp points

- a) Accessible points on toys intended for children under 96 months, shall not be hazardous sharp points when tested according to [5.9](#) (sharp-point test).

If an accessible point fails the sharp-point test as given in [5.9](#), the point shall be assessed to determine whether it presents an unreasonable risk of injury taking into account the foreseeable use and intended age grade of the toy.

Points of pencils and similar drawing implements are not considered sharp points.

- b) Potentially sharp points shall be considered non-accessible if they lie adjacent to a surface of the test sample and any gap between the point and the adjacent surface does not exceed 0,5 mm.
- c) Points, on toys intended for children under 36 months, whose largest cross-sectional dimension is 2 mm or less and which do not necessarily present a sharp point when tested in accordance with [5.9](#), are considered to be potentially hazardous sharp points. They shall therefore be assessed to determine whether or not they present an unreasonable risk of injury, taking into account the foreseeable use and intended age grade of the toy.

4.7.2 Functional sharp points

The requirements below apply to toys having functional sharp points.

- a) Toys intended for children under 36 months shall not have accessible hazardous functional sharp points.
- b) Toys intended for children 36 months and over but under 96 months, which by reason of their function necessarily present the hazard of sharp points and which do not have any non-functional sharp points are exempt from [4.7.1](#) (accessible sharp points) (e.g. a toy sewing machine with a

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needle), provided the packaging carries a warning (see [B.2.12](#), toys with functional sharp edges and functional sharp points for guidance).

4.7.3 Wooden toys

The accessible surfaces and edges of wood used in toys shall be free of splinters.

4.8 Projections

4.8.1 General requirements

See [E.13](#).

These requirements are intended to address the hazards associated with the users of toys falling on projections or on rigid components possibly causing skin puncture or internal injury.

If a projection presents a skin puncture hazard, the projection shall be protected by suitable means, such as turning back the end of a wire or by affixing a smoothly finished protective cap or cover, which effectively increases the surface area for potential contact with the skin. The protective cap or cover shall not become detached when tested in accordance with [5.24](#) (reasonably foreseeable abuse tests).

If a rigid handlebar presents a potential internal injury hazard or a skin puncture hazard, it shall be equipped with handle-grips with enlarged ends. Ends of tubes that present a potential internal injury hazard or a skin puncture hazard shall be equipped with end plugs or other means of protection at the end of the tube.

Handle grips, end plugs, and other protective devices shall not become detached when subjected to a removal force of 70 N.

Since this requirement relates to hazards arising from a child falling on a toy, only vertical or nearly vertical projections shall be evaluated. However, the toy and its projection shall be tested in the most onerous position.

Toys intended to be repeatedly assembled and taken apart shall have the individual pieces and fully assembled articles, as shown on packaging graphics, instructions, or other advertising, evaluated separately. The requirements for the assembled toy do not apply to toys for which the assembling makes up a significant part of the play value of the toy.

4.8.2 Special considerations for bath toy projections

Rigid projections on toys designed primarily for use in the bath tub pose a specific hazard that can result in serious penetration and impalement injuries. Design guidelines that intend to minimize penetration and impalement hazards are presented in [Annex F](#) (bath toy projection design guidelines)

As there are no objective means for determining conformance with these guidelines, they are not to be used to judge compliance with this International Standard.

4.9 Metal wires and rods

See [E.14](#).

- a) Wires and other metallic components that are designed and intended to be bent, for example, to change the shape or position of a toy or part of a toy (e.g. in soft-filled toys) shall not break and produce hazardous sharp points, or protrude through any surface covering of the toy, when tested according to [5.24.8.2](#) (wires and other metallic components intended to be bent).
- b) Wires that are not designed to be bent, but are likely to occasionally or accidentally be bent during play, shall not break and produce hazardous sharp points, or protrude through any surface covering of the toy, when tested according to [5.24.8.3](#) (wires likely to be bent).

- c) The ends of spokes on toy umbrellas shall be protected. If the protection is removed when tested according to 5.24.6.4 (tension test for protective components) the ends of the spokes shall be free from sharp edges and sharp points when tested in accordance with 5.8 (sharp-edge test) and 5.9 (sharp-point test). Furthermore, if the protective components are removed by the tension test, the spokes shall have a minimum diameter of 2 mm and the ends shall be smooth, rounded and approximately spherical with no burrs.

4.10 Plastic film or plastic bags in packaging and in toys

See E.15.

These requirements do not apply to shrink film which is in the form of an overwrap, which would normally be destroyed when the packaging is opened.

Flexible plastic film or flexible plastic bags without backing and with a minor dimension of > 100 mm and used in toys shall either:

- have an average thickness of $\geq 0,038$ mm and individual thickness of $\geq 0,032$ mm when tested in accordance with 5.10 (determination of thickness of plastic film and sheeting), or
- have perforations with well-defined holes (where material has been removed) of 1 % minimum area on any maximum area of dimensions 30 mm \times 30 mm. See Figure 13.

NOTE The requirement in 4.10 b) can be fulfilled by having 3,4 mm diameter holes in a square grid pattern where the vertical and horizontal distance between the centre of two holes is 22,9 mm or less (the area of a 3,4 mm hole is larger than 9 mm² which is more than 1 % of 900 mm² (30 mm \times 30 mm)).

For plastic balloons, the thickness requirement in a) applies to double layers of plastic sheeting (i.e. the thickness is measured without inflating or destroying the balloon).

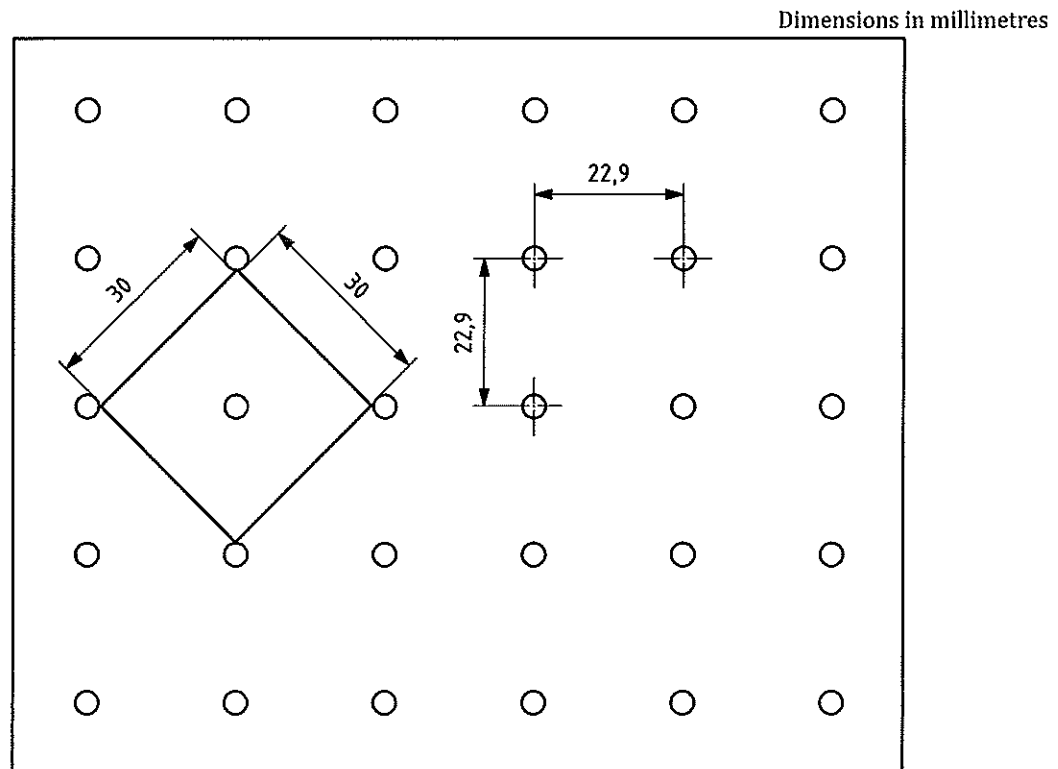


Figure 13 — Example of perforation pattern

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4.11 Cords and elastics

See [E.16](#).

4.11.1 Cords and elastics in toys intended for children under 18 months

The free length of cords or elastics which can tangle to form a loop or a fixed noose, included with or attached to toys, shall be less than 220 mm in length when measured under a tension of (25 ± 2) N.

If cords or elastics or multiple cords or multiple elastics can tangle and/or form a noose or a fixed loop in connection with any part of the toy, including beads or other attachments on the ends of cord or elastics, the perimeter of the noose or the fixed loop shall be less than 360 mm when measured under a tension of (25 ± 2) N.

Cords and elastics on toys shall have a mean thickness (smallest dimension) of 1,5 mm or more when measured in accordance with [5.11.1](#) (determination of cord thickness). This does not apply to ribbons.

4.11.2 Self-retracting pull cords in toys intended for children under 18 months

Accessible cords used in cord-activated mechanisms shall not retract more than 6,4 mm when tested according to [5.11.2](#) (self-retracting pull cords).

4.11.3 Cords for pull toys intended for children under 36 months

Cords and elastics for pull toys intended for children under 36 months, with a length of more than 220 mm when measured under a tension of (25 ± 2) N, shall not be provided with beads or other attachments which could tangle to form a noose or a fixed loop.

4.11.4 Cords on toy bags

Toy bags made of impermeable material with an opening perimeter greater than 360 mm shall not have a drawstring or a cord as a means of closing (see also [4.10](#), plastic film or plastic bags in packaging and in toys).

4.11.5 Crib or playpen toys and mobiles

Mobiles intended to be attached to a crib or playpen shall be accompanied by instructions which draw attention to the hazard of not removing the mobile when a baby begins to push up on hands and knees. Instructions shall also include directions for correct assembly (see [B.2.7](#), crib gyms and similar toys and [B.3.2](#), crib, playpen toys and mobiles for guidance). See [E.16](#) (cords and elastics).

Design guidelines for toys intended for attachment to cribs and playpens are given in [Annex C](#) (design guidelines for toys attached to cribs or playpens).

4.11.6 Crib gyms and similar toys

Crib gyms, including crib exercisers, and similar toys intended to be strung across a crib playpen or perambulator (see [E.16](#), cords and elastics) shall be accompanied by instructions which draw attention to the hazard of not removing the gym when a baby begins to push up on hands and knees. Instructions shall also include directions for correct assembly (see [B.2.10](#), crib gyms and similar toys and [B.3.3](#), crib gyms and similar toys for guidance).

Design guidelines for toys intended for attachment to cribs and playpens are given in [Annex C](#) (design guidelines for toys attached to cribs or playpens).

4.11.7 Cords, strings and lines for flying toys

Hand-held cords, strings and lines over 1,8 m long, attached to toy kites or other flying toys, shall have an electrical resistance of more than 10^8 Ω /cm when tested in accordance with [5.11.3](#) (electric resistance of cords).

Toy kites and other flying toys shall carry a warning (see B.2.16, toy kites for guidance).

4.12 Folding mechanisms

See E.17.

4.12.1 Toy pushchairs, perambulators and similar toys

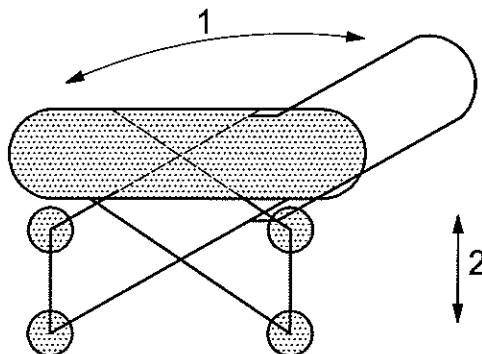
The requirements in 4.12.1 do not apply to toys with a potential sitting surface width of less than 140 mm.

Toy pushchairs, strollers, perambulators and similar toys with folding and sliding mechanisms shall conform to the following requirements.

- a) Toys with a handle or other structural member which can fold down over a child shall:
- 1) have at least one main locking device and at least one secondary locking device, both of which act directly on the folding mechanism,
 - 2) have at least one of the locking devices which automatically engages when the toy is erected,
 - 3) not collapse and neither shall any of the locking devices fail or disengage, when the toy is tested in accordance with 5.22.2 (toy pushchairs and perambulators),
 - 4) be considered as having one locking device, if the toys comprise two devices of the same construction (e.g. locking rings), one on the left-hand side and one on the right-hand side,
 - 5) be subjected to the test given in 5.22.2 with one of the locking devices disengaged, if it is a toy pushchair or perambulator which can be partially erected without one of the locking devices being engaged.

NOTE 1 Partially erect means erected in such a way that the user might wrongly believe the toy to be fully erect.

NOTE 2 An example of a toy pushchair or perambulator covered by 4.12.1 a) (toy pushchairs, perambulators and similar toys) is illustrated in Figure 14.



Key

- 1 direction of handle movement
2 direction of chassis movement

Figure 14 — Toy pushchair or perambulator covered by 4.12.1 a)

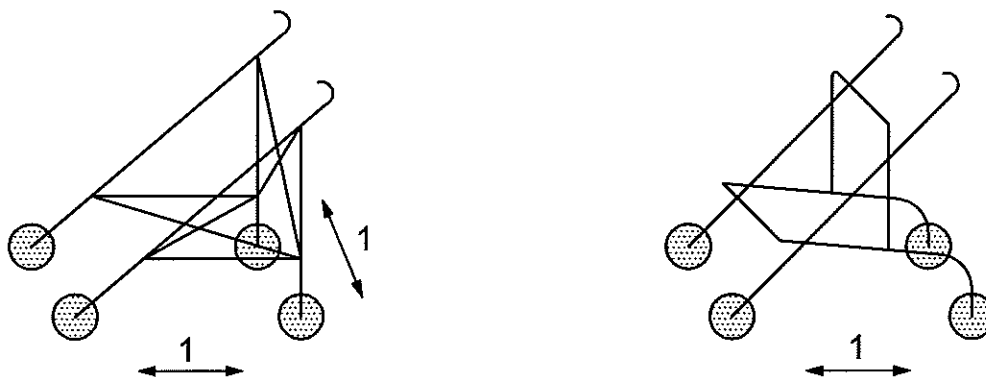
- b) Toy pushchairs and perambulators that do not present a hazard of a handle or other structural member folding down over a child shall:
- 1) have at least a locking device or a safety stop, which may be manual in operation,

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- 2) not collapse and neither shall the locking device or safety stop fail or disengage, when tested according to 5.22.2 (toy pushchairs and perambulators),
- 3) be subjected to the test given in 5.22.2 if it is a toy pushchair or perambulator which can be partially erected without a locking device being engaged (see Note 1).

NOTE 1 Partially erect means erected in such a way that the user might wrongly believe the toy to be fully erect.

NOTE 2 Examples of toy pushchairs and perambulators covered by 4.12.1 b) (toy pushchairs, perambulators and similar toys) are illustrated in Figure 15.



Key

1 direction of chassis movement

Figure 15 — Toy pushchairs covered by 4.12.1 b)

4.12.2 Other toys with folding mechanisms

See E.18.

Play furniture and other toys in which a folding mechanism, arm or brace is capable of supporting a child or a comparable mass shall either:

- a) have a safety stop or locking device to prevent unexpected or sudden movement or collapse of the toy. The toy shall not collapse when tested in accordance with 5.22.3 (other toys with folding mechanisms), or
- b) have adequate clearance between moving parts to protect the fingers and toes against crushing or laceration in the event of sudden movement or collapse of the toy. If it is possible to insert a 5 mm diameter rod between moving parts, it shall also be possible to insert a 12 mm diameter rod.

4.12.3 Hinge-line clearance

See E.19.

Toys having a gap or clearance along the hinge line between a stationary portion and a movable portion which weighs more than 0,25 kg, shall be so constructed that if the accessible gap at the hinge line will admit a 5 mm diameter rod, it shall also admit a 12 mm diameter rod at all positions of the hinge.

4.13 Holes, clearances and accessibility of mechanisms

4.13.1 Circular holes in rigid materials

See E.20.

For toys intended for children under 60 months, if an accessible circular hole in any rigid material less than 1,58 mm in thickness can admit a 6 mm diameter rod to a depth of 10 mm or greater, it shall also admit a 12 mm diameter rod.

4.13.2 Accessible clearances for movable segments

See E.21.

For toys intended for children under 96 months, if accessible clearances for movable segments can admit a 5 mm diameter rod, they shall also admit a 12 mm diameter rod.

4.13.3 Chains or belts in ride-on toys

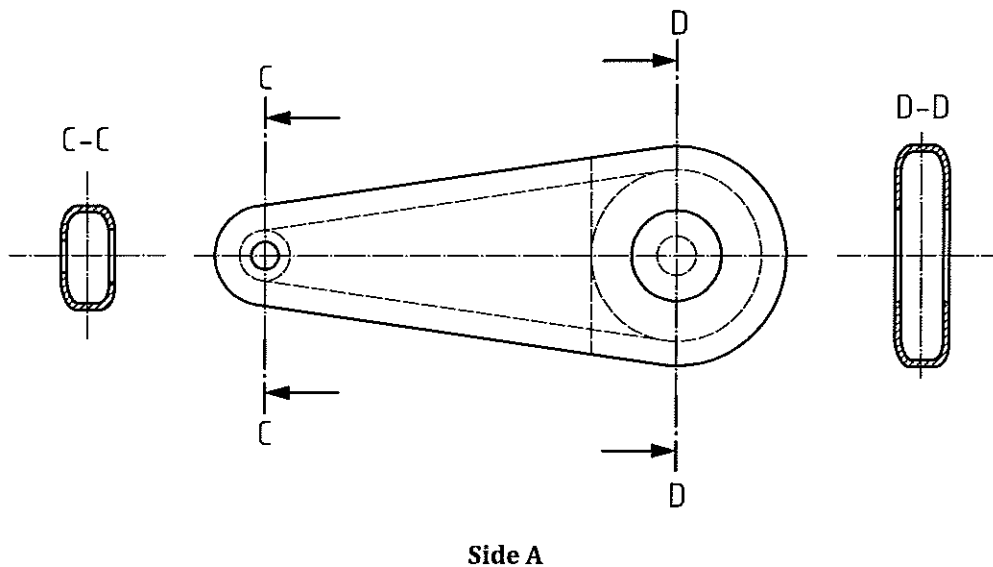
See E.22.

Power transmission chains and belts in ride-on toys shall have a shield from, and including, the driving chain- or belt-wheel to, and including, the driven chain- or belt-wheel at the side(s) where the limb of a child is nearest the chain or belt (see Figure 16, side A). There shall also be a shield around the driving chain- or belt-wheel on any side (see Figure 16, side B) where the chain or belt is separated from the limb of the child (e.g. by a frame on a bicycle).

NOTE A toy could have two sides "A".

The shield shall be such that the chain or belt and any chain- or belt-wheels are not accessible from side A and that the junction between the chain or belt and the chain- or belt-wheel is not accessible from side B (if any) when tested according to 5.7 (accessibility of a part or component).

It shall not be possible to remove the shield without the use of a tool.



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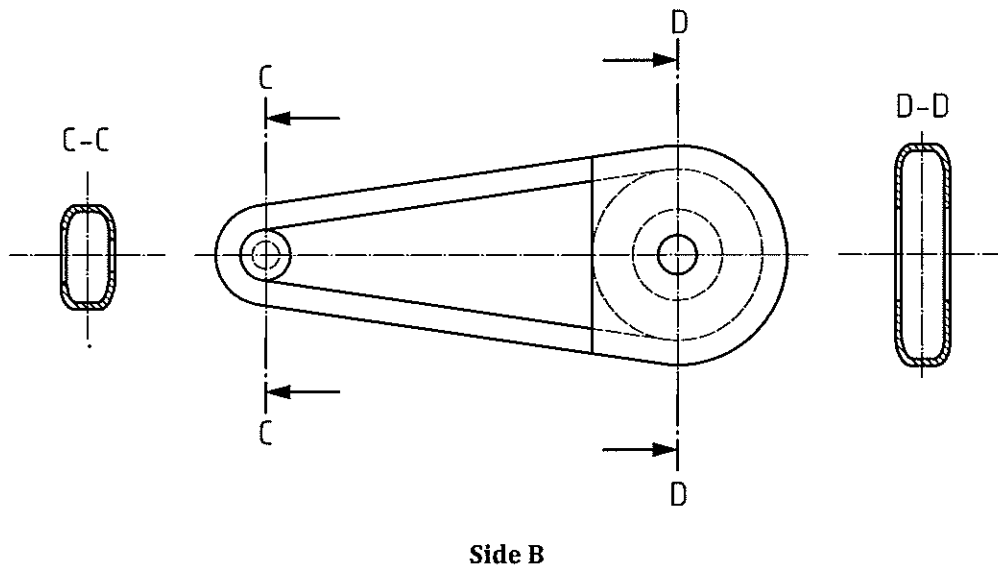


Figure 16 — Propelling chains and chain shields

4.13.4 Other driving mechanisms

See E.23.

Clockwork, battery-operated, inertial, or other power-driven mechanisms in toys shall be so enclosed that they do not expose accessible sharp edges or sharp points or otherwise present a hazard of crushing the fingers or other parts of the body.

4.13.5 Winding keys

See E.24.

This requirement applies to toys intended for children under 36 months which use winding keys that rotate as the mechanism unwinds. The requirement applies to keys with flat plates attached to the stem, and which protrude from a rigid surface of the body of the toy.

If the clearance between the flukes of the key and the body of the toy can admit a 5 mm diameter rod, it shall also admit a 12 mm diameter rod at all positions of the key. For keys covered by this requirement, there shall be no opening in the flukes of the key which can admit a 5 mm diameter rod.

4.14 Springs

See E.25.

Springs shall comply with the following:

- Spiral springs shall not be accessible if the gap between two consecutive spirals is greater than 3 mm in any position of use.
- Extension helical springs shall not be accessible if the gap between two consecutive turns is greater than 3 mm when the spring is subjected to a tensile force of 40 N.

This requirement does not apply to springs which do not essentially return to their original position after unloading.

- c) Compression helical springs shall not be accessible if the gap between two consecutive turns is greater than 3 mm at rest and the spring, when the toy is used, can be subjected to a compression force of 40 N or more.

This requirement does not apply to springs which do not essentially return to their original position after loading with a force of 40 N, nor to springs wound around a second component of the toy (for example a guiding rod) so that it is not possible to insert the accessibility probe A (see 5.7, accessibility of a part or component) between consecutive coils further than 5 mm.

4.15 Stability and overload requirements

4.15.1 Stability of ride-on toys and seats

The requirements in 4.15.1.1 to 4.15.1.3 apply to ride-on toys, rocking toys (e.g. rocking horses) and stationary toys with seats, such as play furniture intended for children under 60 months. Ride-on toys of spherical, cylindrical or other shapes, which do not normally have a stable base (for example toy bicycles and similar toys) are not covered by these requirements.

NOTE Stability requirements for toy scooters with a stable base are given in 4.30.4 (stability).

4.15.1.1 Sideways stability, feet available for stabilization

See E.26.

Ride-on toys and stationary toys with seats, where the height of the seat from the ground is 27 cm or more and where the feet and/or legs of the child are unrestricted in their sideways motion and thus are available for stabilization, shall not tip over when tested in accordance with 5.12.2 (sideways stability test, feet available for stabilization).

4.15.1.2 Sideways stability, feet unavailable for stabilization

See E.26.

Ride-on toys and stationary toys with seats, where the feet and/or legs of the child are restricted in their sideways motion, such as by the enclosed sides of a toy automobile, shall not tip over when tested in accordance with 5.12.3 (sideways stability test, feet unavailable for stabilization).

4.15.1.3 Fore and aft stability

See E.27.

Ride-on toys and stationary toys with seats, where the rider cannot easily use his/her legs for stabilization, shall not tip forward or backward when tested in accordance with 5.12.4 (fore and aft stability test).

4.15.2 Overload requirements for ride-on toys and seats

See E.28.

Ride-on toys, stationary toys with seats and toys designed to support all or part of the mass of a child shall not collapse when tested in accordance with 5.12.5 (overload test for ride-on toys and seats) and 5.24.4 (dynamic strength test for wheeled ride-on toys). The requirements in 4.15.2 do not apply to toy scooters (which are instead covered by the requirements in 4.30.3, strength).

Manufacturers are recommended to consider the strength of the seat and seat pillar under dynamic conditions.

4.15.3 Stability of stationary floor toys

See E.29.

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Stationary floor toys greater than 760 mm in height and weighing more than 4,5 kg shall not tip over when tested in accordance with 5.12.6 (stability test of stationary floor toys).

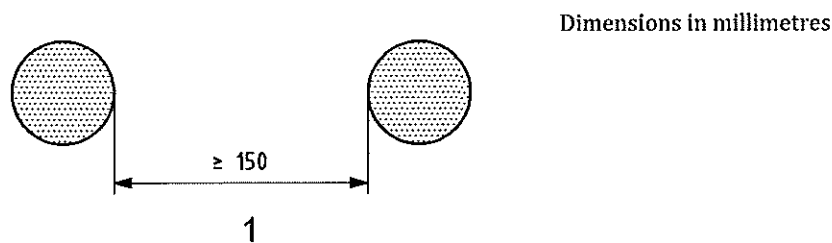
4.16 Enclosures

See E.30.

4.16.1 Ventilation

Any toy, made of impermeable material and having a door or lid, which encloses a continuous volume greater than 0,03 m³ and in which all internal dimensions are 150 mm or more, shall provide means for breathing by the incorporation of unobstructed ventilation openings. These ventilation openings shall consist of a minimum of either two openings, each having a total area of at least 650 mm² and placed at least 150 mm apart or one opening which is the equivalent of the two 650 mm² openings expanded to include the separation area (see Figure 17).

The ventilation opening shall remain unobstructed when the toy is placed on the floor in any position and adjacent to two vertical plane surfaces meeting at a 90° angle, so as to simulate the corner of a room. If a permanent partition or bars (two or more) effectively limit the continuous space by making the largest internal dimension less than 150 mm, the ventilation opening shall not be required.



Key

- 1 total ventilation area, 1 300 mm² or more
- 2 alternative equivalent ventilation, 1 300 mm² or more

Figure 17 — Example of an equivalent single ventilation opening

4.16.2 Closures

4.16.2.1 Lids, doors and similar devices

Closures, such as lids, covers and doors or devices similar to enclosures shall not be fitted with automatic locking devices.

Closures shall be of a type which can be opened with a force ≤ 45 N when tested in accordance with 5.13.1 (closures).

This requirement notably precludes the use of buttons, zips and similar fastenings on lids, covers and doors.

4.16.2.2 Lid support for toy chests and similar toys

The requirements for lid support for toy chests and similar toys are the following.

- a) Toy chests and similar toys with vertically opening hinged lids shall be provided with lid-support mechanisms to prevent sudden collapse or dropping of the lid. The lid-support mechanism shall support the lid so that at no position in the arc of travel of the lid, from within 50 mm of the fully closed position through an arc not to exceed 60° from the fully closed position, shall it drop more

than 12 mm under the influence of its own mass, except in the last 50 mm of travel. The test shall be conducted in accordance with 5.13.2.1 (lid support).

The lid-support mechanism shall comply with this requirement before and after being subjected to 7 000 opening and closing cycles, as described in 5.13.2.2 (durability test for toy chest lids).

- b) The lid-support mechanism shall not require adjustment by the consumer to ensure adequate lid support nor shall it require adjustment in order to comply with 4.16.2.2 a) after being cycled in accordance with 5.13.2.2.
- c) The lid and lid-support mechanism shall comply with the requirements in 4.12 (folding mechanism).
- d) Toy chests shall be accompanied by instructions for proper assembly and maintenance (see B.3.4, toy chests for guidance).

4.16.3 Toys that enclose the head

Toys that enclose the head, such as space helmets, and which are made of impermeable material shall provide means for breathing by the incorporation of unobstructed ventilation areas close to the mouth and nose area. These ventilation areas shall consist of a minimum of either two holes, each hole having a total area of at least 650 mm² and placed at least 150 mm apart, or one opening which is equivalent to the two 650 mm² holes expanded to include the separation area (see Figure 17).

4.17 Simulated protective equipment, such as helmets, hats and goggles

See E.31.

All rigid toys that cover the face, such as goggles, space helmets or face shields, when tested in accordance with 5.14 (impact test for toys that cover the face), shall not produce sharp edges, sharp points or loose parts which could enter the eye. This applies to toys with cut-out eye holes as well as items that cover the eyes.

Toys that simulate safety protective equipment and are intended to be worn by children (examples include but are not limited to construction helmets, sports helmets and fire-fighter helmets) and their packaging shall carry a warning (see B.2.11, simulated protective equipment for guidance).

4.18 Projectile toys

See E.32.

4.18.1 General

- a) The requirements of 4.18.2 a), b), c) (projectiles) and 4.18.3 b) to d) (projectile toys with stored energy) do not apply to projectiles where the maximum range of the discharged projectile is 300 mm or less when measured in accordance with 5.35 (determination of projectile range).
- b) The requirement of 4.18.3 a) does not apply to projectile toys for children 3 years and over with a range of 100 mm or less when measured in accordance with 5.35 (determination of projectile range).
- c) The requirements of 4.18.2, 4.18.3 and 4.18.4 (projectile toys without stored energy) do not apply to:
 - components that function as projectiles which are permanently enclosed within a toy unless they are liberated when the outer container is tested according to 5.24 (reasonably foreseeable abuse tests);
 - ground based toys propelled along a track or launched onto another surface.

NOTE These are not considered to be projectile toys even if they include an element of motion in free flight, for example leaps between tracks or surfaces.

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4.18.2 Projectiles

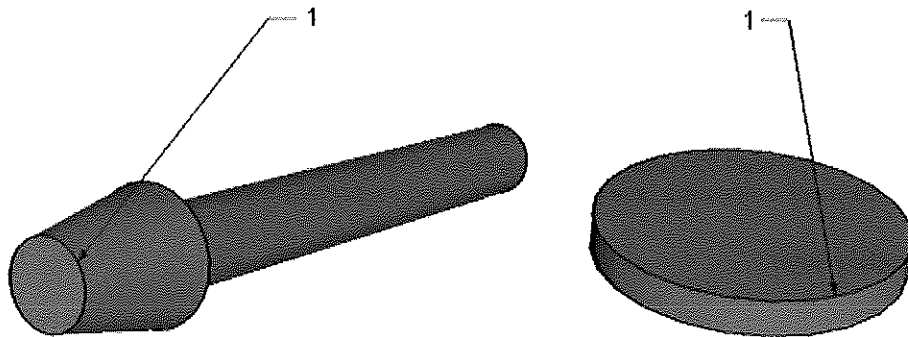
Projectile toys shall conform to the following requirements:

- a) Tips or leading edges on rigid projectiles shall not protrude beyond the depth of the gauge shown in [Figure 44](#) when tested according to [5.36](#) (tip assessment of rigid projectiles).
- b) The leading edge(s) of a projectile, as well as any corners that are adjacent to the leading edge(s), shall be smooth and free of points, burrs, flash or similar projections.
- c) For rigid projectiles discharged by projectile toys with stored energy, the corners of the projectile that are adjacent to the leading edge(s) shall have rounded edges. For purposes of this requirement a radius of 0,25 mm shall be considered sufficient. This requirement does not apply to projectiles made from paper or paperboard.

NOTE 1 There may be multiple leading edges that require evaluation, especially in situations where the projectile may travel in irregular or unpredictable orientations (e.g. tumbling).

NOTE 2 To determine if a leading edge and/or adjacent corner can strike the eye, the spherical shape of the eyeball should be considered, as well as the size and shape of the projectile relative to the eye, the regularity or predictability of the flight path, and any other relevant factors.

See [Figure 18](#) for examples of corners adjacent to leading edges.



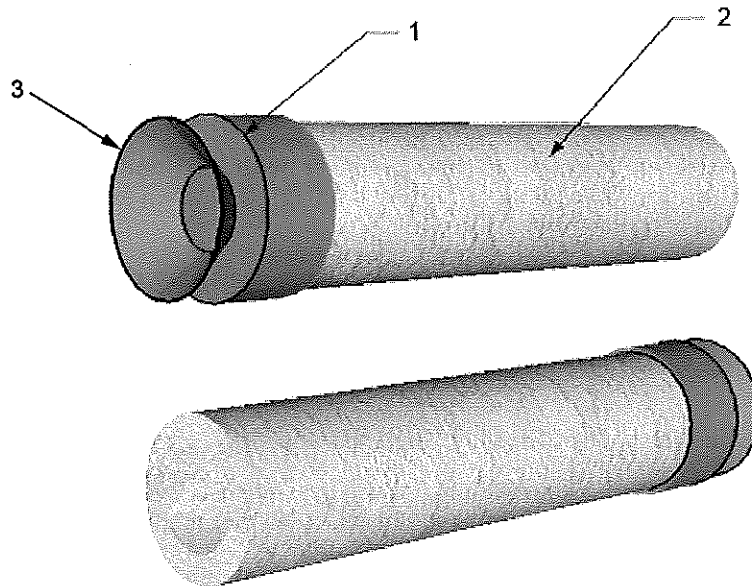
Key

- 1 corners adjacent to leading edges

Figure 18 — Examples of corners adjacent to leading edges on missile and disc-type projectiles

- d) Projectiles with a suction cup as a contact surface shall have a length of 57 mm or more when measured according to [5.37](#) (length of suction cup projectiles) before and after testing according to [5.24.5](#) (torque test) and [5.24.6.5](#) (tension test for a projectile with a suction cup). This requirement does not apply to:
 - projectiles with a suction cup that does not pass entirely through test template C when tested according to [5.4](#) (small balls test), or

- foam shaft projectiles which are 57 mm or more in the as received state when measured according to 5.3.7, and where the suction cup has a diameter, measured in the relaxed state, that is less than or equal to the diameter of the foam shaft (see Figure 19).



Key

- 1 plastic collar
- 2 foam
- 3 suction cup

Figure 19 — Foam projectile with suction cup diameter less than or equal to the diameter of foam shaft

NOTE 3 The requirement of 4.18.2 d) applies to both suction cups that have been separately affixed to the shaft and to those that are integral with the shaft (i.e. one-piece mouldings).

- e) Suction cups on projectiles with a suction cup as a contact surface shall not detach when tested according to 5.24.5 and 5.24.6,5 unless:
 - the detached suction cup does not pass entirely through test template C when tested according to 5.4, and the exposed shaft end complies with 4.8 (projections), or
 - the suction cup is on a foam projectile where the suction cup diameter, when measured in the relaxed state, is less than or equal to the diameter of the foam shaft. See Figure 19.

NOTE 4 The requirement of 4.18.2 e) applies to both suction cups that have been separately affixed to the shaft and to those that are integral with the shaft (i.e. one-piece mouldings).

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4.18.3 Projectile toys with stored energy

Projectile toys with stored energy shall conform to the following requirements:

- a) Projectiles shall not, whatever their orientation, fit entirely into the small parts cylinder when tested in accordance with [5.2](#) (small parts test). This requirement applies before and after testing in accordance with [5.24](#) (reasonably foreseeable abuse testing) and [5.15.2](#) (wall impact test for projectiles).

NOTE 1 This requirement applies to projectile toys intended for children 3 years and over unless excluded by [4.18.1 b\)](#) (general).

This requirement does not apply to:

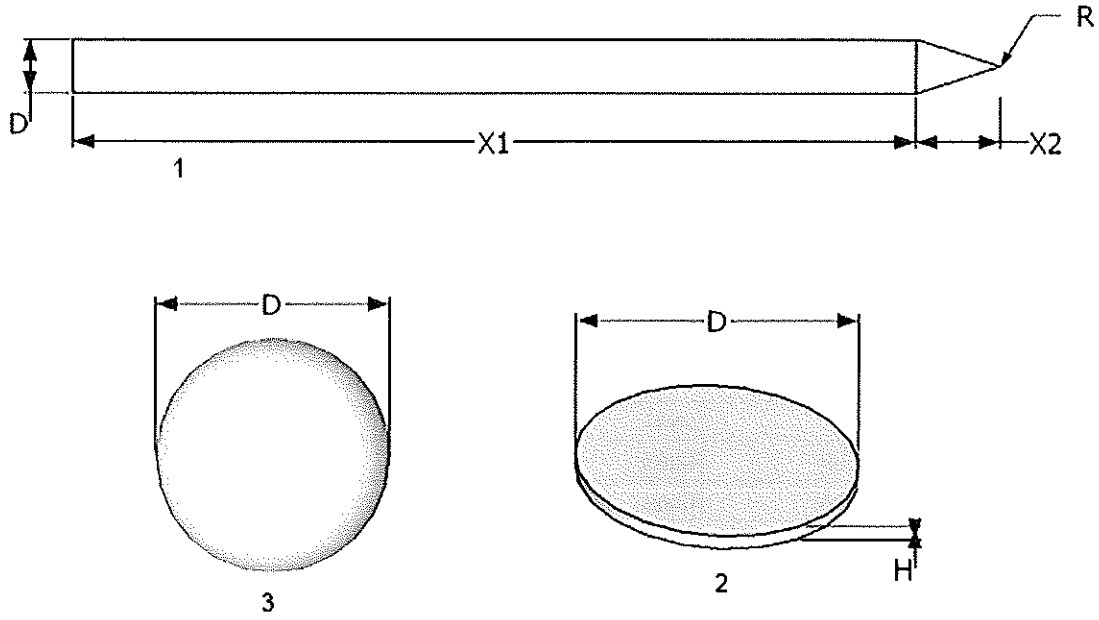
- small parts that are released after testing in accordance with [5.24](#) and [5.15.2](#) that cannot be discharged or are unable to travel a distance greater than 100 mm when measured in accordance with [5.35](#) (determination of projectile range);
 - small parts of foam that are released from projectiles whose shafts are completely made of foam following testing in accordance with [5.24](#) and [5.15.2](#).
- b) Projectiles with a kinetic energy greater than 0,08 J when tested according to [5.15.1](#) (kinetic energy of projectiles) shall:
- have a contact surface(s) made of a resilient material, and
 - be accompanied by a warning about aiming at the eyes or face [see [B.2.15 a\)](#)], projectile toy for guidance). This requirement only applies to projectiles that might reasonably be able to be aimed at the face (see [E.32](#), projectile toys), and
 - have a kinetic energy per unit area not greater than 2 500 J/m² when tested according to [5.15.1.3.3](#) (determination of kinetic energy per area of contact).
- c) Where a protective cap, cover or tip is used it shall either:
- not become detached from the projectile when tested in accordance with [5.24.5](#) (torque test) and [5.24.6.4](#) (tension test for protective components), or
 - if the protective cap, cover or tip becomes detached and if any resulting component can still be discharged from the discharge mechanism, the toy shall continue to comply with the requirements of [4.18.3](#).
- d) When tested in accordance with [5.15.2](#), projectiles shall not produce a hazardous sharp edge or a hazardous sharp point and shall continue to meet the requirements of [4.18.3](#).
- e) The discharge mechanism shall be designed so that it is unable to launch the improvised projectiles, specified in [Figure 20](#) and [Table 1](#), in a manner determined to be hazardous.

NOTE 2 The discharge mechanism shall be assessed in the form in which it is supplied in the toy, i.e. there shall be no user modifications.

NOTE 3 Improvised projectiles that travel a distance of 300 mm or less when discharged are not considered to be hazardous [see [4.18.1 a\)](#)].

When evaluating the ability of a discharge mechanism to launch improvised projectiles in a hazardous manner, consideration should be given to the following factors:

- the repeatability and ease of loading and then launching the improvised projectile;
- the orientation of the discharge mechanism;
- the distance travelled by the improvised projectile;
- other factors considered to be relevant.



Key

- 1 cylindrical shaft
- 2 disc
- 3 sphere

Figure 20 — Improvised projectiles

ISO 8124-1:2014(E)**Table 1 — Dimensions of improvised projectiles shown in Figure 20**

Dimensions in millimetres

Designation	Name	Material	Diameter <i>D</i>	Shaft length	Length of cone	Radius of tip ^a	Thickness
				X1	X2	<i>R</i>	<i>H</i>
Cylindrical Shafts							
A	Pencil	Hardwood	7	155	15	0,5	
B	Long nail / pen refill	Aluminium	3	100	5	0,1	
C	Pen refill	Aluminium	3	50	5	0,1	
D	Short nail / toothpick	Aluminium	1,5	50	2,3	0,05	
E	Toothpick	Aluminium	1,5	25	2,3	0,05	
Spheres							
F	Steel ball	Steel	8				
G	Small marble	Glass	16				
H	Large marble	Glass	25				
Discs							
I	Small coin	Steel	15				1,5
J	Medium coin	Steel	20				2
K	Medium/large coin	Steel	25				3
L	Large coin	Steel	30				3
^a Radius on shaft tips are non-critical dimensions.							

4.18.4 Projectile toys without stored energy

Projectile toys without stored energy that might reasonably be able to be launched at the face, should be accompanied by instructions for use, which draw attention to the hazards of aiming at eyes or face [see B.2.15 b), projectile toys]. This requirement does not apply to projectile toys intended to be thrown towards people, e.g. flying discs, balls and similar objects.

4.18.4.1 Mouth-actuated projectile toys

Mouth-actuated projectile toys shall not permit the intended projectile to pass through the mouthpiece when tested according to 5.20 (durability of mouth-actuated toys).

4.18.4.2 Projectiles in the form of a dart

Projectiles in the form of a dart shall conform to the following requirements:

- a) When measured in accordance with 5.15.1.3.3 a) to e) (determination of the kinetic energy per area of contact), the contact area of the dart shall be at least 3 cm².
- b) The dart shall either:
 - be provided with a protective cap, cover or tip that is integral with the front end of the shaft, or
 - have a blunted front end to which a protective cap, cover or tip is attached, or
 - be made of a resilient material, unless it is reliant on magnetic forces.

- c) After testing in accordance with 5.24.5 (torque test) and 5.24.6.4 (tension test for protective components) projectiles in the form of a dart with a protective cap, cover or tip shall conform with at least one of the following requirements:
- the protective cap, cover or tip shall not become detached from the projectile, or
 - if the protective cap, cover or tip becomes detached from the projectile, the projectile shall not be capable of being discharged by the discharge mechanism, or
 - if the protective cap, cover or tip becomes detached from the projectile and the projectile is made of a resilient material, it shall continue to have a contact area of at least 3 cm² when measured in accordance with 5.15.1.3.3 a) to e).

4.18.4.3 Arrows (e.g. bow and arrow set)

Projectiles in the form of an arrow shall have a maximum kinetic energy per unit area of contact not greater than 2 500 J/m² when determined in accordance with 5.15.1.3.2 (determination of kinetic energy).

After testing in accordance with 5.15.2 (wall impact test for projectiles), a projectile in the form of an arrow shall not produce a hazardous sharp edge or hazardous sharp point and shall continue to meet the requirements of 4.18.4 (projectile toys without stored energy).

Projectiles in the form of an arrow shall also:

- a) be provided with a protective cap, cover or tip that is integral with the front end of the shaft, or
- b) have a blunted front end to which a protective cap, cover or tip is attached, or
- c) be made of a resilient material, unless it is reliant on magnetic forces.

After testing in accordance with 5.24.5 (torque test) and 5.24.6.4 (tension test for protective components) projectiles in the form of an arrow with a protective cap, cover or tip shall conform to at least one of the following requirements:

- the protective cap, cover or tip shall not become detached from the projectile, or
- if the protective cap, cover or tip becomes detached from the projectile, the projectile shall not be capable of being discharged by the discharge mechanism, or
- if the projectile is made of a resilient material, it shall continue to have a maximum kinetic energy per unit area of contact not greater than 2 500 J/m² when determined in accordance with 5.15.1.3.3 (determination of kinetic energy per area of contact).

4.19 Rotors and propellers

See E.33.

These requirements do not apply to:

- rotors and propellers that normally rotate in the vertical plane, e.g. a propeller on an aeroplane or certain remote controlled flying toys, or
- rotors and propellers on projectiles that have a maximum range of 300 mm or less when measured in accordance with 5.35 (determination of projectile range).

Rotors and propellers powered by electrical, spring or inertial energy and that take off into free flight shall be designed to minimize the potential of rotating blades to cause injury. For example, this may be accomplished by one or more of the following:

- a) the design of the rotor or propeller shall prevent access to the blade ends during operation;

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- b) the blade ends shall be “clutched” or loosely attached to the rotor so that the ends are not directly powered by the rotor drive;
- c) rotors or propellers shall be designed so that the leading edges are protected with a resilient material.

Examples of designs that achieve these conditions are given in [Figure E.2](#).

4.20 Aquatic toys

See [E.34](#).

All air inlets of inflatable aquatic toys shall have non-return valves with stoppers permanently attached to the toy.

When the toy is inflated, the stopper shall be capable of being pushed into the toy so that it does not stand more than 5 mm from the surface of the toy.

Advertising copy or graphics shall not state or imply that a child will be safe with such a toy if left unsupervised.

Aquatic toys shall carry a warning in accordance with [B.2.6](#) (aquatic toys).

4.21 Braking

See [E.35](#).

The braking requirements for toys are the following.

- a) Mechanically or electrically propelled ride-on toys with a free-wheeling facility in accordance with [5.16.1](#) (determination of free-wheeling facility)
 - shall have a braking device,
 - when tested in accordance with [5.16.2](#) (brake performance for mechanically or electrically powered ride-on toys other than toy bicycles) shall not move more than 5 cm,
 - for such toys which have a mass of 30 kg or more, it shall be possible to lock the brake (parking brake).
- b) Electrically propelled ride-on toys shall be operated by means of a switch which cuts off the power automatically when it is released, without tilting the toy. Application of the brakes shall cut power automatically to the drive.

Braking requirements in [4.21 a\)](#) and [4.21 b\)](#) do not apply to:

- toys where the hands or feet provide the motive power to the driving wheel or wheels via direct transmission (e.g. pedal cars, tricycles);
- electrically propelled ride-on toys which are propelled at a maximum speed of 1 m/s unloaded, having a seat height of less than 300 mm and in which the feet are free;
- toy bicycles (see [4.22.3](#), braking requirements).

4.22 Toy bicycles

See [4.13.3](#) and [E.36](#).

4.22.1 Instructions for use

Toy bicycles shall be accompanied by assembly and maintenance instructions. The potential dangers of riding toy bicycles and precautions to be taken shall be brought to the attention of the parents or carers (see B.2.17, toy bicycles for guidance).

NOTE Requirements for bicycles with a maximum saddle height between 435 mm and 635 mm are given in ISO 8098.

4.22.2 Determination of maximum saddle height

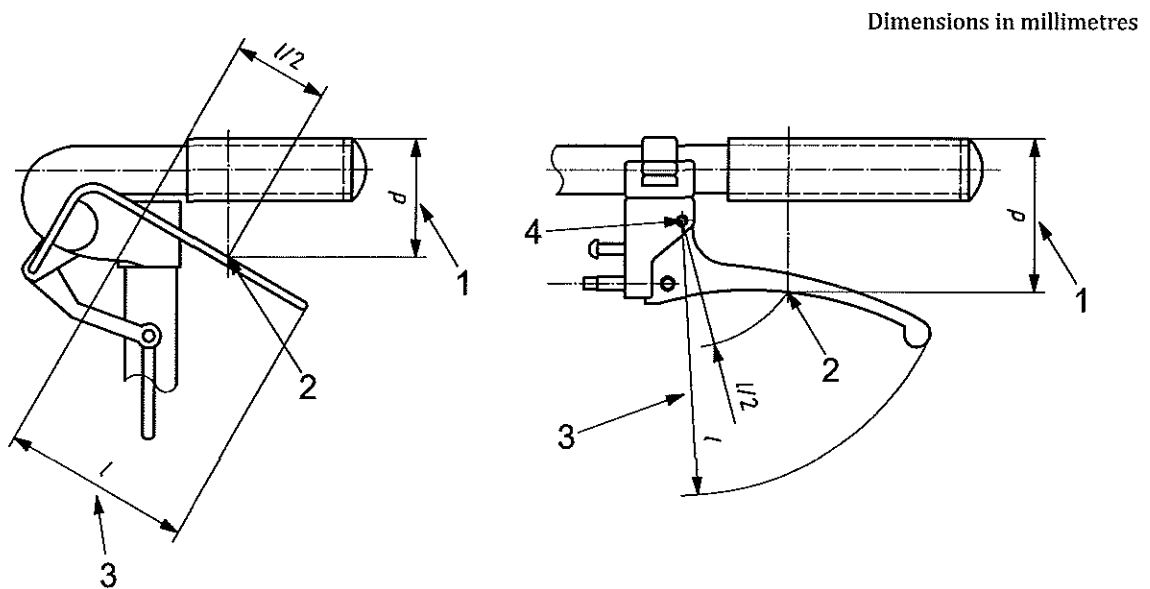
The seat pillar shall have a permanent mark that indicates the minimum insertion depth of the pillar into the frame. The minimum insertion mark shall be positioned at a distance equal to or greater than two and a half times the diameter of the pillar measured from the bottom of the full diameter of the pillar, and shall not affect the seat pillar strength.

4.22.3 Braking requirements

Toy bicycles with a free-wheeling facility in accordance with 5.16.1 (determination of free-wheeling facility) shall be equipped with a braking system which operates on the rear wheel.

For handbrakes, the brake lever dimension, d , measured at the midpoint of the lever as shown in Figure 21 shall not exceed 60 mm. The range of adjustment on an adjustable lever shall permit this dimension to be attained. The lever length, l , shall be ≥ 80 mm.

When tested in accordance with 5.16.3 (brake performance for toy bicycles), the toy shall not move more than 5 cm.



Key

- 1 brake lever dimension, d
- 2 midpoint of lever
- 3 lever length, l
- 4 pivot

Figure 21 — Handbrake lever dimensions

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4.23 Speed limitation of electrically driven ride-on toys

See [E.37](#).

Electrically driven ride-on toys shall have a maximum speed of 8 km/h when tested in accordance with [5.17](#) (determination of speed of electrically driven ride-on toys).

4.24 Toys containing a heat source

This requirement does not cover burners in chemistry sets or related experimental kits, or light bulbs and similar items.

When tested in accordance with [5.18](#) (determination of temperature rises):

- a) toys containing a heat source shall not ignite when used at the maximum input;
- b) the rise in temperature of handles, knobs and similar parts which are likely to be touched by hand shall not exceed the following values:
 - parts made of metal 25 K
 - parts made of glass or porcelain 30 K
 - parts made of plastics or wood 35 K
- c) the rise in temperature of other accessible parts of the toy shall not exceed the following values:
 - parts made of metal 45 K
 - parts made of other materials 55 K

NOTE A temperature difference of 1 K equals a temperature difference of 1 °C.

4.25 Liquid-filled toys

See [E.38](#).

Upon completion of any relevant tests in accordance with [Clause 5](#) (test methods), liquid-filled toys with non-accessible liquid shall be tested according to [5.19](#) (leakage of liquid-filled toys) and there shall be no leakage of the contents which could result in a potential hazard.

Liquid-filled teethers and liquid-filled teething toys shall be marked with a warning not to be placed in a freezer compartment (see [B.3.5](#), liquid-filled teethers and liquid-filled teething toys for guidance).

4.26 Mouth-actuated toys

See [E.39](#).

Mouth-actuated toys shall conform to the following requirements.

- a) Mouth-actuated toys and removable mouthpieces of mouth-actuated toys shall not fit entirely in the small parts cylinder when tested in accordance with [5.2](#) (small parts test).
- b) Non-detachable mouthpieces of mouth-actuated toys, if detached when tested in accordance with [5.24.5](#) (torque test) and [5.24.6.1](#) (tension test, general procedure), shall not fit entirely in the small parts cylinder when tested in accordance with [5.2](#).
- c) Mouth-actuated toys which contain loose components such as spheres in a whistle or reeds in a noisemaker shall not, when tested in accordance with [5.20](#) (durability of mouth-actuated toys), release any objects that fit entirely in the small parts cylinder when tested in accordance with [5.2](#).

- d) Removable or non-detachable mouthpieces fitted to balloons shall conform to the requirements in 4.26 a) and 4.26 b) (see also 4.5.6, balloons).

4.27 Toy roller skates, toy inline skates and toy skateboards

Toy roller skates, toy inline skates and toy skateboards are products that are intended for children with a mass of 20 kg maximum.

Toy roller skates, toy inline skates and toy skateboards shall carry a warning advising that protective equipment be worn and that the product is intended for children with a mass of 20 kg maximum (see B.2.14, toy roller skates, toy inline skates and toy skateboards for guidance).

4.28 Percussion caps

See E.40.

Assuming reasonably foreseeable use, percussion caps specifically designed for use in toys shall not produce flames, glowing parts or other debris which are potential eye injury hazards.

The packaging of percussion caps shall carry a warning (see B.2.18, percussion caps for guidance).

4.29 Acoustic requirements

See E.42.

When tested in accordance with 5.25 (determination of sound pressure levels), toys that are designed to emit sound shall conform to the following requirements.

- a) The A-weighted equivalent sound pressure level, L_{pAeq} , of continuous sounds produced by close-to-the-ear toys shall not exceed 65 dB.
- b) The A-weighted equivalent sound pressure level, L_{pAeq} , of continuous sounds produced by all other toys except close-to-the-ear toys and pull and push toys shall not exceed 85 dB.
- c) The C-weighted peak sound pressure level, L_{pCpeak} , of impulsive sounds produced by close-to-the-ear toys shall not exceed 95 dB.
- d) The C-weighted peak sound pressure level, L_{pCpeak} , of impulsive sounds produced by any type of toy excluding toys using explosive action (e.g. percussion caps) shall not exceed 115 dB.
- e) The C-weighted peak sound pressure level, L_{pCpeak} , of impulsive sounds produced by a toy using percussion caps or other explosive action shall not exceed 125 dB.
- f) If the C-weighted peak sound pressure level, L_{pCpeak} , of impulsive sounds produced by a toy using percussion caps or other explosive action exceeds 115 dB, the potential danger to hearing shall be drawn to the attention of the user (see B.2.19, toys which produce high impulse noise).

The requirements in this subclause do not apply to:

- mouth-actuated toys, i.e. toys the noise level of which is determined by the blowing action of a child (e.g. whistles and imitation musical instruments, such as trumpets and flutes);
- child-actuated toys, i.e. toys the noise level of which is determined by the muscular action of the child (e.g. xylophones, bells, drums, squeeze toys). The continuous sound pressure requirements do not apply to rattles; however, rattles are covered by impulsive sound pressure requirements;
- radios, tape players, CD players and other similar electronic toys;
- toys that are connected to or interfaced with external devices (e.g. televisions, computers) where the sound pressure level is determined by the external device;

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- sound emitted from earphones/headphones.

4.30 Toy scooters

See [E.44](#).

4.30.1 General

For the purposes of this part of ISO 8124, toy scooters are divided into two groups:

- those intended for children with a body mass of 20 kg or less;
- those intended for children with a body mass of between 20 kg and 50 kg.

In addition to relevant requirements in other subclauses of [Clause 4](#) (requirements), toy scooters shall comply with the requirements of [4.30](#).

4.30.2 Warnings and instructions for use

Toy scooters shall carry a warning and an indication about the intended body mass group. They shall also be accompanied by instructions for use and precautions to be taken. The potential dangers of riding a toy scooter shall be brought to the attention of the parents or carers (see [B.2.20](#), toy scooters).

4.30.3 Strength

When tested according to [5.26](#) (static strength for toy scooters) and [5.27](#) (dynamic strength for toy scooters) toy scooters shall not:

- produce accessible hazardous sharp edges (see [5.8](#), sharp-edge test);
- produce accessible hazardous sharp points (see [5.9](#), sharp-point test);
- make accessible driving mechanisms that present a hazard of crushing the fingers or other parts of the body;
- collapse so that they do not continue to comply with relevant requirements of this part of ISO 8124.

When tested according to [5.29](#) (strength of toy scooter steering tubes):

- steering tubes shall not collapse so that they do not continue to comply with relevant requirements of this part of ISO 8124;
- steering tubes shall not separate into two or more parts;
- locking devices shall not fail or disengage.

4.30.4 Stability

Where the spacing is more than 150 mm between the centres of the outermost wheels, toy scooters with three wheels or more shall not tip over when tested with a load of 50 kg according to [5.12.2](#) (sideways stability test, feet available for stabilization).

4.30.5 Adjustable and folding steering tubes and handlebars

The requirements for adjustable and folding steering tubes and handlebars are the following.

- To prevent sudden changes of height, steering tubes with adjustable height shall:
 - be adjustable with the use of a tool, or

- have at least one main locking device and one secondary locking device, of which at least one shall automatically be engaged when the height is adjusted.
- b) The separation of the steering tube shall not be possible unless intended.
- c) Steering tubes intended to be folded shall have a locking device on the folding mechanism.
- d) The space between moving elements capable of injuring fingers shall also allow a 12 mm rod to be inserted, if it allows a 5 mm rod to be inserted.
- e) Accessible openings in moving elements capable of shearing a finger shall not allow the insertion of a 5 mm rod.
- f) Handlebars shall not separate into two or more parts when tested according to 5.30 (resistance to separation of handlebar).

4.30.6 Braking

Toy scooters labelled as intended for children with a body mass of 20 kg or less do not require a braking system.

Other toy scooters shall have at least one braking system which shall operate on the rear wheel and which shall effectively and smoothly reduce the speed without coming to an abrupt stop.

When tested according to 5.28 (brake performance for toy scooters), the force required to hold the toy scooter on the inclined plane shall be less than 50 N.

4.30.7 Wheel size

The diameter of the front wheel(s) on toy scooters shall be ≥ 120 mm.

4.30.8 Protruding parts

See E.13.

The handlebars on toy scooters shall be protected by rounded handlebar grips or plugs of resilient material, which have a diameter of 40 mm or more when measured not more than 20 mm from the end of the grip.

4.31 Magnets and magnetic components

See E.45.

The requirements in 4.31.1 and 4.31.2 do not apply to functional magnets in electrical or electronic components of toys.

4.31.1 Magnetic/electrical experimental sets intended for children 8 years and over

Magnetic/electrical experimental sets intended for children 8 years and over that contain magnetic components shall carry a warning (see B.2.21, magnetic/electrical experimental sets for children 8 years and over for guidance) if they both:

- have a magnetic flux index equal to or greater than $50 \text{ kg}^2\text{mm}^2$ ($0,5 \text{ T}^2\text{mm}^2$) when tested according to 5.32 (magnetic flux index), and
- fit entirely in the cylinder when tested according to 5.2 (small parts test).

NOTE Requirements for magnetic/electrical experimental sets intended for children under 8 years are given in 4.31.2 (all other toys with magnets and magnetic components).

4.31.2 All other toys with magnets and magnetic components

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- a) Any loose-as-received magnet(s) and magnetic component(s) either shall have a magnetic flux index less than $50 \text{ kG}^2\text{mm}^2$ ($0,5 \text{ T}^2\text{mm}^2$) when tested in accordance with 5.32 (magnetic flux index), or shall not fit entirely in the cylinder when tested in accordance with 5.2 (small parts test).
- b) Wooden toys, toys intended to be used in water and mouth pieces of mouth-actuated toys with magnets or magnetic components shall be tested in accordance with 5.34 (soaking test for magnets) before being tested in accordance with 4.31.2 c).
- c) The following tests shall be carried out in the prescribed order on all unique magnetic component(s). The components used for this testing shall not have been previously subjected to normal use and reasonably foreseeable abuse tests. Any magnet(s) and magnetic component(s) that become liberated from a toy, or from a loose-as-received magnetic component either shall, when tested according to the subclauses listed below, have a magnetic flux index less than $50 \text{ kG}^2\text{mm}^2$ ($0,5 \text{ T}^2\text{mm}^2$) when tested in accordance with 5.32, or shall not fit entirely in the cylinder when tested according to 5.2.
- 5.31 (tension test for magnets);
 - 5.24.2 (drop test) or, if applicable, 5.24.3 (tip over test for large and bulky toys);
 - 5.24.5 (torque test);
 - 5.24.6.1 (tension test, general procedure);
 - 5.24.6.2 [tension test for seams in soft-filled (stuffed) toys, beanbag-type toys and other similar filled toys], if applicable;
 - 5.33 (impact test for magnets);
 - 5.24.7 (compression test), for magnets that are accessible but cannot be grasped (as specified in 5.24.6.1);
 - 5.31 (tension test for magnets).

NOTE 1 Examples of unique magnetic components are rods of different sizes or shapes containing magnets.

NOTE 2 If the toy contains one magnet, the component holding the magnet is considered to be a unique component.

NOTE 3 An example of a magnet that is accessible but cannot be grasped is a magnet that is recessed.

5 Test methods

5.1 General

The test methods specified in Clause 5 shall be used to determine the compliance of toys with the requirements of this part of ISO 8124.

The tests in 5.2 (small parts test) to 5.23 (washable toys) apply to particular types of toys as specified in the requirements of Clause 4 (requirements).

The objective of the tests in 5.24 (reasonable foreseeable abuse tests) is to simulate reasonably foreseeable abuse and damage to which the toys may be subjected. The test methods are for use in exposing potential hazards which could result from the reasonably foreseeable abuse and damage of toys intended for children.

Certain test methods have been established for ages:

- from birth but under 18 months;
- from 18 months and over but under 36 months;
- 36 months and over but under 96 months.

If a toy is marked, labelled, advertised or otherwise intended for children of ages spanning more than one of these age groups, the toy shall be subjected to the test(s) providing the most stringent requirements.

If a toy or its packaging is not age-labelled in a clear and conspicuous manner, or (based on such factors as marketing practices and the customary patterns of usage of a toy by children) is inappropriately age-labelled and is intended or appropriate for children under 96 months, it shall also be subjected to the most stringent test requirements.

If during a test the toy has been materially affected, e.g. by a clamp or similar test equipment, further relevant testing shall be carried out on a new toy.

Unless otherwise specified in the test method, each sample shall, prior to testing, be subjected to a temperature of (21 ± 5) °C for at least 4 h. Textile toys and textile soft-filled (stuffed) toys shall be conditioned at a temperature of (21 ± 5) °C and (65 ± 10) % relative humidity for at least 4 h. The testing shall commence within 5 min after the toy has been removed from the preconditioning atmosphere.

Toys reasonably intended to be assembled by an adult and not intended to be taken apart by a child shall be tested only in the assembled state if the packaging and the assembly instructions prominently indicate that the article is to be assembled only by an adult.

In situations where a test procedure may be applied in more than one way to a toy test component, the point (or direction) of force (or torque) application which results in the most onerous conditions shall be used.

5.2 Small parts test

See [4.3.2](#) (expanding materials), [4.4](#) (small parts), [4.18.3](#) (projectiles toys with stored energy), [4.26](#) (mouth actuated toys) and [4.31](#) (magnets and magnetic components).

Place the toy, without compressing it and in any orientation, into the cylinder as shown in [Figure 22](#).

Repeat the procedure with any removable component of the toy and any component liberated after testing according to [5.24](#) (reasonably foreseeable abuse tests). Repeating the procedure after testing in accordance with [5.24](#) is only applicable if specified by the associated requirement in [Clause 4](#) (requirements).

Determine whether the toy or any removable component or liberated component fits entirely within the cylinder.

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Dimensions in millimetres

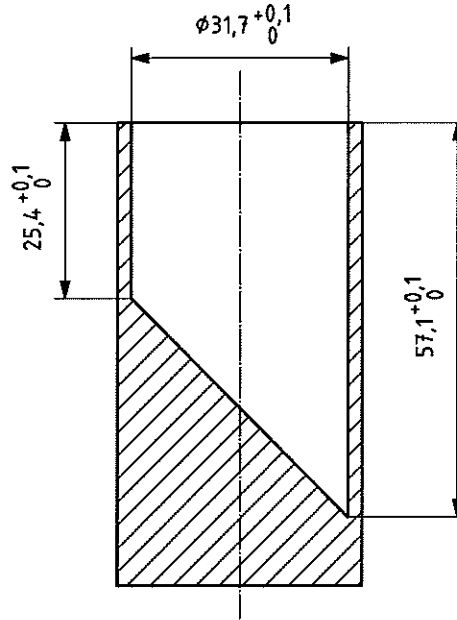


Figure 22 — Small parts cylinder

5.3 Test for shape and size of certain toys

See 4.5.1 (squeeze toys, rattles, fasteners, and certain other toys and components of toys).

Position and clamp the test template A shown in Figure 23 so that the axis of the slot is essentially vertical and the slot is unobstructed at its top and bottom openings.

Orientate the toy to be tested in a position which would most likely permit the entry of the toy through the slot in the test template. Place the toy in the slot in the orientation stated so that the force on the toy is only the force due to its mass.

Determine whether any part of the toy penetrates past the full depth of the cavity of the test template.

Repeat the procedure for toys with nearly spherical, hemispherical, circular flared or dome-shaped ends using supplemental test template B shown in Figure 24, except that only the spherical, hemispherical, circular flared or dome-shaped ends shall be presented to the template.

Dimensions in millimetres

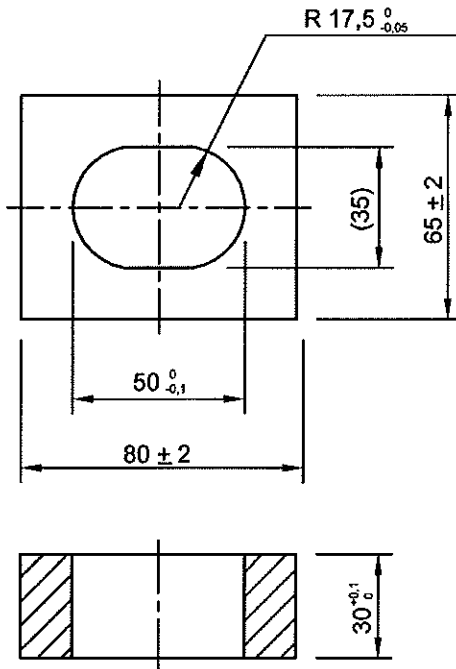


Figure 23 — Test template A

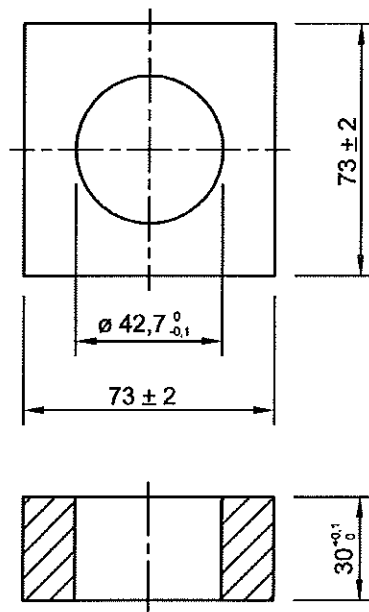


Figure 24 — Supplemental test template B

5.4 Small balls test

See 4.5.2 (small balls) and 4.18.2 (projectiles).

Position and clamp the test template C shown in Figure 25 so that the axis of the slot is essentially vertical and the slot is unobstructed at its top and bottom openings.

Dimensions in millimetres

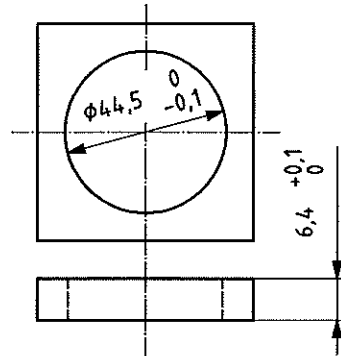


Figure 25 — Test template C

Orientate the ball to be tested in a position which would most likely permit the entry of the ball through the slot in the test template. Place the ball in the slot so that the force on the toy is only the force due to its mass.

Determine whether the ball passes entirely through the test template.

5.5 Test for pompoms

See 4.5.3 (pompoms).

Position and clamp the test template C shown in Figure 25 so that the axis of the slot is essentially vertical and the slot is unobstructed at its top and bottom openings.

Orientate the pompom to be tested in a position which would most likely permit the entry of the pompom through the slot in the test template and put the free ends of fibres into the template first. Place the pompom in the slot so that the force on the toy is only the force due to its mass.

Determine whether the pompom passes entirely through the test template.

5.6 Test for pre-school play figures

See 4.5.4 (pre-school play figures).

Position and clamp the supplemental test template B shown in Figure 24 so that the axis of the slot is substantially vertical and the slot is unobstructed at its top and bottom openings.

Orientate the play figure to be tested in a position which would most likely permit the entry of the rounded end through the slot in the test template. Place the toy in the slot so that the force on the toy is only the force due to its mass.

Determine whether the rounded end penetrates past the full depth of the cavity of the test template.

5.7 Accessibility of a part or component

See 4.6 (edges), 4.7 (points), 4.13 (holes, clearances and accessibility of mechanisms) and 4.14 (springs).

5.7.1 Principle

An articulated probe is manoeuvred to the part or component being tested. If any portion forward of the collar contacts the part or component, that part or component is considered to be accessible.

5.7.2 Apparatus

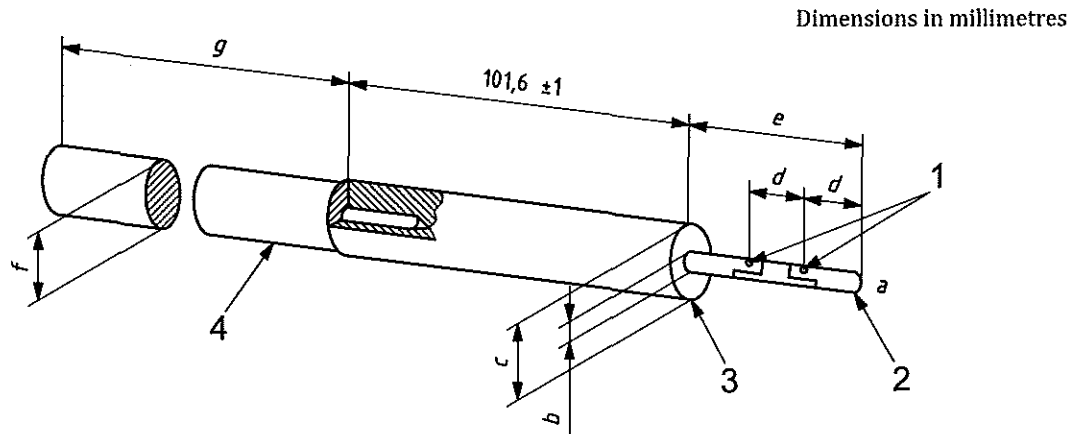
5.7.2.1 Articulated accessibility probe, as specified in [Table 2](#) and illustrated in [Figure 26](#), and manufactured from rigid material.

The tolerance on the dimensions shall be $\pm 0,1$ mm except for f and g , which have a tolerance of ± 1 mm.

Table 2 — Dimensions of accessibility probes

Age grading ^a	Probe	Dimensions ^b						
		mm						
		<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>
Under 36 months	A	2,8	5,6	25,9	14,7	44,0	25,4	464,3
36 months and over	B	4,3	8,6	38,4	19,3	57,9	38,1	451,6

^a Toys intended for children spanning both age groups should be tested using both probes.
^b See [Figure 26](#).



Key

- 1 pivot points
- 2 spherical radius (*a*)
- 3 collar
- 4 extension

Figure 26 — Accessibility probe

5.7.3 Procedure

Remove all components on the toy which are intended to be removed without the use of a tool.

Where a tool is intended to be used in conjunction with the toy, all the components on the toy that are capable of being removed by that tool should be removed.

Manoeuvre, as described in [5.7.3 a\)](#) to [5.7.3 c\)](#), the appropriate articulated accessibility probe in any convenient position, towards the part or component of the toy being tested. Each probe joint may be

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rotated up to 90° to simulate knuckle movement. If necessary, pivot the probe at any of its joints in an attempt to contact the part or component of the toy.

NOTE 1 Where the part is a sharp point that lies adjacent to a plane surface such that the gap between the point and the surface is 0,5 mm or less, the point is considered to be non-accessible and the procedure specified in 5.7.3 b) need not be carried out.

- a) For any hole, recess or other opening having a minor dimension (see Note 2) smaller than the collar diameter of the appropriate probe, insert the probe such that the total insertion depth for accessibility is up to the collar.

NOTE 2 The minor dimension of an opening is the diameter of the largest sphere that will pass through the opening.

- b) For any hole, recess or other opening having a minor dimension larger than the collar diameter of probe A but less than 187 mm when probe A is used, or a minor dimension larger than the collar diameter of probe B but less than 230 mm when probe B is used, determine the total insertion depth for accessibility by inserting the appropriate probe, with the extension shown in Figure 26, in any direction for a distance up to 2,25 times the minor dimension of the hole, recess or opening, measured from any point in the plane of the opening.
- c) For any hole, recess or other opening having a minor dimension of 187 mm or larger when probe A is used, or a minor dimension of 230 mm or larger when probe B is used, the total insertion depth for accessibility is unrestricted unless other holes, recesses or openings within the original hole, recess or opening are encountered which have dimensions conforming to a) or b) of this subclause; in such instances follow the procedure in 5.7.3 a) or 5.7.3 b) as appropriate. If both probes are to be used, a minor dimension of 187 mm or larger shall determine the unrestricted access.

Determine whether a tested part or component can be contacted by any portion of the accessibility probe forward of the collar.

5.8 Sharp-edge test

See 4.6 (edges), 4.9 (metal wires and rods) and 4.30.3 (strength).

5.8.1 Principle

A self-adhesive tape is attached to a mandrel which is then rotated for a single 360° revolution along the accessible edge being tested. The tape is then examined for the length of cut.

5.8.2 Apparatus

The apparatus shall be as illustrated in Figure 27.

5.8.2.1 Mandrel, made of steel, with diameter of $(9,53 \pm 0,12)$ mm, with test surface free of scratches, nicks or burrs and of surface roughness value $Ra \leq 0,40$ μm in accordance with ISO 4287.

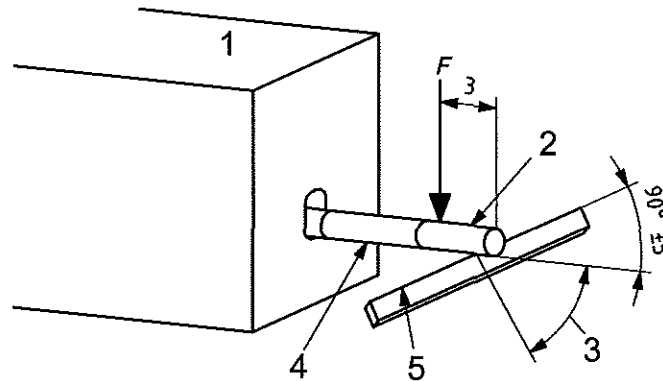
This surface shall have a Rockwell hardness value of ≥ 40 HRC when measured in accordance with ISO 6508-1.

5.8.2.2 Device for rotating the mandrel and applying a force to it, capable of rotating the mandrel at a constant tangential velocity of (23 ± 4) mm/s during the central 75 % of its 360° travel, starting and stopping of the mandrel being smooth.

Portable or non-portable and of any suitable design, the device shall be capable of applying any force up to 6 N to the mandrel, perpendicular to the mandrel axis.

5.8.2.3 Pressure-sensitive polytetrafluoroethylene (PTFE) tape, of thickness between 0,066 mm and 0,090 mm, of width ≥ 6 mm, and with adhesive made of pressure-sensitive silicone polymer with a nominal thickness of 0,08 mm.

Dimensions in millimetres



Key

- 1 device, portable or non-portable, to apply a known force, F , and rotation to the mandrel (see 5.8.2.2, device for rotating the mandrel and applying a force to it)
- 2 single wrap of PTFE tape (see 5.8.2.3, pressure-sensitive polytetrafluoroethylene tape)
- 3 variable angle to seek worst-case situation (see 5.8.3, procedure)
- 4 mandrel
- 5 edge under test

Figure 27 — Edge test apparatus

5.8.3 Procedure

Ascertain that the edge to be tested is accessible by the method described in 5.7 (accessibility of a part or component).

Support the toy in such a manner that the accessible edge to be tested does not bend or move when the force of the mandrel is applied. Ensure that the support is not less than 15 mm from the edge to be tested.

If part of the toy has to be removed or disassembled in order to test a particular edge, and as a result, the rigidity of the edge being tested is affected, support the edge so that its stiffness approximates the edge stiffness in the assembled toy.

Wrap the mandrel (5.8.2.1, mandrel) with one layer of the tape (5.8.2.3, pressure-sensitive polytetrafluoroethylene tape) to provide sufficient area for performing the test.

Place the taped mandrel such that its axis is at $(90 \pm 5)^\circ$ to the line of a straight edge, or $(90 \pm 5)^\circ$ to a tangent at the test point of a curved edge, and the tape is in contact with the sharpest part of the edge (i.e. the worst-case situation) when the mandrel is rotated one full revolution (see Figure 25).

Apply a force, F , of $\left(6 \begin{smallmatrix} 0,0 \\ -0,5 \end{smallmatrix}\right)$ N to the mandrel, 3 mm from the leading edge of the tape, and rotate the mandrel 360° about its axis against the edge, ensuring that no relative motion occurs between the mandrel and the edge during rotation of the mandrel. If this procedure causes the edge to bend, apply the maximum force that will not cause the edge to bend.

Remove the tape from the mandrel without enlarging any cut in the tape or causing any score in the tape to become a cut. Measure the length of tape which has contacted the edge during the test. Measure the length of tape which is cut, including any intermittent cuts.

Calculate the percentage length of the tape which has been cut during the test. If this is more than 50 % of the contact length, the edge is a potentially hazardous sharp edge.

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5.9 Sharp-point test

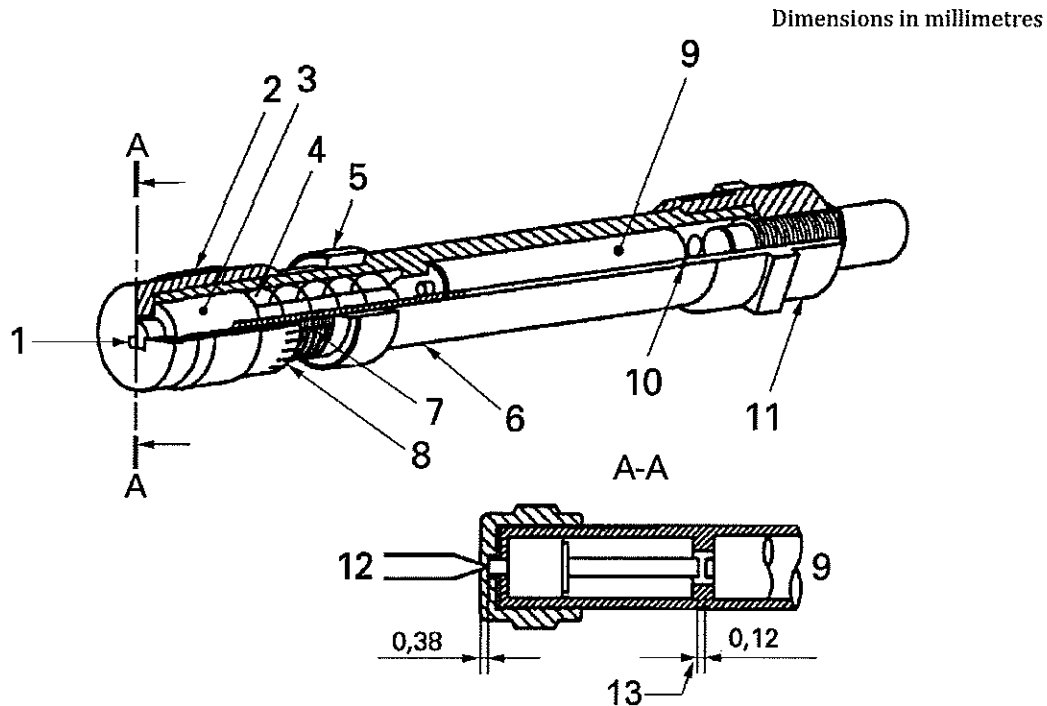
See 4.7 (points), 4.9 (metal wires and rods) and 4.30.3 (strength).

5.9.1 Principle

A point tester is applied to an accessible sharp point and it is observed whether or not the point being tested penetrates a specified distance into the sharp-point tester. Depth of penetration of the point being tested determines sharpness. If the point can contact a sensing head which is recessed a distance of $(0,38 \pm 0,02)$ mm below the end cap and can move the sensing head a further $(0,12 \pm 0,02)$ mm against a $(2,5 \text{ }_{-0,3}^0)$ N force of a return spring, the point shall be identified as potentially sharp.

5.9.2 Apparatus

5.9.2.1 Point tester, with gauging slot measuring $(1,02 \pm 0,02)$ mm wide by $(1,15 \pm 0,02)$ mm long in the end of the slotted cap of the point tester, which establishes two reference dimensions, and sensing head recessed $(0,38 \pm 0,02)$ mm below the end cap (as shown in Figure 28).



Key

- 1 gauging slot
- 2 gauging cap
- 3 sensing head
- 4 loading spring
- 5 locking ring
- 6 barrel
- 7 adjustment reference mark
- 8 micrometer divisions
- 9 R03 dry cell
- 10 electrical contact spring

- 11 indicator lamp assembly and adaptor nut
- 12 test point
- 13 the gap is closed upon insertion of point sufficiently sharp to pass through gauging slot and depress sensing head 0,12 mm. Electrical circuit is thereby completed and indicator test lamp lights, that is sharp point fails test

Figure 28 — Point tester

5.9.3 Procedure

Ascertain that the point to be tested is accessible by the method described in [5.7](#) (accessibility of a part or component).

Support the toy to be tested in such a manner that the point does not move during the test. In most cases it will not be necessary to support the point directly; however, if necessary, support at not less than 6 mm from the point to be tested.

If part of the toy has to be removed or disassembled in order to test a particular point, and as a result, the rigidity of the point being tested is affected, support the point so that its stiffness approximates the point stiffness in the assembled toy.

Adjust the point tester ([5.9.2.1](#), point tester) by loosening the locking ring and rotating it so that it moves toward the indicator lamp assembly a sufficient distance to expose the calibration reference mark on the barrel. Rotate the gauging cap clockwise until the indicator lamp lights. Rotate the cap anticlockwise until the sensing head moves a distance of $(0,12 \pm 0,02)$ mm from making contact with the dry cell, as shown in [Figure 28](#).

NOTE Where the gauging cap includes micrometer markings, the distance can be readily achieved by rotating the cap anticlockwise until the appropriate micrometer marking corresponds with the calibration reference mark. The gauging cap can now be locked in this position by rotating the locking ring until it fits firmly against the cap.

Insert the point, in the most onerous direction, into the cap slot and apply a force of $\left(4,5 \begin{smallmatrix} 0 \\ -0,2 \end{smallmatrix}\right)$ N to depress the spring as far as possible without shaving the point on the edges of the slot or extruding the point through the slot. If the point being tested penetrates a distance of 0,5 mm or more into the gauging slot, causing the indicator lamp to light, and the point under test maintains its original shape while under a force of $\left(4,5 \begin{smallmatrix} 0 \\ -0,2 \end{smallmatrix}\right)$ N, the test point is a potentially hazardous sharp point.

5.10 Determination of thickness of plastic film and sheeting

5.10.1 General

See [4.10](#) (plastic film or plastic bags in packaging and in toys).

Prepare plastic bags by cutting the sides, without stretching, into two single sheets.

5.10.2 Apparatus

A measuring device capable of measuring thickness to an accuracy of 4 μ m with plane upper and lower measuring surfaces having a diameter of (6 ± 1) mm that are parallel to within 5 μ m and have polished surfaces, and which applies a compression force of $(0,75 \pm 0,25)$ N.

5.10.3 Procedure

Condition the specimen for at least 1 h at (21 ± 5) °C.

Ensure that the specimens and the faces of the measuring device are free from contamination (e.g. dust).

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Check the zero point of the measuring device before starting the measurements and recheck after each series of measurements.

When determining the thickness, lower the foot gently to avoid deforming the material.

Measure the thickness of any sheet at 10 equidistant points across the diagonal of any 100 mm × 100 mm area.

Determine whether the thickness complies with the requirements of 4.10 a) (plastic film or plastic bags in packaging and in toys).

5.11 Test for cords

5.11.1 Determination of cord thickness

See 4.11.1 (cords and electrics in toys intended for children under 18 months).

Tension the cord under test with a force of (25 ± 2) N.

Measure the thickness of the cord at three to five locations along its length with a suitable device having an accuracy of $\pm 0,1$ mm. For cords approaching 1,5 mm in thickness, use a non-compressible method, e.g. an optical projector.

Calculate the mean thickness of the cord.

Determine whether the thickness complies with the requirements of 4.11.1.

5.11.2 Self-retracting pull cords

See 4.11.2 (self-retracting pull cords in toys intended for children under 18 months).

Using a suitable clamp, position the toy so that the cord is vertical and the toy is in the most favourable position for retraction. Extend the cord fully and attach a mass of $(0,9^{+0,05}_{0,0})$ kg.

For monofilament cords less than 2 mm in diameter, attach a mass of $(0,45^{+0,05}_{0,0})$ kg.

Determine whether the cord retracts more than 6,4 mm.

5.11.3 Electric resistance of cords

See 4.11.7 (cords, strings and lines for flying toys).

Condition the samples for 7 h minimum at a temperature of (25 ± 3) °C and at a relative humidity of 50 % to 65 % and carry out the test in this atmosphere.

Using an appropriate appliance, determine whether the electric resistance is more than 10^8 Ω/cm.

5.12 Stability and overload tests

See 4.15 (stability and overload requirements).

5.12.1 General

Where the toy is intended to bear the mass of more than one child at a time, test each sitting or standing area simultaneously.

5.12.2 Sideways stability test, feet available for stabilization

See 4.15.1.1 (sideways stability, feet available for stabilization) and 4.30.4 (stability).

Place the toy on a smooth surface inclined $(10^{+0,5}_{0,0})^\circ$ to the horizontal plane.

Position the toy on the inclined surface so that it is facing in a direction that would most likely cause it to tip sideways. Turn the steering mechanism, if any, to the most onerous position. Chock wheels to restrict rolling, but allow casters to assume their natural position before chocks are applied.

Load the toy on its standing or sitting surface with the appropriate mass in accordance with [Table 3](#).

Table 3 — Loads for stability test

Age group	Load kg
Under 36 months	25 ± 0,2
36 months and over	50 ± 0,5

Apply the load so that the major axis is perpendicular to the true horizontal while the toy is on the specified incline. Design the load so that the height of its centre of gravity is (220 ± 10) mm above the seat surface. For toy scooters, however, use a test load with dimensions as specified in [Figure 30](#). For all ride-on toys, secure the centre of gravity of the load both (43 ± 3) mm rearward of the front-most portion of the designated seating area, and (43 ± 3) mm forward of the rear-most portion of the designated seating area.

NOTE This involves two separate tests.

If there is no designated seating area, place the load at the least favourable position in which it is reasonable to anticipate that a child will choose to sit or stand.

Observe whether the toy tips over within 1 min after application of the load.

5.12.3 Sideways stability test, feet unavailable for stabilization

See [4.15.1.2](#) (sideways stability, feet unavailable for stabilization).

Perform the test in accordance with [5.12.2](#) (sideways stability test, feet available for stabilization) except that the slope shall be inclined $(15^{+0,5}_{0,0})^\circ$ to the horizontal plane.

Observe whether the toy tips over within 1 min after application of the load.

5.12.4 Fore and aft stability test

See [4.15.1.3](#) (fore and aft stability).

Ride-on toys shall be tested with the steering mechanism, if any, in the position where the toy is most likely to tip.

For rocking horses, displace the toy to the limit of its bow.

Place the toy on a slope of a smooth surface inclined $(15^{+0,5}_{0,0})^\circ$ to the horizontal plane. Test the toy facing both up and down the slope.

Load the toy as specified in [5.12.2](#) (sideways stability test, feet available for stabilization).

Observe whether the toy tips over within 1 min after application of the load.

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5.12.5 Overload test for ride-on toys and seats

See 4.15.2 (overload requirements for ride-on toys and seats).

Place the toy on a horizontal plane.

Load the toy on its standing or sitting surface with the appropriate mass in accordance with Table 4.

Table 4 — Loads for overload test

Age group	Load kg
Under 36 months	35 ± 0,3
36 months and over but under 96 months	80 ± 1,0
96 months and over	140 ± 2,0

Conduct the test for overload requirements so that it will be consistent with the advertised mass capacity of the toy, if that mass is higher than the required load according to Table 4.

Determine whether the toy collapses such that it does not conform to the relevant requirements.

5.12.6 Stability test of stationary floor toys

See 4.15.3 (stability of stationary floor toys).

Place the toy on a smooth surface inclined (10 ± 1)° to the horizontal plane. Position the toy on the inclined surface such that it is facing in a direction that would most likely cause it to tip. Adjust any movable portions to the most onerous position, e.g. drawers fully drawn out or fully pushed in, whichever is more onerous.

Observe whether the toy tips over within 1 min.

5.13 Test for closures and toy chest lids

See 4.16.2 (closures).

5.13.1 Closures

With the closure in a closed position, apply a force of ($45 \pm 1,3$) N in an outward direction to the inside of the closure perpendicular to the plane of the closure and anywhere within 25 mm from the geometric centre of the closure.

Observe whether the closure opens.

5.13.2 Toy chest lids

Before testing the toy chest lid (see 4.16.2, closures), assemble the toy chest in accordance with the manufacturer's instructions.

5.13.2.1 Lid support

Lift the lid to any position in its arc of travel to a distance greater than 50 mm, but not through an arc of more than 60° from its fully closed position, as measured at the outermost edge of the lid. Release the lid and measure any dropping motion at a point in the approximate centre of the outermost edge of the lid.

Determine whether the lid drops more than 12 mm (see 4.16.2, closures).

5.13.2.2 Durability test for toy chest lids

Subject the lid to 7 000 opening-and-closing cycles, where one cycle consists of raising the lid from its fully closed to its fully open position and returning it to fully closed. To prevent undue stress on screws or other fasteners used to attach the lid support mechanism, care should be taken not to force the lid beyond its normal arc of travel.

The time to complete one cycle shall be approximately 15 s. The 7 000 cycles shall be completed within a time period of 72 h, after which the test described in 5.13.2.1 (lid support) shall be repeated.

Determine whether the toy chest lid and the lid support mechanism still comply with the requirements of 4.16.2.2 (lid support for toy chests and similar toys).

5.14 Impact test for toys that cover the face

See 4.17 (simulated protective equipment, such as helmets, hats and goggles).

Affix the toy firmly in a suitable clamp with that portion which covers or, in the case of cut-out eye holes, which surrounds the eyes, in a horizontal plane.

Drop a steel ball with a diameter of $(16 \pm 0,15)$ mm and mass of $(16,9 \pm 0,7)$ g from a height of $(130 \pm 0,5)$ cm onto the horizontal upper surface of the toy in the area that would cover the eyes in normal use.

The ball may be guided but not restricted in its fall by being dropped through a perforated tube extending to within approximately 100 mm of the toy.

Determine whether the toy has produced hazardous sharp edges, hazardous sharp points or loose parts which could enter the eye.

5.15 Kinetic energy and wall impact test

See 4.18 (projectile toys).

5.15.1 Kinetic energy of projectiles

5.15.1.1 Principle

The kinetic energy of the projectile, when used under normal conditions, is calculated from the maximum of 5 velocity determinations. If more than one type of projectile is supplied with the toy, the kinetic energy of each type of projectile is calculated.

5.15.1.2 Apparatus

Timing device for determining the velocity, to give a calculated kinetic energy to an accuracy of 0,005 J.

5.15.1.3 Procedure

5.15.1.3.1 Determination of velocity

Determine the velocity of the projectile using Formula 1:

$$v = d/t \tag{1}$$

where

d is the distance in metres;

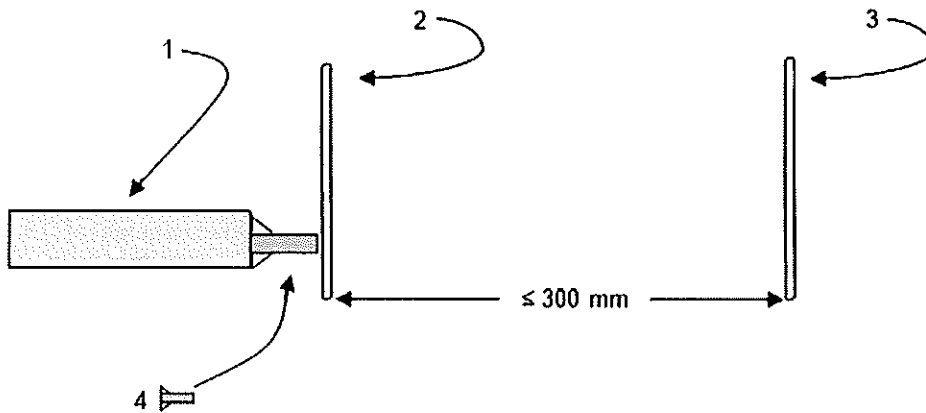
t is the time in seconds.

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Position the discharge mechanism so that the projectile is launched in its intended manner, e.g. vertically for a rocket, through a suitable timing device (e.g. a chronoscope or ballistic screen). Measure the time (t) over a distance (d) of not more than 300 mm, measured from the contact surface of the projectile as soon as it has entered free flight. See [Figure 29](#).

The measurement distance (d) must be reduced if necessary to ensure that the entire measurement is done with the projectile in free flight.

NOTE The natural deceleration of the projectile once it has left the discharge mechanism may cause different results to be obtained depending on the measurement distance.



Key

- 1 discharge mechanism
- 2 first screen
- 3 second screen
- 4 projectile at the point of horizontal *free flight*

Figure 29 — Example of determination of velocity using ballistic screens

Discharge the projectile through the timing device 5 times and use the minimum time for the calculation of the velocity. If more than one type of projectile is supplied with the toy, repeat this process and use the projectile with the greatest velocity for the calculation of kinetic energy in [5.15.1.3.2](#) (determination of kinetic energy) below.

For bows, use an arrow intended for the bow, and stretch the bowstring until the first of one of the following occurs, before firing the arrow:

- 1) a 150 N pull force is reached, or
- 2) the arrow cannot be pulled back further due to its length, or
- 3) a 70 cm pull back distance has been reached.

5.15.1.3.2 Determination of kinetic energy

Determine the maximum kinetic energy E_k of the projectile in free flight using Formula 2:

$$E_k = mv^2/2 \quad (2)$$

where

m is the mass of the projectile, in kilograms;

v is the maximum velocity of the projectile, in metres per second measured according to 5.15.1.3.1 (determination of velocity);

E_k is the maximum kinetic energy, in joules.

5.15.1.3.3 Determination of kinetic energy per area of contact

Determine the maximum kinetic energy per area of contact, $E_{k, \text{area}}$, using Formula 3:

$$E_{k, \text{area}} = mv^2/(2A) \quad (3)$$

where

m is the mass of the projectile, in kilograms;

v is the maximum velocity of the projectile, in metres per second measured according to 5.15.1.3.1 (determination of velocity);

A is the contact area of the projectile, in square metres;

E_k is the maximum kinetic energy per area of contact, in J/m².

For the measurement of contact area of a resilient-tipped projectile, one acceptable method is to apply a suitable staining or inking agent (e.g. Prussian blue) to the projectile, firing it at a suitable perpendicular hard flat surface from a distance of (300 ± 5) mm, and measuring the area of residual impression. An alternative method suitable for some projectiles is the use of an impressionable contact surface (e.g. covered with a carbon paper system) rather than inking the projectile. Determine the contact area as follows:

- a) Apply a suitable staining or inking agent to the contact surface of the projectile. Place a sheet of clean white paper on a hard flat surface. Support this surface so that it will not move when impacted or,
- b) Place a sheet of carbon paper against a sheet of white paper and hold these sheets against a hard flat surface so that the projectile impact image will be transferred from the carbon paper onto the white paper.
- c) Load the projectile to be tested into the discharge mechanism. Orientate the loaded discharge mechanism perpendicular to the hard flat surface, with the contact surface of the projectile from a distance of (300 ± 5) mm from the hard flat surface.

If the discharge mechanism has more than one speed setting, set to the maximum speed.

For bows use an arrow intended for the bow and stretch the bowstring until the first of one of the following occurs:

- 1) a 150 N pull force is reached, or
 - 2) the arrow cannot be pulled back further due to its length, or
 - 3) a 70 cm pull back distance has been reached.
- d) Discharge the projectile onto the paper.

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- e) Measure the image area on the white paper. The contact area is the average of a minimum of 10 measurements.

NOTE When calculating the contact area, exclude any areas of white, i.e. areas without ink transfer.

- f) Calculate the maximum kinetic energy per area of contact in J/m^2

5.15.2 Wall impact test for projectiles

If the discharge mechanism has multiple speed settings, set it to discharge at maximum speed.

Position the toy such that the projectile will discharge in a direction perpendicular to a vertically orientated concrete block or similar hard flat impact surface. The distance between the leading edge of the projectile and the impact surface shall be such that the projectile enters free flight (disengaged from the discharge mechanism) as it strikes the impact surface.

For bows use an arrow intended for the bow and stretch the bowstring until the first of one of the following occurs:

- a) a 150 N pull force is reached, or
- b) the arrow cannot be pulled back further due to its length, or
- c) a 70 cm pull back distance has been reached.

Discharge the projectile onto the impact surface.

NOTE If possible, use a projectile that has not been previously subjected to any test.

Carry out the test three times. Examine the projectile for any hazardous sharp edge, or hazardous sharp point.

5.16 Free-wheeling facility and brake performance test

5.16.1 Determination of free-wheeling facility

See 4.21 (braking) and 4.22.3 (braking requirements).

To determine free-wheeling facility, load the toy as in 5.12.2 (stability test, feet available for stabilization) with the appropriate mass as given in Table 3 and place it on a horizontal plane.

Pull the toy at a constant speed of $(2 \pm 0,2)$ m/s on a surface covered with aluminium oxide paper P60 and determine the maximum pull force, F .

The toy is not free-wheeling if [using Formula (4) or Formula (5)]:

$$F_1 \geq (m + 25) \times 1,7 \quad (4)$$

or

$$F_2 \geq (m + 50) \times 1,7 \quad (5)$$

where

F_1 is the maximum pull force, in newtons, for a toy intended for children under 36 months;

F_2 is the maximum pull force, in newtons, for a toy intended for children 36 months and over;

m is the mass of the toy, in kilograms.

NOTE If a toy accelerates down a slope of 10° when loaded with a mass of 50 kg, it can be expected to be free-wheeling.

5.16.2 Brake performance for mechanically or electrically powered ride-on toys other than toy bicycles

See 4.21 (braking).

Load the toy as in 5.12.2 (sideways stability test, feet available for stabilization) with the appropriate mass as given in Table 3 and place it on a plane inclined at $(10^{+0,5}_0)^\circ$ covered with a surface of aluminium oxide paper P60, with its longitudinal axis parallel to the incline.

Apply a force of (50 ± 2) N in the direction in which the brake handle is normally operated.

If the brake is operated by a handle similar to that of a bicycle, apply a force of (30 ± 2) N at right angles to the axis of the handle, at the middle of the handle.

If the brake is operated by a pedal, apply a force of (50 ± 2) N to the pedal in the operating direction producing the effect of the brake.

If the vehicle has several brakes, test each brake separately.

Determine whether the toy moves more than 5 cm upon application of the braking force.

5.16.3 Brake performance for toy bicycles

See 4.22.3 (braking requirements).

Load the toy bicycle with a mass of $(50 \pm 0,5)$ kg, whose centre of gravity is 150 mm above the surface on which a child sits. Place the toy bicycle on a plane inclined at $(10^{+0,5}_0)^\circ$ with its longitudinal axis parallel to the incline.

If the brake is operated by a handle similar to that of a bicycle, apply a force of (30 ± 2) N at right angles to the axis of the handle, at the middle of the handle.

If the brake is operated by a pedal, apply a force of (50 ± 2) N in the operating direction producing the effect of the brake.

Determine whether the toy moves more than 5 cm upon application of the braking force.

5.17 Determination of speed of electrically driven ride-on toys

See 4.23 (speed limitation of electrically driven ride-on toys).

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Load the toy in its normal sitting or standing position with a mass of $(25 \pm 0,2)$ kg.

Operate the toy on a horizontal surface and determine whether the maximum velocity exceeds 8 km/h.

5.18 Determination of temperature increases

See 4.24 (toys containing a heat source).

In an ambient draft-free atmosphere with a temperature of (21 ± 5) °C, operate the toy according to the instructions for use at the maximum input until equilibrium temperature is reached.

Measure the temperature of the accessible parts and calculate the temperature increases.

Observe whether the toy ignites.

5.19 Leakage of liquid-filled toys

See 4.25 (liquid-filled toys).

Condition the liquid-filled toy at a temperature of (37 ± 1) °C for a minimum of 4 h.

Within 30 s of removing the toy from conditioning, apply a force of $(5^{+0,5}_0)$ N to the external surface of the toy through a steel needle with a diameter of $(1 \pm 0,1)$ mm and with a tip radius of $(0,5 \pm 0,05)$ mm.

Apply the force gradually within a period of 5 s. Maintain the force for 5 s.

After completion, determine leakage by applying cobalt chloride paper over the area where the force was applied while elsewhere compressing with a force of $(5^{+0,5}_0)$ N using suitable means other than a needle.

Repeat the test after conditioning the toy at a temperature of (5 ± 1) °C for a minimum of 4 h.

After completion, examine the toy for leakage of the contents.

If liquid other than water is used, confirm leakage using another suitable method.

Cobalt chloride paper should not be used for the 5 °C test as condensation may give false results.

5.20 Durability of mouth-actuated toys

See 4.26 (mouth-actuated toys).

Connect a piston pump capable of discharging and receiving more than 300 cm³ of air in less than 3 s to the mouthpiece of the mouth-actuated toy. Arrange a relief valve so that the pump will not generate a positive or negative pressure of more than 13,8 kPa. Subject the toy to 10 alternating blowing and sucking cycles, each within 5 s and of at least (295 ± 10) cm³ of air including the volume which may be discharged through the relief valve. If the air outlet is accessible, ensure that the above is also applied to the outlet.

Determine whether any released component fits entirely in the cylinder when tested in accordance with 5.2 (small parts test).

5.21 Expanding materials

See 4.3.2 (expanding materials).

Condition the toy or component at (21 ± 5) °C and at a relative humidity of 40 % to 65 % for at least 7 h before the test. Measure the maximum dimensions $x, y,$ and z of the toy or any component of the toy using callipers.

Submerge the toy or component completely in a container of demineralized water at (20 ± 5) °C for $(24 \pm 0,5)$ h. Ensure that sufficient water is used so that the toy or component still remains under water at the end of the test.

Remove the item using a pair of tongs. If the item cannot be removed because of insufficient mechanical strength, it is considered to comply with the requirement of 4.3.2.

Allow water adhering to the toy or component to drain for 1 min and re-measure the item.

After re-measuring, place the item in the demineralized water again and repeat the above procedure twice, such that the item has been measured after 24 h, 48 h and 72 h of submersion.

Calculate the expansion in the *x*, *y* and *z* dimensions as a percentage of the original dimension.

Determine whether the item complies with the requirements of 4.3.2.

5.22 Folding or sliding mechanisms

5.22.1 Loads

Load the toy with a mass of $(50 \pm 0,5)$ kg.

For toys intended for children under 36 months, load the toy with a mass of $(25 \pm 0,2)$ kg.

5.22.2 Toy pushchairs and perambulators

See 4.12.1 (toys pushchairs, perambulators and similar toys).

Precondition the toy by erecting and folding it 10 times.

a) For toy pushchairs and perambulators covered by 4.12.1 a), carry out the following.

Erect the toy on a horizontal surface with the locking devices engaged and load the toy with the appropriate mass specified in 5.22.1 (loads), ensuring that the load is borne by the frame. Where necessary, use a suitable support to ensure that the seat material is not damaged. Apply the load to the frame in the least favourable position with respect to the folding parts. Apply the load evenly over 5 s and maintain for 5 min.

Determine whether it is possible to partially erect the toy without engaging one of the locking devices. If so, also carry out the above loading in the partially erect position.

If the seat of the body is detachable from the chassis, this test shall also be carried out on the chassis only, using suitable support for the test mass.

Determine whether the toy collapses and whether the locking devices are still operable and engaged.

b) For toy pushchairs and perambulators covered by 4.12.1 b), carry out the following.

Erect the toy on a horizontal surface with the locking devices engaged and load the toy with the appropriate mass specified in 5.22.1 ensuring that the load is borne by the frame. Where necessary, use a suitable support to ensure that the seat material is not damaged. Apply the load to the frame in the most onerous position with respect to the folding parts. Apply the load evenly over 5 s and maintain for 5 min.

Determine whether it is possible to partially erect the toy without engaging the locking devices. If so, also carry out the above loading in the partially erect position.

Determine whether the toy collapses and whether the locking devices or safety stop are still operable and engaged.

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5.22.3 Other toys with folding mechanisms

See 4.12.2 (other toys with folding mechanisms).

- a) Erect the toy. Lift the toy and observe whether the locking device disengages when the toy is tilted in any $(30 \pm 1)^\circ$ angle from the horizontal.
- b) Erect the toy and position it on a surface inclined $(10^{+0,5}_0)^\circ$ in the most onerous position with respect to the folding parts. Engage any locking device. Load the toy for 5 min with the appropriate mass specified in 5.22.1 (loads). Apply the load wherever it is possible for a child to sit and in the least favourable position with respect to the folding parts. Ensure that the load is borne by the frame. Where necessary, use a suitable support to ensure that the seat material is not damaged.

Determine whether the toy collapses or the locking device disengages.

5.23 Washable toys

See 4.1 (normal use).

Determine the mass of each washable toy prior to the beginning of the test.

Subject the toy to six washing-machine and tumble-dryer cycles, unless a different method is specified by the toy manufacturer by means of a permanent label.

Any commercially available washer, dryer or laundry detergent intended for use in the home may be used for this test. Consideration should be given to the specific types of washing machines (top- or front-loading) used in the country in which the toy is meant to be sold.

Wash the toys plus a dummy load of clothes sufficient to bring the total dry mass to a minimum 1,8 kg in an automatic washing machine, using the "warm" water setting and approximately 12 min wash cycle at the "normal" setting.

Dry the toys and dummy load in accordance with the manufacturer's instructions.

NOTE For equivalent settings on other types of machines, "warm" is approximately 40 °C and a "normal" load is for an average size load according to the machine being used.

The toy shall be deemed to be dry when the final mass does not exceed the original dry mass by more than 10 %.

Determine whether the toy still conforms to the relevant requirements of [Clause 4](#) (requirements).

5.24 Reasonably foreseeable abuse tests

See 4.2 (reasonably foreseeable abuse).

5.24.1 General

The tests in 5.24 are meant to simulate situations in which possible damage can occur to a toy as a result of reasonably foreseeable abuse.

Unless otherwise stated, these tests are only applicable for toys intended for children under 96 months.

After undergoing each of the appropriate tests, the toy shall still continue to conform to the relevant requirements of [Clause 4](#) (requirements).

NOTE The tests specified in 4.31.2 (all other toys with magnets and magnetic components) are carried out in the order specified in 4.31.2 on a toy, or part of a toy, that has not been previously tested according to this subclause (5.24, reasonably foreseeable abuse test).

5.24.2 Drop test

Except for toys covered in 5.24.3 (tip-over test for large and bulky toys), toys falling below the mass limits indicated in Table 5 shall be dropped onto a specified impact surface. The number of times the toy shall be dropped and the height from which it is dropped shall also be determined from Table 5. The toy shall be dropped in random orientation.

The impact surface shall consist of vinyl composition tile of approximately 3 mm nominal thickness laid over concrete of at least 64 mm thickness. The tile shall have a hardness of (80 ± 10) Shore A and the impact surface shall be at least 0,3 m².

For battery-operated toys, the recommended batteries shall be in place during the drop test. If no specific type of battery is recommended, the heaviest battery which is generally available shall be used.

Table 5 — Drop test

Age group	Mass criterion kg	Number of drops	Drop height cm
Under 18 months	< 1,4	10	138 ± 5
18 months and over but under 96 months	< 4,5	4	93 ± 5

After each drop, the toy shall be allowed to come to rest and shall be examined and evaluated before continuing.

Determine whether the toy continues to conform to the relevant requirements of Clause 4 (requirements).

5.24.3 Tip-over test for large and bulky toys

Large and bulky toys shall not be tested according to 5.24.2 (drop test), but in accordance with the following procedure:

Tip the toy over three times, one of which shall be in the most onerous position, by pushing the toy slowly past its centre of balance onto the impact surface described in 5.24.2.

After each tip-over, the toy shall be allowed to come to rest and shall be examined and evaluated before continuing.

Determine whether the toy continues to conform to the relevant requirements of Clause 4 (requirements).

5.24.4 Dynamic strength test for wheeled ride-on toys other than toy scooters

Load the toy for 5 min in the most onerous position with the appropriate mass in accordance with Table 3 on its standing or sitting surface.

Secure the load to the toy in a position corresponding to the normal use of the toy.

Drive the toy three times at a speed of $(2 \pm 0,2)$ m/s into a non-resilient step with a height of 50 mm.

If the toy is intended to bear the mass of more than one child at a time, test each sitting or standing area simultaneously.

Determine whether the toy continues to conform to the relevant requirements of Clause 4 (requirements).

5.24.5 Torque test

Any toy with a projection, part or assembly that a child can grasp with at least the thumb and forefinger or the teeth shall be subjected to this test.

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Position the toy rigidly in any reasonable test position. Apply a clamp capable of holding the test component firmly and transmitting a torsion force to the test object or component.

Using a torque gauge or torque wrench, apply a torque of $(0,45 \pm 0,02)$ N·m in a clockwise direction until either

- a) a rotation of 180° from the original position has been attained, or
- b) the required torque is reached.

Apply the maximum rotation or required torque evenly over a 5 s period and maintain for an additional 10 s. The torque shall then be removed and the test component permitted to return to a relaxed condition.

Repeat the procedure in an anticlockwise direction.

Projections, parts, or assemblies that are rigidly mounted on an accessible rod or shaft designed to rotate along with the projections, parts, or assemblies, shall be tested with the rod or shaft clamped to prevent rotation.

If a component which is attached by a screw thread which has been assembled by the manufacturer, or which has been assembled according to the manufacturer's instructions, becomes loosened during the application of the required torque, continue to apply the torque until either the required torque is exceeded or the part disassembles. If it becomes obvious that the part under test will continue to rotate at less than the required torque limit and will not disassemble, terminate the test.

If the part disassembles and exposes an accessible component which can be grasped as noted above, repeat the torque test on the component.

Determine whether the toy continues to conform to the relevant requirements of [Clause 4](#) (requirements).

5.24.6 Tension test

5.24.6.1 General procedure

Any toy with a projection, part or assembly that a child can grasp with at least the thumb and forefinger or the teeth shall be subjected to this test. The tension test shall be performed on the same components of the toy subjected to the test in [5.24.5](#) (torque test).

Apply a clamp capable of applying the tension load to the test component in a manner that will not affect the structural integrity of the attachment between the component and the toy. The loading device shall be a self-indicating gauge or other appropriate means having an accuracy of ± 2 N. With the test sample fastened in a convenient position, attach an appropriate clamp to the test object or component.

Apply a force of (70 ± 2) N parallel to the major axis of the test component evenly over a 5 s period and maintain for 10 s.

Release the force, replace or reposition the clamp, or reposition the toy such that the tension load can be applied perpendicularly to the major axis of the test component.

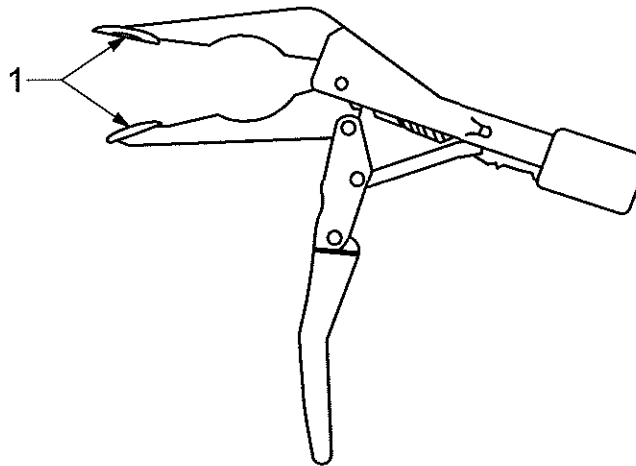
Apply a force of (70 ± 2) N perpendicularly to the major axis of the test component evenly over a 5 s period and maintain for 10 s.

Determine whether the toy continues to conform to the relevant requirements of [Clause 4](#) (requirements).

5.24.6.2 Tension test for seams in soft-filled (stuffed) toys, beanbag-type toys, and other similar filled toys

For toys constructed of pliable material having seams (including, but not limited to, seams which are stitched, glued, heat-sealed, or ultrasonically welded), the seams shall be subjected to a separate tension test.

The clamps used to grip the material on either side of the seam to be tested shall have jaws with attached discs of diameter 19 mm (see Figure 30).



Key

1 flat discs

Figure 30 — Seam clamp

Attach the clamps to the cover material of a completely assembled toy in such a manner that the outside diameter of the 19 mm discs at a point nearest to the seams will be approximately 13 mm from the edge of the seam stitching thread, but no closer. If threads are not used to create the seam, attach the clamps in such a manner that the edges of the 19 mm discs are approximately 13 mm from the edge of the seam, but no closer.

Apply a force of (70 ± 2) N evenly over a 5 s period and maintain for 10 s.

If the material adjacent to the seam cannot be grasped between the thumb and the forefinger of the test personnel sufficient for full clamping by the 19 mm diameter washer discs, the seam test shall not be performed. If this is the case, instead of the seam test, an arm, leg or other appendage of the toy shall be tested according to 5.24.5 (torque test) and 5.24.6.1 (tension test, general).

Determine whether the toy continues to conform to the relevant requirements of [Clause 4](#) (requirements).

5.24.6.3 Tension test for pompoms

See [4.5.3](#) (pompoms).

Pompoms shall be tested according to [5.24.5](#) (torque test) and the tension test as described in this subclause.

The clamps used to grip the material to be tested shall have jaws with attached 19 mm diameter discs (see [Figure 30](#)). Attach one clamp to the pompom and use a second clamp to grip the base material.

Apply a force of (70 ± 2) N evenly over a 5 s period and maintain for 10 s.

Determine whether the toy continues to conform to the relevant requirements of [Clause 4](#) (requirements).

5.24.6.4 Tension test for protective components

See [4.8](#) (projections), [4.9](#) (metal wires and rods) and [4.18](#) (projectile toys).

Subject the part to be tested to a tensile force of (70 ± 2) N, applied evenly over a 5 s period, and maintain for 10 s. Apply the force in the most onerous direction in an attempt to remove the component.

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5.24.6.5 Tension test for a projectile with a suction cup

See 4.18.2 (projectiles)

For projectiles with a suction cup as a contact surface, attach a clamp on the shaft such that the edge of the clamp is at a point (57 ^{+1}_0) mm from the contact surface of the projectile. Determine this distance in accordance with the procedure contained in 5.37 (length of suction cup projectiles). If, due to the length of the projectile, it is not possible to achieve 57 mm between the clamp and the contact surface of the projectile, place the clamp such that its distance from the contact surface of the projectile is maximized. Place a second clamp around the suction cup such that it is held securely against a flat surface as shown in Figure 31.

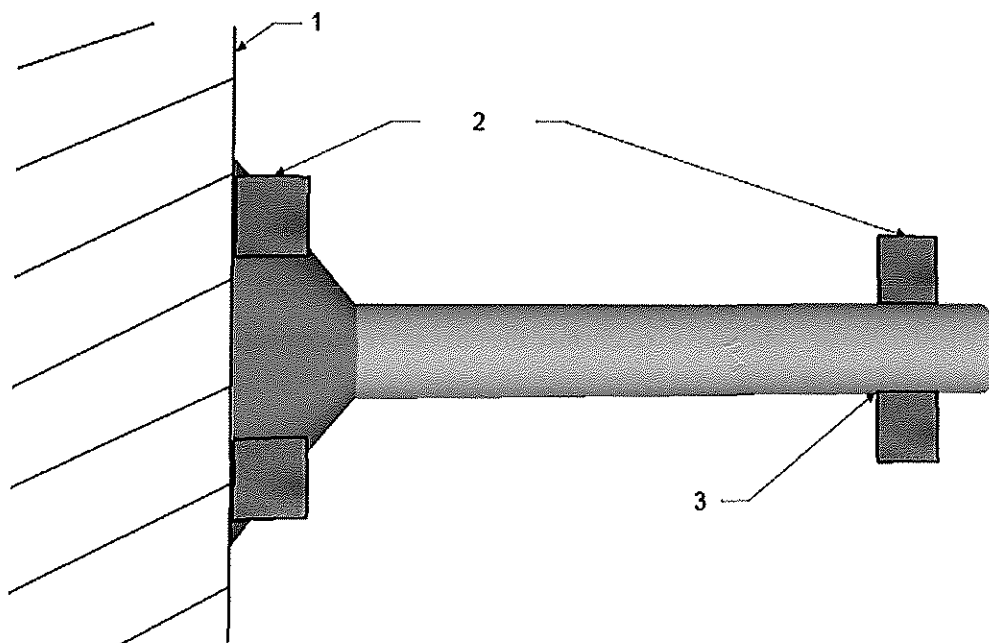
If clamping causes any damage to the projectile, it is allowable to use alternative methods to secure the projectile.

NOTE If glue is used to fasten the suction cup to a flat surface, care must then be taken that the solvents in the glue do not influence the material properties of the suction cup or its fastening to the shaft.

Subject the projectile to a longitudinal force of (70 ± 2) N evenly over a 5 s period and maintain for 10 s.

If the suction cup has detached determine whether the suction cup passes through test template C in 5.4 (small balls test).

If the shaft has broken, determine whether or not the remaining portion of the shaft and suction cup has a total length of 57 mm or more.



Key

- 1 flat surface
- 2 clamps
- 3 57 mm from tip

Figure 31 — Example of attachment of clamps when testing suction cups on projectiles

5.24.7 Compression test

Any area on the surface of a toy that is accessible to a child and non-accessible to flat surface contact when tested according to 5.24.2 (drop test) shall be subjected to this test.

Determine the compression force from Table 6 according to the age group for which the toy is intended.

Table 6 — Compression force

Age category	Compression force N
Under 36 months	114 ± 2,0
36 months and over but under 96 months	136 ± 2,0

The loading device shall be a rigid metal disc with a diameter of (30 ± 1,5) mm and a thickness of 10 mm minimum. The perimeter of the disc shall be rounded to a radius of 0,8 mm to eliminate irregular edges.

Attach the disc to an appropriate compression scale having an accuracy of ± 2 N.

Place the toy on a flat hard surface in any convenient position. Position the disc so that the flat contact surface is parallel to the surface under test.

Apply the required force through the disc evenly over a 5 s period and maintain for 10 s.

Determine whether the toy continues to conform to the relevant requirements of Clause 4 (requirements).

5.24.8 Flexure test

5.24.8.1 General

See 4.9 (metal wires and rods).

If the metallic wire has a covering, apply the test to the metallic wire in the condition in which it appears in the toy (i.e. do not remove the metallic wire from the toy).

Grip the metallic wire firmly between two metal cylinders, radiused pliers or equivalent metal pieces with a diameter of (10 ± 1) mm. At a point located 50 mm from the point of gripping or, if less than 50 mm protrudes, at the end of the metallic wire, apply a force of (70 ± 2) N perpendicular to the metallic wire. If the metallic wire bends by more than 60°, continue the test as follows.

Bend the metallic wire from the upright position to one side through 60°, and then bend in the opposite direction through 120°, and finally return to the upright position. This is one cycle.

5.24.8.2 Wires and other metallic components intended to be bent

Perform 30 times the cycle described in 5.24.8.1 (general) at a rate of one cycle per 2 s with a 60 s rest period after each 10 cycles. To ensure that the metallic wire or other metallic component bends at the point emerging from the cylinders, it shall be kept taut during the test.

Determine whether the toy continues to conform to the relevant requirements of 4.9 (metal wires and rods), removing any covering material, if applicable, to aid the examination.

5.24.8.3 Wires likely to be bent

Perform the cycle described in 5.24.8.1 (general) once.

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Determine whether the toy continues to conform to the relevant requirements of 4.9 (metal wires and rods), removing any covering material, if applicable, to aid the examination.

5.25 Determination of sound pressure levels

See 4.29 (acoustic requirements).

5.25.1 Installation and mounting conditions

5.25.1.1 General

Carry out the measurements on a new toy not already subjected to testing. Test battery-operated toys using new primary batteries or fully charged secondary batteries.

External power supplies should not be used as they will, in many cases, affect the performance of the toy.

5.25.1.2 Test environment

Test environments shall meet the qualification requirements specified in Annex A of ISO 3746:2010.

NOTE In practice, this means that most normally furnished rooms with a volume exceeding 30 m³ will qualify at measurement distances of 50 cm, provided the largest dimension of the toy does not exceed 50 cm. For distances shorter than 25 cm, almost any environment will qualify.

If the more accurate ISO 11201 is used, the test environment should meet the requirements of ISO 3744.

5.25.1.3 Mounting

Test rigs used for the mounting of toys and/or the operator of the toy shall not affect the sound emission of the toy under test nor cause sound reflections which will increase the sound pressure levels at the measuring points.

NOTE 1 It is often convenient to be able to rotate the test object instead of moving the microphone.

- Mount close-to-the-ear toys and hand-held toys in a proper test rig at least 100 cm above the reflecting plane or have them operated by an adult operator with the arm outstretched.

NOTE 2 If an operator is used, hearing protectors should be used when testing very loud toys.

- Place stationary table-top, floor and crib toys on a standard test table as described in ISO 11201. The table top should be large enough such that, with the toy resting on and fully over the table top, the side of the measurement box from which the measurement is being made is also above the table top (see 5.25.2.3.6, stationary and self-propelled table-top, floor and crib toys).
- Mount self-propelled table-top and floor toys on the standard test table as described above in a test rig so that they can be operated with full power, but are prevented from moving around.
- Place pull and push toys on the reflecting plane (e.g. concrete, tile or other hard surface) and fix them in a test rig which enables them to be moved with varying speed along a direct line which passes the measuring microphones ("pass-by" test). Make sure that the friction of the reflecting plane prevents wheels from skidding.
- Place hand-actuated wind-up toys, with the wind-up spring fully loaded, on the reflecting plane (e.g. concrete, tile, or other hard surface) so that the front of the toy is (40 ± 1) cm along the x-axis from the microphones of the "pass-by" test (see Figure 35).
- Mount other types of toys in the most appropriate way using the principles described in previous paragraphs.

5.25.1.4 Operating conditions

Operate the toy under test in that mode of its intended or foreseeable use which produces the highest sound pressure level to the microphone position, i.e. where the maximum noise level is obtained.

In particular, perform the following.

- Operate a hand-actuated toy manually, excluding pull and push toys, by applying the force at the point and direction of its intended or foreseeable use giving the maximum sound pressure level. For a toy intended to be shaken, shake at a rate of three times per second. One cycle shall consist of an initial 15 cm stroke followed by a return to the starting point.
- Operate a rattle by grasping it where it is meant to be held or, if in doubt, where the longest lever between the hand and the sound emitting part of the rattle can be obtained. Make sure that the radiated sound is not affected by the grip of the hand. Strike downwards 10 times with hard lashes in a slow tempo. Use the wrist and keep the forearm essentially horizontal. Endeavour to achieve the highest possible sound level. Stand side-face with the microphone and keep the rattle at the same height as the microphone at a distance of 50 cm.
- Operate a pull and push toy at a speed that yields the maximum sound pressure level. Do not exceed 2 m/s.
- Operate a cap-firing toy using percussion caps recommended by the manufacturer and which are available on the market.

5.25.2 Measurement procedure

5.25.2.1 Basic International Standards to be used

The minimum requirement is to determine sound pressure levels at the specified positions around the toy in accordance with ISO 11202 and ISO 11204, which are survey methods. In case of dispute, the more accurate ISO 11201 shall be used.

NOTE 1 Because of fewer reflections from the room boundaries, ISO 11201 will tend to give slightly lower values than ISO 11202 and ISO 11204.

NOTE 2 In certain cases, ISO 11204 can have the accuracy of an engineering method.

5.25.2.2 Instrumentation

The instrumentation system, including the microphone and cable, shall meet the requirements of a class 1 or class 2 instrument specified in IEC 61672-1 and IEC 61672-2. When measuring high peak sound pressure levels, e.g. from toys using percussion caps, the microphone and the entire instrumentation system shall have the capability of handling linear peak levels, exceeding the C-weighted peak levels, by at least 10 dB.

When ISO 11201 is used, a class 1 instrument is required.

5.25.2.3 Microphone positions

5.25.2.3.1 General

Several microphone positions shall be used. In practice, this often means that one microphone is moved from position to position. Whenever it is practicable, it is always an alternative to rotate the test object instead. Attention must be paid to maintaining the correct measuring distance.

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5.25.2.3.2 Close-to-the-ear toys

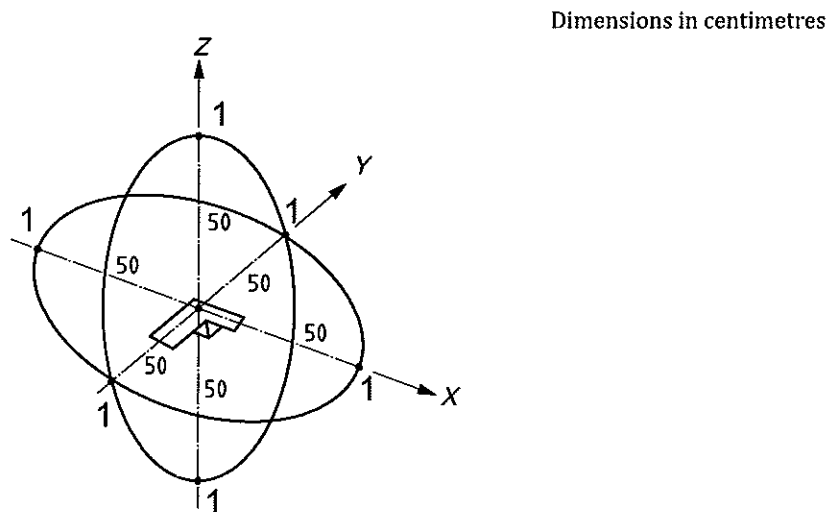
To measure continuous sounds, face the earpiece of the toy towards the microphone with the microphone ($50 \pm 0,5$) cm from the earpiece. To measure continuous sounds on toys without earpieces, locate the microphone ($50 \pm 0,5$) cm from the surface of the toy where the main sound source exists such that the sound pressure level at the microphone is maximized.

To measure impulsive sounds, locate the microphone ($50 \pm 0,5$) cm from the surface of the toy where the main sound source exists such that the sound pressure level at the microphone is maximized.

5.25.2.3.3 Cap-firing toys

Use six microphone positions around the toy. Place the main sound-emitting part of the toy at the origin of the measuring coordinate system in its normal operating orientation in such a way that the main axes of the toy coincide with the axes of the measuring coordinate system (see Figure 32). If the length of the toy exceeds 50 cm, rotate the toy in the XY-plane 45° around the Z-axis without changing the microphone positions.

Select two microphone positions along each axis at a distance of (50 ± 1) cm to both directions from the origin as shown in Figure 32.



Key

1 flat surface

Figure 32 — Microphone positions for the measurement of sound pressure levels of cap-firing toys

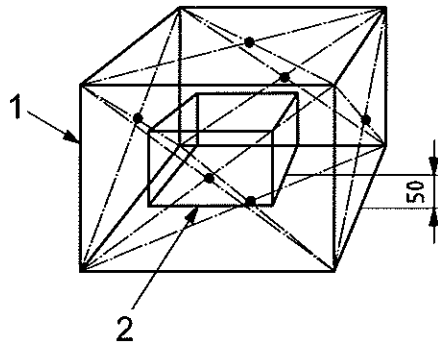
5.25.2.3.4 Rattles

Mount the microphone 1,2 m above the floor and at a distance of 0,5 m from the sound source in a room either large enough or sound absorbing enough to make all sound reflections negligible.

5.25.2.3.5 Other hand-held toys

Select six microphone positions on a box-shaped measurement surface at the measuring distance of 50 cm from the reference box of the toy, as defined in ISO 3746, and as specified in Figure 33. The positions are at the centres of the sides of the measurement surface at a distance of 50 cm from the reference box.

Dimensions in centimetres



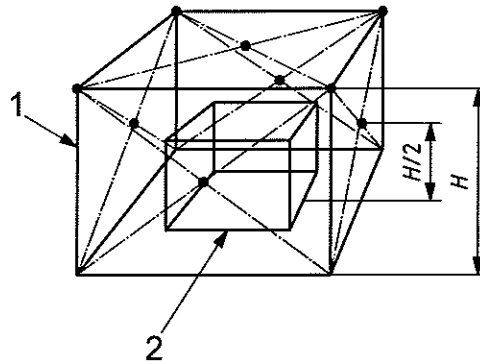
Key

- 1 measurement box
- 2 reference box

Figure 33 — Microphone positions for all other hand-held toys

5.25.2.3.6 Stationary and self-propelled table-top, floor and crib toys

Select five, or if the length or width of the toy is larger than 100 cm, nine microphone positions on a box-shaped measurement surface at the measuring distance of 50 cm from the reference box of the toy as specified in Figure 34. The sides of the measurement box with height, H , are always 50 cm from the sides of the reference box, except for the bottom of the boxes, which lie in the same plane. All microphone positions are on the measurement box.



Key

- 1 measurement box
- 2 reference box

Figure 34 — Microphone positions for the measurement of stationary and self-propelled table-top, floor and crib toys

5.25.2.3.7 Pull and push toys and hand-activated spring-propelled toys

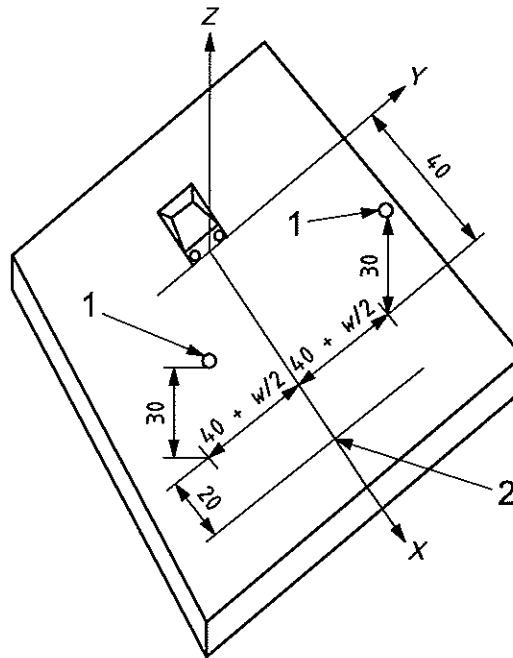
For toys with a width, w , of 25 cm or less, use two microphones at distances, d , 50 cm from the x-axis of the measuring coordinate system as shown in Figure 35.

For toys with a width, w , of more than 25 cm, use two microphones at distances, d , 40 cm plus half the width of the toy from the x-axis ($40 + w/2$) as shown in Figure 35.

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Place the toy on a test rig or on the reflecting plane in its normal operating orientation in such a way that movement of the toy is possible along the x-axis passing the microphone positions.

Dimensions in centimetres



Key

- 1 microphone
- 2 end of measurement
- w width of toy

Figure 35 — Microphone positions for the measurements of pull and push toys and for hand-actuated spring-propelled toys (“pass-by” test)

5.25.2.4 Measurements

5.25.2.4.1 General

Normal operating mode(s) shall be reached before the tests are performed.

5.25.2.4.2 Measurements of continuous sounds

If the toy under test has a clearly-defined operating cycle, measure the equivalent sound pressure level in each microphone position during at least one whole cycle. Quiet periods longer than 15 s shall be excluded from the measurement period. Perform a total of three measurements.

If the toy under test does not have a clearly-defined operating cycle, measure the equivalent sound pressure level in each microphone position for at least 15 s during the operational mode where the noise level is highest. Perform a total of three measurements.

5.25.2.4.3 Measurements of impulsive sounds

Measure the C-weighted peak sound pressure level, L_{pCpeak} , of impulsive sounds in each microphone position. Perform a total of three measurements.

For pass-by tests, measure the C-weighted peak sound pressure level, L_{pCpeak} . Measure twice on each side.

5.25.2.4.4 Measurement for rattles

Measure the C-weighted peak sound pressure level, L_{pCpeak} for 10 cycles. Perform a total of three measurements.

5.25.2.4.5 Measurement results

Sound measurement results shall be given as:

- A-weighted equivalent sound pressure level at the specified position, L_{pAeq} , in decibels;
- A-weighted maximum sound pressure level at the specified position, L_{pAmax} (pass-by tests), in decibels;
- C-weighted peak sound pressure level at the specified position, L_{pCpeak} , in decibels.

The highest value of the applicable measurements (L_{pAeq} , L_{pAmax} and L_{pCpeak}) at any of the microphone positions is the measurement result.

5.26 Static strength for toy scooters

See 4.30.3 (strength).

Position a test mass in the centre of the platform (see Figure 36).

For toy scooters labelled as intended for children with a body mass of 20 kg or less, a test load of $(50 \pm 0,5)$ kg shall be used.

For other toy scooters, a test mass of (100 ± 1) kg shall be used.

Maintain the load for 5 min.

The dimensions of the test mass are given in Figure 37.

The approximate diameter of the base of the test mass shall be 150 mm (see Figure 37). The other dimensional requirements in Figure 37 apply only for the stability test of toy scooters (see 5.12.2, sideways stability test, feet available for stabilization).

Determine whether the toy continues to comply with relevant requirements of this part of ISO 8124.

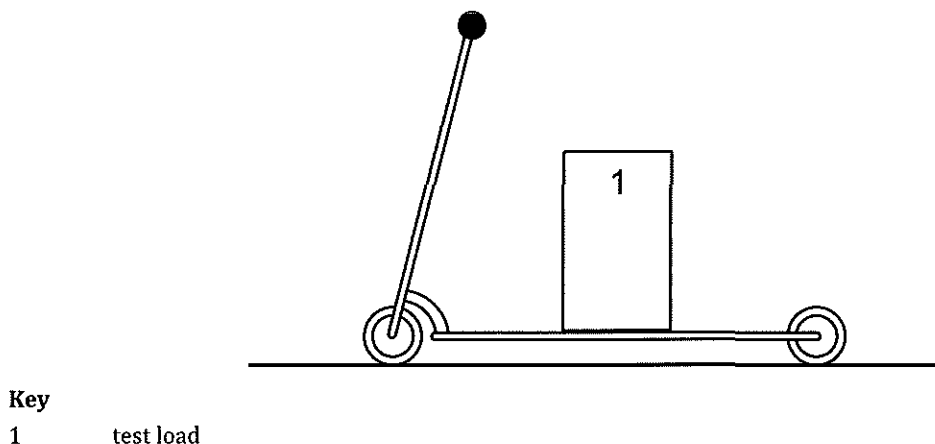
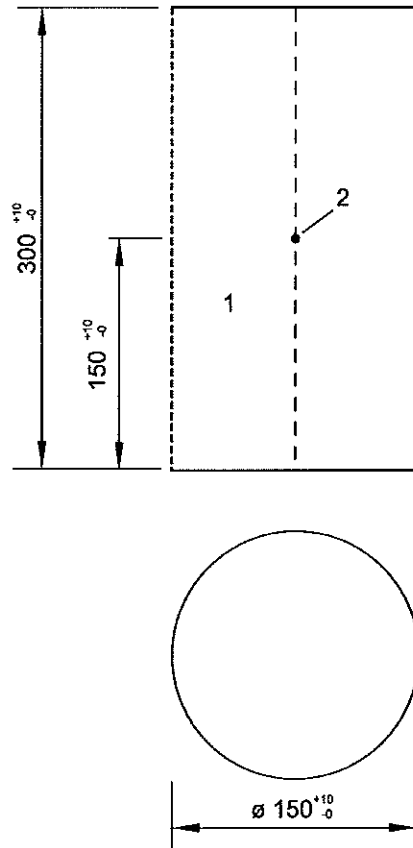


Figure 36 — Static strength test for toy scooters

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Dimensions in millimetres



Key

- 1 mass, 50 kg or 100 kg
- 2 centre of gravity

NOTE The sides of the load are dotted to indicate that the diameter of the load is permitted to vary between the base and the top. Thus, the 50 kg load and the 100 kg load may have different shapes, provided that the other dimensional requirements are fulfilled.

Figure 37 — Load for determination of strength and stability

5.27 Dynamic strength for toy scooters

See 4.30.3 (strength).

5.27.1 Principle

A load is secured to the toy scooter and then articulated arms with the elbow joints in a downward position are attached to the handlebars. The toy scooter is driven three times into a non-resilient step.

It is then determined whether the toy scooter continues to comply with relevant requirements of this part of ISO 8124.

5.27.2 Load

A load as specified in [Figure 38](#), equipped with two articulated arms and a removable cushion with straps, shall be used.

The mass of each articulated arm shall be $(2 \pm 0,02)$ kg.

The mass of the cushion including sand and straps shall be $(0,5 \pm 0,01)$ kg.

The masses of the two articulated arms and the cushion shall be added to the load giving a nominal mass of 54,5 kg for toy scooters intended for users up to 50 kg, and 29,5 kg for toy scooters intended for users of 20 kg or less.

The articulated arms shall be attached with spherical joints to the top element diametrically opposite each other, allowing the arms to be moved in any direction.

The joints at the "elbows" move in one direction and shall be capable of being locked. The joints at the "wrists" move in two directions and shall be capable of being locked. The ends of the arms shall be equipped with clamps for securing the arms to the toy.

5.27.3 Procedure

Load the toy scooter onto its platform with the mass (appropriate for the type of scooter) using a platform with a height of (250 ± 25) mm and a mass of $(4,8 \pm 0,2)$ kg (see example of platform in Figure 39). Place the load in a position that corresponds approximately to the normal use of the toy and secure the load to the toy scooter by means of the straps. To prevent undue damage to the toy scooter by the test load, a cushion shall be used but may be omitted if the test load will clearly not cause damage.

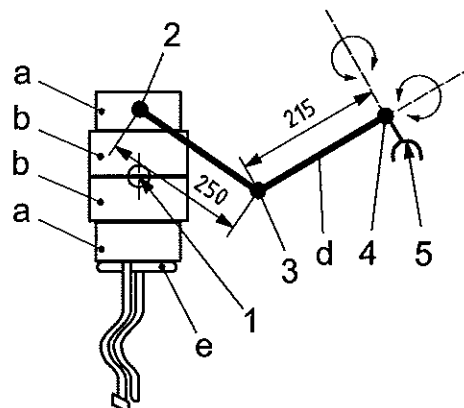
Attach the clamps of the articulated arms to the handlebar of the toy scooter in a position that corresponds approximately to the normal use of the toy scooter, and lock the joints at the elbows and the wrists.

Accelerating smoothly, drive the toy scooter three times at a steady speed of $(2 \pm 0,2)$ m/s perpendicularly into a non-resilient step with a height of (50 ± 2) mm. The load shall be suspended just after impact in order to prevent it from falling and thereby causing unrelated damage to the toy.

During the setting up of the test, adequate precautions for the safe handling of the 50 kg test load should be taken. To achieve the suspension and for the safety of the test personnel, it is recommended to connect the load by a wire to an overhead telfer line or similar arrangement. A means of constraining the toy scooter should be used so that the wheel(s) runs into the non-resilient step perpendicularly. Stabilizers may be used in order to keep the toy scooter and the load in a vertical position during the test.

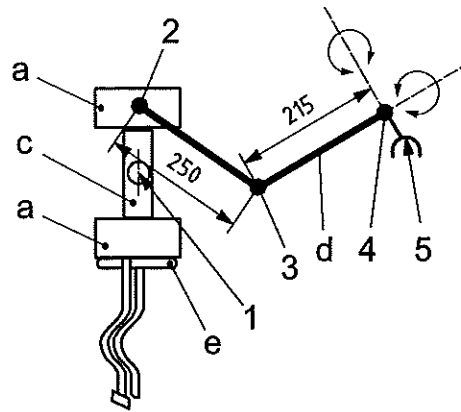
Determine whether the toy scooter continues to comply with relevant requirements of this part of ISO 8124.

Dimensions in millimetres



a) Test load for scooters intended for children with a body mass of between 20 kg and 50 kg

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b) Test load for scooters intended for children with a body mass of 20 kg or less

Specification of load for determination of dynamic strength			
Part	Mass kg	Diameter mm	Height mm
a	10,42	150 ± 2	75 ± 2
b	14,58	178 ± 2	75 ± 2
c	4,16	—	150 ± 2
d (each)	2,00		
e	0,50 (max.)		40 (max.)

Key

- 1 centre of gravity
- 2 spherical joint
- 3 one-way joint
- 4 two-way joint
- 5 clamp
- d articulated arms
- e cushion with straps (removable)

Figure 38 — Load for determination of dynamic strength

5.28 Brake performance for toy scooters

See 4.30.6 (braking).

5.28.1 Toy scooters with handbrake

Using a 250 mm high platform (with stabilizers) with a total mass of (4,8 ± 0,2) kg as shown in Figure 39, load the toy scooter with a mass of (50 ± 0,5) kg as described in 5.27.2 (load), so that the centre of gravity is 400 mm over the platform of the toy scooter.

Attach the articulated arms to the handlebar and place the toy scooter on a plane inclined at (10 ± 1)° covered with a surface of abrasive paper (aluminium oxide P60) and with its longitudinal axis parallel to the incline. Apply a force of (30 ± 2) N at right angles to the axis of the brake handle at the middle of the handle.

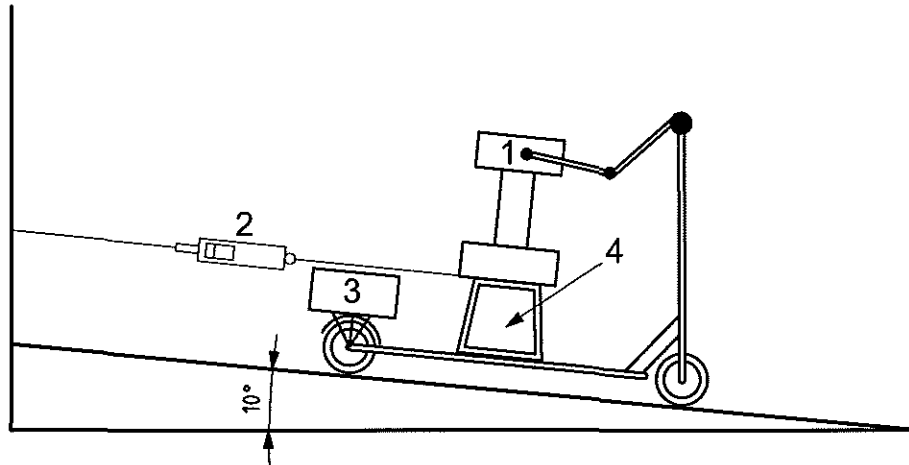
Determine the force required to hold the toy scooter on the inclined plane, parallel to the plane.

5.28.2 Toy scooters with foot brake

Using a 250 mm high platform (with stabilizers) with a total mass of $(4,8 \pm 0,2)$ kg as shown in Figure 39, load the toy scooter with a mass of $(25 \pm 0,2)$ kg as described in 5.27.2 (load), so that the centre of gravity is 400 mm over the platform of the toy scooter.

Attach the articulated arms to the handlebar and place the toy scooter on a plane inclined at $(10 \pm 1)^\circ$ covered with a surface of abrasive paper (aluminium oxide P60) and with its longitudinal axis parallel to the incline (see Figure 39). Apply a mass of (20 ± 1) kg on the foot brake.

Determine the force required to hold the toy scooter on the inclined plane, parallel to the plane.



Key

- 1 test load, 25 kg, with articulated arm
- 2 dynamometer
- 3 test load, 20 kg
- 4 platform and stabilizers with a height of 250 mm and a mass of $(4,8 \pm 0,2)$ kg

Figure 39 — Brake performance for toy scooters with foot brake

5.29 Strength of toy scooter steering tubes

See 4.30.3 (strength).

5.29.1 Resistance to downward forces

Place the toy scooter on a horizontal plane and secure it so that it will stand upright during the test. Check that any locking devices are correctly engaged.

- a) For toy scooters with two handles, suspend a mass of $(50 \pm 0,5)$ kg at the centre of each handle [see Figure 40 a)]. Maintain the load for 5 min.

Determine whether the steering tube collapses and the locking devices are still operable and engaged.

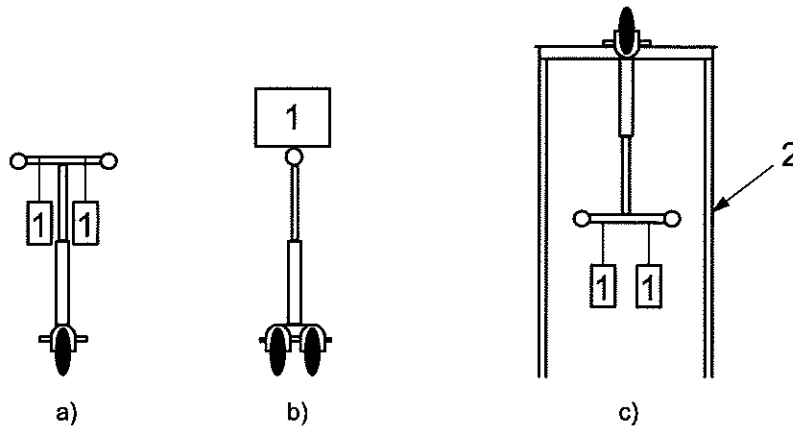
If the steering tube has an adjustable height, remove the two 50 kg masses. Release the main locking device and with the secondary locking device still engaged, load the handles with a mass of $(25 \pm 0,2)$ kg each and maintain the load for 5 min.

Determine whether the secondary locking device is still operable and engaged.

NOTE Each locking device is tested under the assumption that it is the main locking device.

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- b) For toy scooters with steering tubes without handles, perform the test as in 5.29.1 a) (resistance to downward forces) using a load with a mass of (100 ± 1) kg and $(50 \pm 0,5)$ kg, respectively, on top of the tube [see Figure 40 b)].



Key

- 1 test load
2 podium

Figure 40 — Test of steering tubes

5.29.2 Resistance to upward forces

Place and secure the toy scooter upside down on a podium [see Figure 40 c)]. Check that the locking devices are correctly engaged.

- a) For toy scooters with two handles, suspend a mass of $(25 \pm 0,2)$ kg at the centre of each handle. Maintain the load for 5 min.
- b) For toy scooters with steering tubes without handles, place a mass of $(50 \pm 0,5)$ kg on the end of the steering tube. Maintain the load for 5 min.

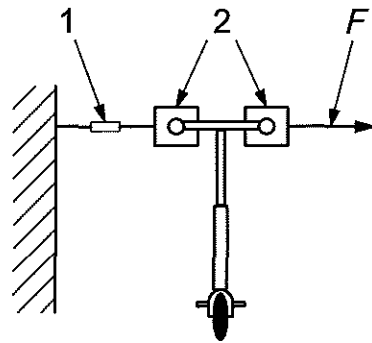
Determine whether the steering tube has separated and the locking devices are still operable and engaged.

5.30 Resistance to separation of handlebar

See 4.30.5 (adjustable and folding steering tubes and handlebars).

Apply a load of 90 N to each end of the handlebar in opposite directions (see Figure 41). Maintain the loads for 5 min.

Determine whether the handlebar has separated.



Key

- 1 method of measuring force
- 2 clamping device
- F force, 90 N

Figure 41 — Test for separation of handlebars

5.31 Tension test for magnets

See 4.31.2 c) (all other toys with magnets and magnetic components).

5.31.1 Principle

These tests simulate the intended or reasonably foreseeable play pattern. It is recognized that toys may contain a single magnet or a combination of magnets, magnetic components and/or metal mating parts; the tests are designed to simulate a reasonably foreseeable play pattern using these components to attach and detach the magnetic parts.

For toys that contain more than one magnet/magnetic component, the test specified in 5.31.2 (toys with magnetic or magnetic components) shall be carried out unless it is not possible to perform the test without damaging the toy. In the latter case, the test shall be carried out using the reference disc, as described in 5.31.4 (toys that contain one magnet only and no mating metal component).

NOTE An example of a case where it is not possible to perform the test in 5.31.2 with magnet(s) or magnetic component(s) without damaging the toy, is a toy figurine with one accessible but non-graspable magnet in each foot.

Toys that contain one magnet only and a mating metal component shall be tested according to 5.31.3 (toys that contain one magnet only and a mating metal component)

Toys that contain one magnet only and no mating metal component, shall be tested according to 5.31.4, since this simulates a play pattern where the toy is attached and detached to a surface that is not delivered with the toy.

5.31.2 Toys with magnets or magnetic components

Identify the magnet or magnetic component in the toy that is most likely to be able to detach. The identified magnet or magnetic component shall be subjected to the tension test for magnets.

If it is not possible to determine which magnet or magnetic component(s) in the toy is most likely to be able to detach the magnet under test, it is permissible to repeat the test with another magnet or magnetic component from the toy.

Without damaging the toy, place the magnet or magnetic component in the orientation of attraction, as close as possible, making contact if possible, to the magnet to be tested. Gradually apply a pulling force

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to the magnet/magnetic component until it separates from the magnet under test. Perform the test 10 times or until the magnet under test is detached from the toy, whichever occurs first.

Repeat the procedure for any other magnet that, in accordance with 4.31.2 (all other toys with magnets and magnetic components), shall be subjected to the tension test for magnets.

5.31.3 Toys that contain one magnet only and a mating metal component

Without damaging the toy, place the metal components as close as possible, making contact if possible, to the magnet to be tested. Gradually apply a pulling force to the metal component until it separates from the magnet under test. Perform the test 10 times or until the magnet under test is detached from the toy, whichever occurs first.

5.31.4 Toys that contain one magnet only and no mating metal component

5.31.4.1 Apparatus

Nickel disc with a minimum nickel content of 99 %, a diameter of $(30 \pm 0,5)$ mm and thickness of $(10 \pm 0,5)$ mm.

5.31.4.2 Procedure

Without damaging the toy, place the flat part of the disc as close as possible to the magnet to be tested, making contact if possible. Gradually apply a pulling force to the disc until it separates from the magnet under test. Perform the test 10 times or until the magnet under test is detached from the toy, whichever occurs first.

5.32 Magnetic flux index

5.32.1 General

See 4.31.1 (magnetic/electrical experimental sets intended for children 8 years and over), 4.31.2 a) and c) (all other toys with magnets and magnetic components).

5.32.2 Principle

The magnetic flux index is calculated based on the results from measurements of the flux density and the pole surface area.

5.32.3 Apparatus

5.32.3.1 Direct current field Gauss meter; with a resolution of 5 G, capable of determining the field to an accuracy of 1,5 % or better. The meter shall have an axial type probe with an active area diameter of $(0,76 \pm 0,13)$ mm and a distance between the active area and probe tip of $(0,38 \pm 0,13)$ mm.

5.32.3.2 Calliper, or similar device, with an accuracy of 0,1 mm.

5.32.4 Procedure

5.32.4.1 Measurement of flux density

Identify the surface of the magnet that is a pole.

Place the tip of the Gauss meter probe in contact with the pole surface of the magnet. For a magnetic component (where the magnet is fully or partially embedded in part of the toy), place the tip of the probe in contact with the surface of the component.

Maintain the probe in a position perpendicular to the surface.

Move the probe across the surface to locate the maximum absolute value of the flux density. Record the maximum absolute value of the flux density.

NOTE Since the meter can read both negative and positive values, the absolute value is used for calculations.

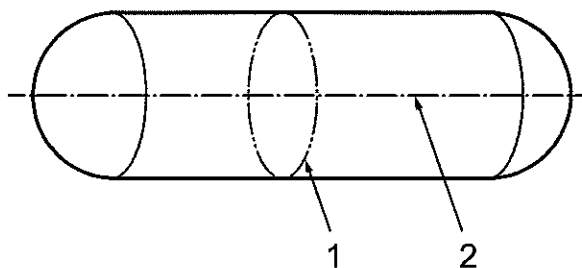
5.32.4.2 Measurement and calculation of the pole surface area

If the magnet is embedded/attached as part of a magnetic component, extract the magnet from the component, even if it is necessary to break the toy.

If the pole surface of the magnet is flat, measure the dimensions with an accuracy of $\pm 0,1$ mm and calculate the area using the appropriate geometric formula.

If the pole is not flat (for example hemispherical), measure the maximum diameter of the magnet perpendicular to an axis through the magnetic poles (see Figure 42), with an accuracy of $\pm 0,1$ mm and calculate the area of the corresponding cross section. For multi-pole magnets, measure and calculate the area of the largest single pole, which can be identified using magnetic field viewing film or equivalent.

NOTE An example of a multi-pole magnet is a rubberized/plastoferrite magnet, consisting of multiple strips or poles.



Key

- 1 maximum cross-section perpendicular to the axis
- 2 axis through the magnet poles

Figure 42 — Maximum diameter of magnet with a non-flat pole

5.32.5 Calculation of magnetic flux index

The flux index (kg^2mm^2) is calculated by multiplying the calculated area of the pole surface (mm^2) of the magnet by the square of the maximum flux density (kg^2).

5.33 Impact test for magnets

See 4.31.2 c) (all other toys with magnets and magnetic components).

Place the relevant component of the toy in the most onerous position on a plane horizontal steel surface and drop a metallic weight with a mass of $(1 \pm 0,02)$ kg, distributed over a diameter of (80 ± 2) mm, through a distance of (100 ± 2) mm onto the toy.

Determine whether any liberated magnets or magnetic components fit entirely in the cylinder when tested in accordance with 5.2 (small parts test).

5.34 Soaking test for magnets

See 4.31.2 b) (all other toys with magnets and magnetic components).

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Submerge the toy or toy component completely in a container of demineralized water at a temperature of (21 ± 5) °C for 4 min. Remove the toy, shake off the excess water and keep the toy at room temperature for 10 min.

Perform the soaking test for a total of four cycles.

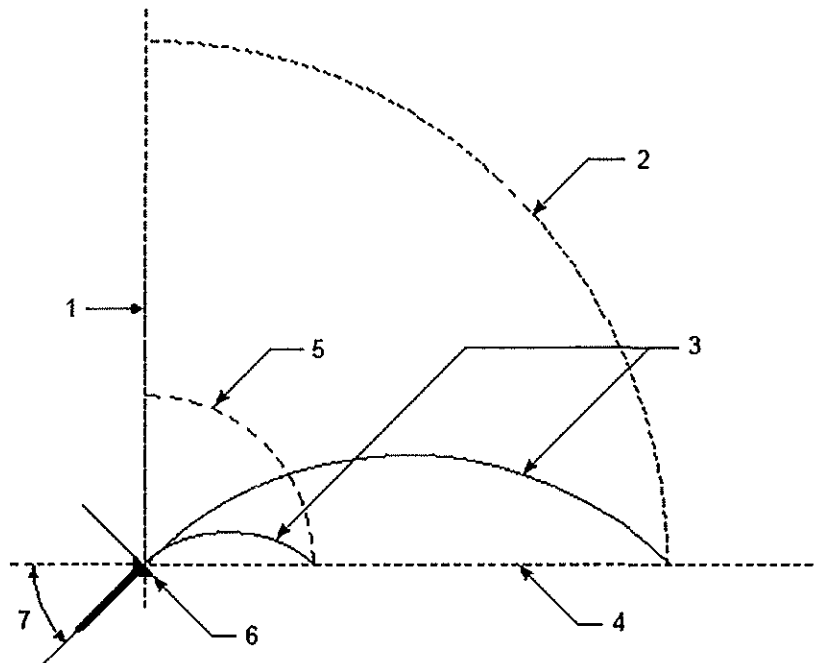
Immediately after the last cycle, determine whether any liberated magnets or magnetic components fit entirely in the cylinder when tested in accordance with 5.2 (small parts test).

5.35 Determination of projectile range

See 4.18 (projectiles toys) and 4.19 (rotors and propellers).

Discharge the projectile in any normally foreseeable manner using a discharge angle that will maximize the distance travelled (typically this is 45°). At the point of discharge, the projectile shall be disengaged from the discharge mechanism and in free flight. Determine the maximum distance the projectile travels from the point of discharge while in the air. See Figure 43.

NOTE A projectile intended to be discharged vertically would also be launched at lower angles if this is possible.



Key

- 1 vertical plane
- 2 distance 300 mm
- 3 trajectory examples
- 4 horizontal plane
- 5 distance 100 mm
- 6 point of discharge
- 7 angle of discharge

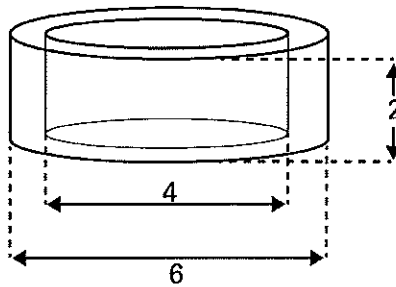
Figure 43 — Determination of projectile range

5.36 Tip assessment of rigid projectiles

See 4.18.2 (projectiles).

Apply the gauge shown in Figure 44, to any leading edge using minimal force and in any case not greater than the force due to the mass of the projectile. Visually determine whether the tip or leading edge protrudes beyond the depth of the gauge.

Dimensions in millimetres



Dimensions and tolerances:

Height: 2 mm +0.1/- 0 mm

Inner
diameter: 4 mm +0/-0.1 mm

Outer
diameter: 6 mm +0/-0.1 mm

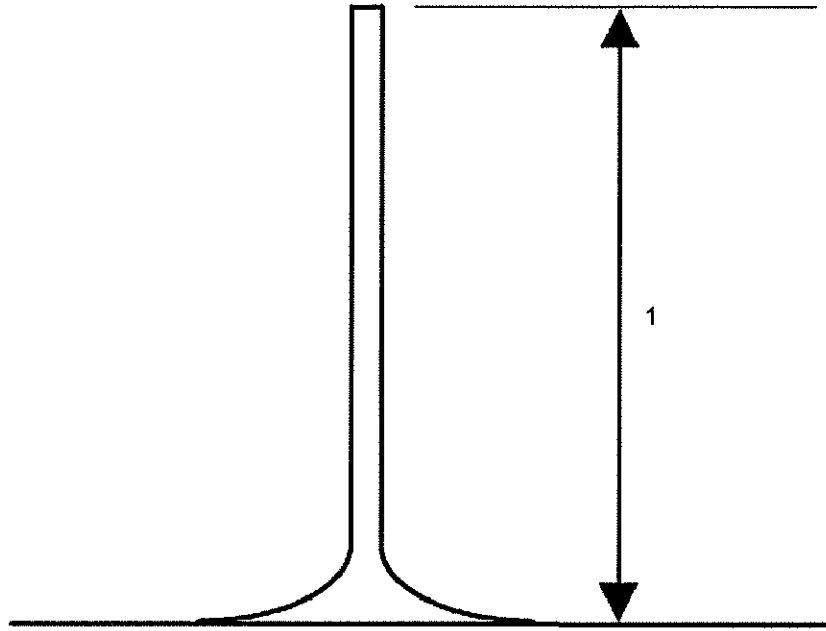
Figure 44 — Cylindrical gauge for measurement of projectile tips

5.37 Length of suction cup projectiles

See 4.18.2 (projectiles).

Rest the suction cup on a flat horizontal surface such that its shaft is substantially vertical without it being subjected to any force other than that produced by its own mass. If the projectile falls over without support, support the projectile with just a sufficient horizontal force during the measurement. Measure the length of the projectile as shown in Figure 45.

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Key

1 length of projectile

Figure 45 — Measurement of length of projectiles with suction cup

Annex A **(informative)**

Age-grading guidelines

A.1 General

Good age-grading practices are important to ensure that a toy is appropriate and safe at the various stages of physical and mental development of the child using the toy.

Age labelling is meant to provide point-of-purchase guidance to consumers for the selection of appropriate toys for children with respect to average abilities, interests of various age groups and safety aspects of the toys themselves.

In order to provide guidance to designers and manufacturers of toys, ISO/TR 8124-8, Age Determination Guidelines, has been published.

These guidelines are meant to provide thoughts and considerations necessary to establish meaningful age recommendations for toy products.

A.2 Criteria for establishing age grades

The following criteria should be considered when establishing age grading for a toy. While all these should be considered in total, each one may be weighted individually to arrive at the appropriate age grading.

- a) The toy should match the physical ability of a child to manipulate and play with the specific features of the toy.

This necessitates an understanding of the physical coordination, fine and gross motor capabilities, size and strength generally available at a given age.

- b) The toy should match the mental ability of a child to understand how to use the toy (i.e. to understand instructions, sequences of operations and the objective of the toy).

Consideration of the mental skills at a given age is important in order to provide a concept that will challenge abilities and stimulate further development, yet not frustrate. Accomplishment should be neither too easy nor too difficult to be satisfying to a child.

- c) The toy should meet play needs and interests at different levels of development.

Understanding developmental levels and identifying play materials and play environments to enhance each development stage is important for assigning appropriate age grades. Play interests and toy preferences change rapidly; there should be careful attention to children's preference or aversion to specific toy subjects at certain stages. In order for a toy to enhance play time, it obviously must be appealing to its user. In short, it has to be fun.

A.3 Resources for establishing age grades

Use of the following can help guide the establishment of meaningful age grading for a toy. These resources are not arranged in a particular order of importance; all of them should be considered during the age-grading process:

- prior experience with the toy or a similar toy in the marketplace indicating suitability for a specific age group;

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- reference materials on comparative body measurements and human factor elements;
- reference resources on child development norms to establish developmental milestones;
- identification of developmental features to be enhanced/stimulated within certain age spans;
- expertise of outside consultants, child development specialists, physicians and psychologists;
- testing of models or prototypes with children;
- observing skills levels in children at play;
- seeking opinions of parents;
- interacting with children and asking questions.

A.4 Safety considerations of age grading

A.4.1 General

The toy should be safe for the intended user. Once the skill level has been determined, the design should be tailored to satisfy the requirements of this specification associated with the age level, that is, a toy within the skill and interest level of a child of 2 years and containing small parts cannot be age-graded at 3 years to avoid enlarging those parts.

Age grades are indicators of average development, which does not necessarily reflect suitability for an exceptional child. A parent remains the best judge of whether a child is at the appropriate development stage for safe play with a particular toy.

A.4.2 Toys appropriate for children under 3 years of age

A primary consideration should be potential choking and aspiration hazards associated with small parts. Children under the age of 3 are more prone to placing objects in their mouths. However, the propensity to put non-food objects in the mouth does not disappear at the chronological age of 3 years. The following toys are appropriate for children under 3 years of age.

- Squeeze toys, teethers, crib exercisers, crib gyms, crib mobiles, toys intended to be affixed to a crib, stroller, playpen or baby carriage, pull and push toys, pounding toys, blocks and stacking sets, bathtub, wading pools and sand toys, rocking, spring, and stick horses and other figures, chime and musical balls and carousels, jack-in-the-boxes, stuffed, plush and flocked animals and other figures, and pre-school toys, games and puzzles, riding toys, dolls and animal figures, cars, trucks and other vehicles that are intended for use by children under the age of 3.

Some of the characteristics that describe pre-school toys appropriate for children under the age of 3 are listed below by class of toy.

- Dolls: soft-bodied baby dolls or character dolls that are for holding or cuddling, stuffed or “beanbag” dolls, rag or cloth dolls with simple features (including accessories), and lightweight plastic dolls with small features and limited articulation at the limb joints.
- Infant toys: intended to be used in a crib or playpen, to be held easily by small hands, shaken, grasped, rattled or cuddled.
- Toy vehicles: cars, trucks, boats and trains of simple chunky shape, decorated in primary colours without extensive descriptive detail or representations of a particular make or model of vehicle, and which require simple actions such as rolling, dumping, pushing and releasing.
- Action toys: simple action toys for the identification of sounds or pictures and surprise-action toys.
- Early-learning toys: toys, books and puzzles for learning basics such as letters or numbers or shapes, and simple physical motions such as turning wheels or knobs, pulling and letting go or sorting by size, etc.

- Soft balls and similar items: soft, lightweight balls or other shapes for squeezing, shaking, rolling or tossing.

A.4.3 Toys not appropriate for children under 3 years of age

Toys that should not be considered appropriate for children under 3 years of age and therefore should not be age-labelled as such, have the following characteristics:

- toys that require intricate finger movements or controlled adjustments, fitting intricate pieces together;
- toys, e.g. games, that require or incorporate elements of reading elements of reading ability beyond the ABCs or 123s;
- toys that simulate adult figures or characters and their associated accessories;
- collecting sets (for example figures and vehicles);
- projectile-type toys, launched vehicles, planes, etc.;
- make-up sets.

A.4.4 Toys for children aged 8 years and over

Another major development cut-off has been cited at approximately 8 years of age, at which time reading ability has progressed so that a child can, on his/her own, read, understand and heed instructions, caution statements, etc. Because the instructions and caution statements are necessary for the safe use of the product in some cases, those products should be labelled for use by children over the age of 8.

Products that fall into this category include the following:

- science and environmental kits or sets containing breakable glass components and complex instructions;
- complex model and craft sets requiring precision assembly and finger dexterity or incorporating sharp tools or components;
- electrically operated toys incorporating heating elements;
- certain chemistry sets, fuelled model vehicles, and rockets, etc. which contain chemicals that may be hazardous, cannot generally be handled safely by children unable to read and understand instructions and cautionary statements. The minimum age for which any such product should be recommended is 8 years and then only with adult supervision.

A.5 Descriptive age-labelling

Manufacturers can assist parents and other purchasers in the appropriate selection of toys by incorporating descriptive labelling to identify potential safety concerns if the toy is accessible to children outside the recommended age group.

Factors to consider include the appeal of the toy to young children, market experience, the design or construction of the toy, and whether the packaging provides visual indications of any small play pieces. In addition, a manufacturer should consider the probability that a purchaser may overestimate a child's physical or mental abilities and the child's understanding of a potential hazard related to the toy.

Annex B (informative)

Safety-labelling guidelines and manufacturer's markings

B.1 General

This annex provides guidance for labelling of certain types of toys.

The purpose of safety labelling is to supply appropriate safety information to the consumer at the point of purchase (i.e. on the toy, or on the packaging if there is one) and/or prior to the initial use of the toy (i.e. in the instructions) and/or prior to each use of the toy (i.e. labelling on the toy).

Requirements for toy safety labelling for certain toys or toy characteristics are given in the appropriate subclauses of [Clause 4](#) (requirements).

It should be noted that these guidelines do not ensure full compliance with relevant national toy safety requirements in the market where the product is meant to be distributed. The user of these guidelines is therefore advised to study relevant national requirements.

B.2 Safety-labelling guidelines

B.2.1 Label definition and location

The safety labelling should be in a visible, easily legible, understandable and indelible form.

The safety information should be in a format that draws the attention of the consumer, and should be placed on the packaging or the product so the consumer, at the point of purchase, can easily see it.

Safety labelling and manufacturing markings should be in the language of the country in which the toys will be distributed.

B.2.2 Age grading

Toys subject to any of the requirements of this part of ISO 8124 should be labelled to indicate the minimum age for intended use. If the toy or the packaging is not age-labelled in a clear and conspicuous manner or is inappropriately age-labelled, the toy should be subjected to the most stringent applicable requirements within this part of ISO 8124.

For certain toys such as costumes and riding toys, it may also be appropriate, from a safety point of view, to label the toy, its packaging or both in terms of size or weight limitations.

Guidelines for determining the appropriate age grade for toys are given in [Annex A](#) (age-grading guidelines).

B.2.3 Small toys and toys containing small parts

Small toys and toys containing small parts (see [4.4](#), small parts) or their packaging should carry a statement similar to the following:

“Warning! Not suitable for children under 3 years. Contains small parts.”

The words “Warning! Not suitable for children under 3 years” may be substituted by a graphical symbol as given in [Figure B.1](#).

The indication of the hazard should appear on the toy itself, on the packaging or in the instructions for use.



Figure B.1 — Graphical symbol for age warning

The details of the design of the graphical symbol should be as follows:

- the circle and the stroke should be red;
- the background should be white;
- the age range and the outline of the face should be black;
- the symbol should have a diameter of at least 10 mm and the proportions between its different elements should be such as those prescribed in [Figure B.1](#);
- the age range for which the toy is not suitable should be expressed in years, e.g. 0 to 3.

B.2.4 Balloons

See [4.5.6](#).

The packaging of balloons should carry a statement similar to the following:

“Warning! Children under 8 years can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once.”

B.2.5 Small balls and marbles

See [4.5.2](#) and [4.5.7](#).

Small balls and marbles or their packaging should carry statements comparable to the following.

- a) If the toy is a small ball or the toy contains a small ball, the toy or its packaging should carry a statement similar to the following:

“This toy is a small ball which may present a choking hazard. Not suitable for children under 3 years.”

or

“This product contains a small ball which may present a choking hazard. Not suitable for children under 3 years.”

- b) If the toy is a marble or the toy contains a marble, the toy or its packaging should carry a statement similar to the following:

“This toy is a marble which may present a choking hazard. Not suitable for children under 3 years.”

or

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“This product contains a marble which may present a choking hazard. Not suitable for children under 3 years.”

B.2.6 Aquatic toys

See [4.20](#).

Aquatic toys should carry a statement that this is not a life-saving device, followed by a warning that the toy should only be used in shallow water and under supervision.

B.2.7 Crib, playpen toys and mobiles

See [4.11.5](#).

The crib, playpen toys and mobiles and accompanying packaging should carry a statement drawing attention to the possible entanglement or strangulation injury if the toy is not removed when a baby begins to push up on hands and knees (see also [B.3.2](#), crib, playpen toys and mobiles and [B.3.3](#), crib gyms and similar toys).

B.2.8 Toys in contact with food

The packaging, instructions, or both, for toys and their components intended to be used in contact with food, should carry a statement to alert adults to wash the product thoroughly before and after use.

B.2.9 Toys intended to be assembled by an adult

The packaging of toys that are intended to be assembled by an adult should be so labelled (see also [B.3.6](#), toys intended to be assembled by an adult).

B.2.10 Crib gyms and similar toys

See [4.11.6](#).

Crib gyms and similar toys intended exclusively to be strung across a crib, playpen or perambulator by string, cord, elastic or straps, as well as their packaging, should carry a statement drawing attention to the possible entanglement or strangulation injury if attached to crib, playpen or perambulator and not removed when a baby begins to push up on hands and knees (see also [B.3.2](#), crib, playpen toys and mobiles and [B.3.3](#), crib gyms and similar toys).

B.2.11 Simulated protective equipment

See [4.17](#).

Toys that simulate safety protective equipment (examples include, but are not limited to, construction helmets, sports helmets and fire-fighter helmets), as well as their packaging, should carry a statement informing the consumer that they are toys and do not offer protection.

B.2.12 Toys with functional sharp edges and functional sharp points

See [4.6.2](#) and [4.7.2](#).

Toys that are intended for use by children 36 months and over but under 96 months, which contain accessible sharp edges or accessible sharp points that are a necessary part of the function of the toy, should carry a statement on the packaging that a sharp edge or sharp point, or both, exists.

B.2.13 Functional toys

Functional toys should carry a label stating that the product should only be used under direct adult supervision.

B.2.14 Toy roller skates, toy inline skates and toy skateboards

See [4.27](#).

Toy roller skates, toy inline skates and toy skateboards are products which are intended for children with a mass of 20 kg maximum. Toy roller skates, toy inline skates and toy skateboards should carry a label indicating that the product is intended for children with a mass of 20 kg maximum, recommending the user to use protective equipment such as a helmet, wrist-pads, knee-pads and elbow-pads and to not use the product on roads where motorized traffic can be expected.

B.2.15 Projectile toys

See [4.18.3 b\)](#) and [4.18.4](#).

- a) Projectile toys with stored energy with projectiles with a kinetic energy greater than 0,08 J when tested according to [5.15.1](#), (kinetic energy of projectiles), should be accompanied by a warning, which may appear in the instructions for use, concerning aiming at the eyes or face, such as:

“Warning. Do not aim at eyes or face.”

NOTE This requirement for a warning does not apply to projectile toys that are not reasonably able to be aimed at the eyes or face of the user or third party.

- b) Projectile toys without stored energy that might reasonably be able to be launched at the face should be accompanied by instructions for use which draw attention to the hazards of aiming at eyes or face.

B.2.16 Toy kites

See [4.11.7](#).

Toy kites or other flying toys with cords should carry a warning not to be used near overhead power lines or during thunderstorms.

B.2.17 Toy bicycles

See [4.22.1](#).

Toy bicycles should carry a label recommending the use of a protective helmet when cycling.

In addition, the instructions for use should contain a reminder that this bicycle is not permitted for use on public highways. Moreover, parents or carers should ensure that children are properly instructed in the use of toy bicycles, particularly in the safe use of the braking systems.

B.2.18 Percussion caps

See [4.28](#).

The packaging of percussion caps should carry a warning to not be used indoors or near eyes and ears and to not be carried loose in a pocket.

B.2.19 Toys which produce high impulse noise

See [4.29 f\)](#).

Toys that produce high impulse sound levels or their packaging shall bear the following warning:

“Warning! Do not use close to the ear! Misuse may cause damage to hearing.”

For toys using percussion caps, add:

“Do not fire indoors!”

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B.2.20 Toy scooters

See 4.30.2.

Toy scooters intended for children with a body mass of 20 kg or less shall carry the statement:

“20 kg max”

Toy scooters intended for children with a body mass of 50 kg or less shall carry the statement:

“50 kg max”

In addition, the packaging, if present, and the instructions for use, shall carry the following warning:

“Warning! Protective equipment should be worn.

Not for children with a body mass of more than 20 kg (or, as appropriate, “of more than 50 kg”).”

The instructions for use shall contain a reminder that the toy shall be used with caution, since it requires great skill, so as to avoid falls or collisions causing injury to the user and third parties. They shall also, as appropriate, include information such as:

- the warnings indicated above;
- how to safely fold or unfold foldable scooters;
- the necessity to pay attention that all locking devices are engaged;
- the dangers of using it on public highways or public roads;
- a recommendation to use protective equipment such as a helmet, gloves, knee-pads and elbow-pads.

B.2.21 Magnetic/electrical experimental sets for children 8 years and over

See 4.31.1 and E.45.

The packaging and the instructions for use of magnetic/electrical experimental sets intended for children 8 years and over shall carry a statement comparable or similar to the following.

“Warning. Not suitable for children under 8 years. This product contains (a) small magnet(s).

Swallowed magnets can stick together across intestines causing serious injuries. Seek immediate medical attention if magnet(s) are swallowed.”

B.3 Instructional literature

B.3.1 Information and instructions

Information and instructions provided for the safe use or assembly, or both, of a toy, whether on the packaging or in leaflet form, should be easy to read.

B.3.2 Crib, playpen toys and mobiles

See 4.11.5.

Mobiles intended to be mounted on a crib, playpen, wall or ceiling should be provided with instructions for proper assembly, installation and use to ensure that the product does not present an entanglement hazard. The instructions should include at least the following information:

- a crib mobile is not intended to be grasped by a child;
- if attached to the crib or playpen, remove when a baby begins to push up on hands and knees;

- if mounted on a wall or ceiling, install the mobile clearly out of a standing baby's reach;
- always attach all provided fasteners (strings, straps, clamps, etc.) tightly to a crib or playpen according to the instructions and check frequently;
- do not add additional strings or straps to attach to a crib or playpen.

B.3.3 Crib gyms and similar toys

See [4.11.6](#).

Toys intended to be strung across a crib or playpen by means of string, cords, elastic, or straps (including, but not limited to, crib exercisers, crib gyms, and activity toys) should be provided with instructions for proper assembly, installation, and use to ensure that the product does not present an entanglement or strangulation hazard.

The instructions should include at least the following information:

- this toy is not intended to be "mouthed" by a baby and should be positioned clearly out of reach of the baby's face and mouth;
- on cribs with adjustable mattress levels, the highest position can cause the toy to be too close to the baby;
- the drop side of the crib should never be lowered with the toy in place and a baby left unattended;
- always attach all provided fasteners (strings, straps, clamps, etc.) tightly to a crib or playpen according to the instructions and check frequently;
- do not add additional strings or straps to attach to a crib or playpen.

B.3.4 Toy chests

See [4.16.2.2 d](#)).

Instructions for proper assembly and maintenance of toy chests should be provided in sufficient detail to describe the correct assembly of components, the resulting hazard if the lid support device is not installed, and a description of how to determine whether the support is working properly.

B.3.5 Liquid-filled teethers and liquid-filled teething toys

See [4.25](#).

Liquid-filled teethers and teething toys should be accompanied by instructions that they should not be placed in the freezer compartment.

B.3.6 Toys intended to be assembled by an adult

Assembly instructions that accompany toys, which are intended to be assembled by an adult and that contain potentially hazardous sharp edges or sharp points, or contain small parts if the toy is intended for children under 3 years of age, should carry a statement stating this and also that it is to be assembled by an adult (see also [B.2.9](#), toys intended to be assembled by an adult).

B.4 Manufacturer's markings

A principal component of the toy, the packaging, a label or a leaflet accompanying the toy should be marked with the name and address of the manufacturer or the distributor, or with a trademark and/or mark which clearly identifies the manufacturer/distributor. All these markings should be visible and easily legible by the consumer and should resist normal use conditions.

Annex C **(informative)**

Design guidelines for toys attached to cribs or playpens

C.1 General

This annex provides guidance for design practices meant to encourage the careful examination of product characteristics and configurations with respect to safety. As there are no objective means for determining conformance with these design guidelines, they are not to be used to judge compliance with this part of ISO 8124.

C.2 Guidelines

The design of products intended to be attached to cribs or playpens should be such that strings, ribbons, elastic or parts of clothing have minimal potential for being caught on the product and thereby creating a hazardous situation in which possible strangulation could occur.

Examples of the implementation of good design practice for crib and playpen environments include the following:

- avoidance of hazardous protrusions that could contribute to entanglement on toys attached to cribs and playpens;
- rounded corners with the use of generous radii wherever possible;
- smooth contours that minimize abrupt changes in shape that could easily become a catch point for strings, ribbons, elastic or loose clothing;
- concealing of fastening hardware using recesses, counterbores or other similar methods;
- reduction of the potential for any mismatch of surfaces where a catch point could develop.

Annex D (informative)

Toy gun marking

D.1 Purpose

The guidelines in this annex are intended to minimize the potential for a toy gun to be mistaken for a real firearm.

D.2 General

The guidelines apply to all toy, look-alike and imitation firearms which have the general appearance, shape or configuration, or combination thereof, of a firearm. This includes, but is not limited to, non-functional guns, water guns, air soft guns, cap guns, light-emitting guns and guns with an opening to eject any non-metallic projectile.

The guidelines do not apply to the following types of gun:

- futuristic toy guns that do not have the general appearance, shape or configuration, or combination thereof, of any firearm;
- non-firing collector replica antique firearms that look authentic and may be scale models but are not intended as toys;
- traditional B-B guns, paintball guns or pellet guns that expel a projectile through the force of compressed air, compressed gas or mechanical spring action, or a combination thereof;
- decorative, ornamental and miniature objects having the appearance, shape or configuration, or combination thereof, of a firearm provided that the objects measure no more than 38 mm in height by 70 mm in length, with the length measurement excluding any gun stock length measurement. This includes items intended to be displayed on a desk or worn on bracelets, necklaces and key chains.

D.3 Markings

Items covered by this annex should be marked or manufactured, or both, in any one of the following ways. The marking should be permanent and should remain in place after being tested in accordance with 5.24 (reasonably foreseeable abuse tests). The word "permanent" excludes the use of ordinary paint or labels for the purposes of this clause.

- A blaze orange plug, or brighter orange coloured plug, affixed to the muzzle end of the barrel as an integral part of the toy. The plug should not be recessed more than 6 mm from the muzzle end of the barrel.
- A blaze orange band or brighter orange coloured band, covering the circumference of the muzzle end of the barrel for a distance of at least 6 mm.
- Coloration of the entire exterior surface of the toy in white, bright red, bright orange, bright yellow, bright green, bright blue, bright pink or bright purple, either individually or as the predominant colour in combination with any other colour in any pattern.

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Annex E (informative)

Rationale

E.1 General

See [Clause 1](#).

There are a number of products listed in [Clause 1](#), which for the purposes of this part of ISO 8124, are not considered toys. However, some explanatory comments on the following items are considered necessary.

- a) This part of ISO 8124 considers toy bicycles with a maximum seat height of 435 mm. Bicycles for children with a seat height ranging from 435 mm to 635 mm are specified in ISO 8098.
- b) "Compressed-air and gas-operated guns and pistols" refers to weapons which use high-compressed air or other gases to eject metal or plastic bullets or small darts and which are often used by adults in competitions. In many countries there are legal restrictions on the sale of such guns to children. The exemption does not include toy guns, which for example eject water by means of compressed air.
- c) "Models of aircraft, rockets, boats and land vehicles powered by combustion engines" also includes the engine itself as well as spare parts.
- d) "Fashion jewellery for children" does not include jewellery which is part of, e.g. a doll and is not intended to be worn by a child. Nor does it include kits for making jewellery.

E.2 Normal use

See [4.1](#).

The objective of these tests is to simulate the normal play mode of the toy, and the tests are therefore unrelated to the reasonably foreseeable abuse tests required in [4.2](#) (reasonably foreseeable abuse). The tests are intended to expose potential hazards, rather than to demonstrate the reliability of a toy.

For the purposes of this part of ISO 8124, the fact that a toy fails normal use testing is only relevant if the failure generates a potential hazard according to the appropriate test methods given in [Clause 5](#) (test methods).

Toys should be subjected to appropriate tests to simulate the expected mode of use of the particular toy. For example, levers, wheels, catches, triggers, strings, wires and chains that are intended to be actuated by a child should be repeatedly operated. Spring- or power-operated devices should be similarly tested.

The tests should be carried out in an expected-use environment. For example, toys intended for use in the bathtub should be tested in soapy water, and toys intended for use in the sandbox should be exposed to sand during testing.

It is recognized that no specific requirements are defined here; it would not be possible in view of the wide range of toys covered by this part of ISO 8124. However, the manufacturer or distributor should do enough testing to satisfy himself/herself that normal use during the estimated lifetime of the toy is being simulated.

E.3 Reasonably foreseeable abuse

See [4.2](#).

The intention of the tests in 5.24 (reasonably foreseeable abuse tests) is to simulate the exposure of a toy to structural damage as a result of dropping, pulling, twisting and other actions likely to be performed by a child interacting with the toy. These simulated interactions are characterized as reasonably foreseeable abuse.

The severity of the tests in 5.24 should be determined according to the age group for which the toy is intended. If the toy is intended for an age range that spans more than one age group, the toy should be subjected to the most severe test.

After testing according to 5.24, the toy should continue to conform to the relevant requirements of this part of ISO 8124.

E.4 Material quality

See 4.3.1.

The intention of this requirement is that materials used in toys are to be new or, if reprocessed, so refined that the level of contamination of hazardous substances does not exceed that found in new material. There should be no infestation from animals or vermin.

E.5 Expanding materials

See 4.3.2.

This requirement is intended to reduce the risks related to certain toys which expand substantially if swallowed.

Fatal accidents have occurred when children have swallowed such toys.

E.6 Small parts

See 4.4.

This requirement is intended to reduce the risks from ingestion or inhalation of small objects, such as small toys and small components of toys.

Toys made of foam from which small parts are torn off when tested according to 5.24 (reasonably foreseeable abuse tests) are considered hazardous. This also applies to soft-filled toys with filling composed of small foam parts which become accessible when tested according to 5.24.

Wood knots in wooden toys are by nature never the same, and no conclusion about the safety level for a certain kind of product can be drawn from a single toy with loose wood knots. Small wood knots in wooden toys which can easily be pulled or pushed out should, however, be considered as removable small components.

E.7 Shape, size and strength of certain toys

See 4.5, 4.5.1.3 and 4.5.1.4.

The purpose of the requirements in 4.5 (shape size and strength of certain toys) is to identify certain toys which can present impaction, choking, and/or suffocation hazards because their design or construction permits them to enter an infant's mouth and potentially become lodged in the throat.

In determining which toys are intended for children who are unable to sit up unaided or intended for children under 18 months, the following factors are relevant: the manufacturer's stated intent (such as on a label) if it is reasonable, the advertising, the promotion, the marketing, and whether the toys are generally considered as suitable for the age group in question.

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It is recognized that children start to sit up unaided between 5 months and 10 months of age.

The requirements in 4.5.1.2 (squeeze toys, rattles, and certain other toys and components of toys) are intended to address choking, suffocation, and impaction hazards associated with rattles, teething toys, and squeeze toys intended for children under 18 months. The requirements apply to toys having a mass less than 0,5 kg and intended for children too young to sit up unaided, including toy components that are removable from toys intended to be strung across a crib, playpen, or perambulator; the requirements do not apply to the fasteners of such products intended for attaching the toy to the crib, playpen, or perambulator.

NOTE The term "nearly" is used below, consistent with the long standing and successful squeeze toy requirement.

The requirements in 4.5.1.3 (nearly spherical, hemispherical, circular flared, or dome-shaped ends of toys or components of toys) are intended to address several deaths and incidents reported through the US Consumer Product Safety Commission (CPSC), involving young children (under 18 months) playing with various toys featuring spherical ends attached to a handle or shaft. The deaths or incidents resulted from the spherical end of a toy becoming lodged in the child's throat causing asphyxiation. The incidents were similar to those previously addressed by use of the supplemental gauge. The European standard EN 71 was also used as reference as it addresses similar situations. The exclusion for toys weighing over 0,5 kg (1,1 lbs) was incorporated to differentiate the subject toys from other toys as also referenced from the European EN 71 standard.

The requirements in 4.5.1.4 [toy fasteners (e.g. nails, bolts, screws, and pegs) with nearly spherical, hemispherical, or dome-shaped ends intended for children 18 months and over but under 48 months] are intended to address toys that meet specific dimension criteria and present a fall-on impaction hazard. The requirements are based on incident data provided by the CPSC involving objects that are long enough to be pushed into the mouth, probably past the uvula in a fall-on incident, and large enough to prevent or inhibit removal, even by an adult caregiver. An otolaryngologist was consulted to review the incident data. The requirements address only toy fasteners because the incident data involved these toy components. A broader scope including all components with this shape would prohibit many existing toy components that have been widely distributed and used for many years with no known impaction incidents.

Products less than 57,1 mm (the length of the small parts cylinder) in length are excluded as are products less than 15 mm in diameter. These exemptions are based on the dimensions of products in the incident data. Flexible items are exempted because the flexible end ensures they will not create a fall-on impaction hazard.

According to the 1992 CPSC Briefing Package: Options to Address Choking Hazards from Small Toy Figures, the actual size of objects known to have choked children are often more meaningful than measurements of children's airways. Several factors contribute to the importance of actual choking data. Individual differences in mouth and throat size, combined with the elasticity of tissue in the mouth and throat, increase the variability of anatomical measurements. Also, anatomical reference points are difficult to standardize and the tissues of patients which have been anesthetized or have died respond (stretch) differently, compared to those in non-anesthetized healthy airway passages.

The impaction hazard addressed by 4.5.1.4 is different from the hazard associated with pre-school play figures addressed in 4.5.4 (pre-school play figures). The pre-school play figures were associated with seven deaths by choking and one incident resulting in serious injury. The incidents involved children under the age of 2 years with one exception, which involved a developmentally delayed child. In addition, there were other choking incidents with the pre-school play figures that did not result in significant injury.

The distance to the undercut is based on the dimensions of the small ball test fixture (test template C).

There were a total of nine cases involving a variety of products in the impaction incident data. Four resulted in fatality and one in permanent brain damage. The ages of victims were seven months, nine months, two children 13 months old, 19 months, 22 months, two children aged two years, and one child aged four years with a severe developmental delay. Included in this incident data were two fatalities in 2006 involving the same product (plastic nail) that was age graded 3+. The age grade was verified to be appropriate by experts in the field. The victims in these cases were 19 months and two years old. To ensure that the requirements of 4.5.1.4 for toy fasteners addressed the toy that resulted in the two

fatalities mentioned above, the age grade for this requirement extends to 48 months. This requirement would not prevent future production of the same product if it did not apply to products intended for children under 48 months. There is no need to extend the age grade beyond 48 months, since all the incidents are addressed with the stated age grade. Aside from the product involved in the 2006 incidents, all other products involved in this incident data were age graded under three years.

There is no force associated with the test because it is not intended to simulate an actual impaction incident. Rather, it is designed to identify the size and shape of products associated with these incidents.

The supplemental test template B is used to identify the size and shape of objects associated with incident data and is not related to the size of the child for these incidents. Similarly, the 0,5 kg exemption is related to the weight of objects associated with this type of hazard, not the strength capabilities of children.

The requirements of 4.5.1.4 do not apply to certain tethered components as specified in the exclusions because the weight of the product and the limited length of the tether make it highly unlikely for the fastener to pose an impaction hazard. Further, the absence of injury data associated with tethered fasteners justifies this exclusion.

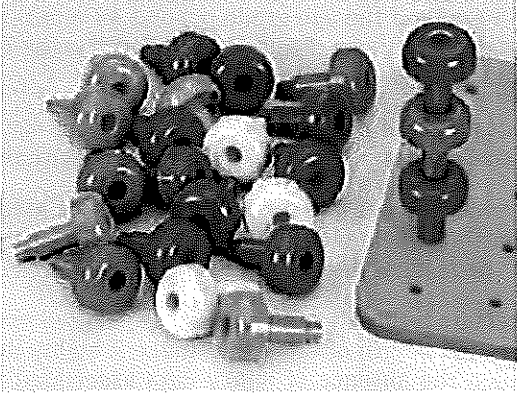
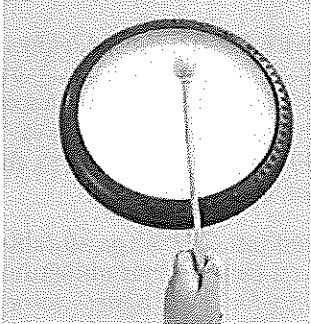


The requirements of 4.5.1.4 do not apply to fasteners with flat tops because the incident data addressed involved nearly spherical, hemispherical, or domed-ends. Also, the task group evaluated fasteners with flat tops, where millions of units are in distribution without incident data. According to the 1992 CPSC Briefing Package: Options to Address Choking Hazards from Small Toy Figures, "objects that are round, or that have at least one rounded end, were the most likely to be involved in a choking incident. Objects with flat or pointed ends were less likely to be involved in an incident".

When the requirements for toy fasteners were elaborated, information on a fatality in the United Kingdom with a flat-topped play figure was available. This was a concern, but unfortunately the available data was not detailed enough to justify that the requirements for toy fasteners were expanded to cover also flat-topped items which are not fasteners. If in the future more accident data involving flat-topped items becomes available, the requirements should be revisited.

The table provides interpretations with examples given to assist the reader in understanding whether a toy/component with a particular shape falls within the scope of 4.5.1.4. These interpretations assume that the dimensions of the part and age grade of the product are such that it would otherwise fall within the scope of 4.5.1.4.

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Table E.1 — Interpretations with examples

	<p>Applicable: 4.5.1.4 applies to this domed peg, even if the very centre of the head is flat or has a through hole.</p>
	<p>Not Applicable: 4.5.1.4 does not apply to this mallet since it is not a toy fastener, e.g. nail, screw, peg, or bolt.</p>
	<p>Applicable: 4.5.1.4 applies to this item because the end is domed.</p>
	<p>Not Applicable: 4.5.1.4 does not apply to these toy fasteners because the end is not spherical, hemispherical, or domed. The end is flat across the top.</p>

E.8 Pompoms

See 4.5.3.

These requirements are meant to address choking hazards associated with pompoms (see examples in Figure 5) on toys intended for children under 36 months.

The definition of pompoms (3.50) includes regular pompoms as well as rounded pompoms, as shown in Figure 5. In addition, although different in construction, spherical-shaped attachments made of stuffed material are very similar to pompoms in feel and appearance and are used to adorn products in a similar way. These pose a hazard similar to that of pompoms and should therefore be subject to the same requirements.

Injury data do not support the need to include tassels with long strands as shown in Figure 6.

E.9 Pre-school play figures

See 4.5.4.

This requirement is meant to address the potential choking and/or obstruction hazard associated with certain pre-school play figures intended for children under 36 months.

Pre-school play figures, which are the subject of this requirement, present a hazard to very young children especially infants. Accident data from, for example, the US Consumer Product Safety Commission reveal that these products have been historically linked to choking incidents including fatalities in very young children. Products “appropriate” for children under 3 years (i.e. by virtue of their functions, dimensions, and characteristics, are intended for children under 3 years) are subject to the requirements even if that product is “recommended” for children over 3 years (i.e. labelled by the manufacturer as not recommended for children under 3 years).

The particular characteristics identified were those of shape as described in the requirement. They are simple in design without appendages and incorporate round, spherical, or hemispherical ends. Play figures can be intended to represent, e.g. humans, animals, or fantasy characters, regardless of whether or not they display all the physical attributes such as eyes, nose, mouth, etc.

The existing supplemental test template B was selected based on an analysis of all available data which indicated that the template would identify as potentially hazardous all of those play figures known to have been associated with accidents. The limitation on length (64 mm) similarly was based on evaluation of the dimensions of play figures known to have been associated with accidents. The play figures involved in the accidents did not entirely fit into the small parts cylinder.

E.10 Balloons

See 4.5.6.

Pieces of broken latex balloons present choking and suffocation hazards to children and a warning should be given.

E.11 Edges

See 4.6.

These requirements are intended to reduce the risks related to cuts and lacerations from sharp edges on toys.

This part of ISO 8124 refers to metal and glass edges only, as there is no test method available for plastic edges. Manufacturers should however, in designing toys and in production and tooling, avoid sharp plastic edges as far as possible.

It has been considered that the test method for assessing sharp edges should be supplemented with a subjective assessment to determine whether they are, in fact, hazardous. There could be edges on toys, which although sharp according to the test method, do not present a hazard.

The presence of burrs on an edge is established by drawing a finger along the edge. To fail the requirement, the roughness needs to be sufficient to fail the sharp-edge test.

It has been established that it is not possible to manufacture electrical conductors (for example in battery boxes) which do not present sharp edges. This hazard has, however, been considered to be of a minor nature and allowance has therefore been given for such edges.

E.12 Points

See 4.7.

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These requirements are intended to reduce the risks from sharp points on toys capable of causing punctures of the skin, etc. It should, however, be noted that they do not intend to cover risks related to the eyes, which are too delicate to be protected.

It has been considered that the test method for assessing sharp points should be supplemented with a subjective assessment to determine whether they are, in fact, hazardous. There could be points on toys, which although sharp according to the test method, do not present a hazard. An example of this are the points of pipe-cleaners, used as toys, which are so weak that they are not capable of puncturing the skin.

For children under 36 months however, points that are not sharp according to the test method may present an unreasonable risk. In 4.7.1 c) (accessible sharp points) requirements are given for points with a maximum cross-section of 2 mm.

E.13 Projections

See 4.8 and 4.30.8.

The ends of protruding parts that present a skin puncture hazard or an internal injury hazard should be protected.

If the projection is on a small toy which topples over when pressure is applied to the end of the projection, it is unlikely to present a hazard.

Handle bars and other protruding tubes shall always be protected in order to minimize the impact hazards which arise when a child falls over while using the toy. The size and shape of the protection has not been stipulated, except for toy scooters, but it should be given a sufficiently large surface area.

As in E.12, the requirements are not intended to cover risks related to the eyes, which are too delicate to be protected.

E.14 Metal wires and rods

See 4.9.

Wires and other metallic components that are designed and intended to be bent, and wires likely to be bent, whether covered by other materials or not, are tested according to a flexibility test (5.24.8, flexure test) to ensure that they do not break and produce sharp points.

Wires and other metallic components designed and intended to be bent are often used in soft-filled (stuffed) toys, which are considered suitable for children under 36 months. Should such a wire break, it will eventually protrude through the covering and be hazardous. Wires and other metallic components designed and intended to be bent are also often used in other types of toys for stiffening or retention of form.

Wires likely to be bent accidentally can be found, for example, in the form of antennas on toys. The requirements in 4.9 b) (metal wires and rods) are not intended to cover for example U- or L-shaped profiles, such as those often used in spokes in toy umbrellas. Toys where the wires cannot be bent in the manner that is described in the test method, without the wires being removed from the toy, need not be tested. An example of such a toy could be a toy whisk.

E.15 Plastic film or plastic bags in packaging and in toys

See 4.10.

This requirement is meant to minimize the possibility of asphyxiation hazards which might be caused by thin flexible plastic film if it is covering the face of a child or being inhaled.

Thin plastic sheeting may adhere to a child's mouth and nose, making it impossible to breathe. If the thickness is greater than 0,038 mm this risk is considered less dangerous.

Latex balloons are not covered by 4.10 (plastic film or plastic bags in packaging and in toys), as they are not made of plastic. Plastic balloons are normally so strong that they cannot be taken apart by a child and the thickness of the plastic sheeting should therefore be measured on double layers of sheeting (i.e. without cutting the balloon apart).

E.16 Cords and elastics

See 4.11.

The intention of these requirements is to prevent children from being strangled by cords on toys, which can tangle to form a noose or a fixed loop around the neck. They also address the risk of a child being entangled by a self-retracting cord on, for example a chiming toy.

A non-woven (monofilament) cord cannot easily form a noose.

The requirement in 4.11.6 (crib gyms and similar toys) is intended to reduce the possible risk of strangulation that might be caused by toys on a cord fixed across, for example a crib. If a child is trying to stand up in the crib, it might be entangled by the cord which could form a loop around the neck or the child could fall with his/her throat across it.

The purpose of the requirements in 4.11.7 (cords, strings and lines for flying toys) is to prevent the user of a toy kite suffering electric shock from a toy kite which comes in contact with overhead power lines. They also highlight the danger of flying a toy kite in thunderstorms.

The purpose of the requirements in 4.11.7 (cords, strings and lines for flying toys) is to prevent the user of a toy kite suffering electric shock from a toy kite which comes in contact with overhead power lines. They also highlight the danger of flying a toy kite in thunderstorms

E.17 Toy pushchairs, perambulators and similar toys

See 4.12.1.

These requirements refer to certain, but not all, possible crushing, laceration and pinching hazards which might occur due to the sudden and unexpected collapse of folding toys, whether intended to support the mass of a child or not.

They are also intended to reduce the possible risk of a child being entrapped in a collapsing pushchair or perambulator, as well as children getting their fingers jammed when playing with a toy.

Fatal accidents are known to have occurred when toy pushchairs have collapsed and the handle has come down over the head or throat of a child when the child has been trying to sit in or climb into the toy pushchair. It has been considered necessary to require that such pushchairs or perambulators be equipped with two separate locking and/or safety devices, as is the case for full-size pushchairs and prams.

Certain pushchairs are not designed with a handlebar that folds down over the toy when it collapses, but folds together in a sideways direction. It has been considered that such toys do not present the same severe hazard and consequently do not require two separate locking devices.

However, it has not been considered possible to eliminate all possible jamming hazards on toys when they are folded together in their intended way. Manufacturers should reduce those risks as far as possible, for example by allowing for a 12 mm clearance between moving parts or by using safety stops. Great care should also be used when designing toys with folding or sliding parts, so that scissors-like actions of moving parts are avoided as far as possible.

E.18 Other toys with folding mechanisms

See 4.12.2.

The requirement that the toy be capable of supporting a child, or comparable mass, excludes smaller toys.

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E.19 Hinge-line clearance

See 4.12.3.

This requirement is intended to eliminate the possible crushing hazard related to the changing clearances at the hinge line, admitting fingers in one position of the hinged part but not in another.

It is only applicable to hinged assemblies of which both parts have a mass of 250 g or more and where the moving part with respect to the hinge can be construed as a "door" or a "lid". A door or lid can be defined for the purpose of this requirement as a closure of extended surface area with an extended hinge line. Other hinged parts without a significant surface area or hinge line would probably fall into the category of folding mechanisms (see 4.12.1, toy pushchairs, perambulators and similar toys) or other collapsible toys (see 4.12.2, other toys with folding mechanisms).

The requirement relates to the entrapment and injury through squashing of a finger between edges along the hinge line and between surfaces parallel with the hinge line as shown in [Figure 4](#), but not between other edges and surfaces of the assembly. It is concerned only with the considerable force which can be applied to the edges of the hinge line when the door or lid is closed or opened.

It was not considered possible to specify a hinge area instead of a hinge line. Manufacturers should, however, consider this and try to reduce the risk of crushing the fingers or other parts of the body, for example by allowing for a 12 mm clearance between moving parts near the hinge line.

E.20 Circular holes in rigid materials

See 4.13.1.

This requirement is meant to avoid finger entrapment in accessible holes in sheet metal and other rigid material in toys intended for children aged under 60 months. Non-circular holes are believed to present no significant hazard or cutting off blood circulation in entrapped fingers.

E.21 Accessible clearances for movable segments

See 4.13.2.

This requirement concerns clearances between movable segments on toys intended for children under 96 months, and only where the potential for crushing of fingers or other appendages exists. It includes, but is not limited to, wheels and rigid-wheel wells, fenders or the radial clearance between the wheels and chassis of ride-on toys powered by electrical, spring or inertial energy.

E.22 Chains or belts in ride-on toys

See 4.13.3.

Driving mechanisms should be enclosed in order to prevent jamming or crushing of fingers and other parts of the body. Toys that are to be assembled by an adult are tested when assembled.

E.23 Other driving mechanisms

See 4.13.4.

These requirements are intended to reduce the risks caused by sharp edges and points being exposed and to avoid pinching or laceration by entrapment of fingers in holes if the toy has been damaged.

Failure under this clause occurs where mechanisms become accessible and the accessibility of moving parts would be liable to jam the fingers or otherwise injure a child. Small mechanisms, such as in small cars which would have insufficient power to jam fingers, should be excluded. Power should be checked with a finger or pencil inserted into the mechanism.

E.24 Winding keys

See [4.13.5](#).

This requirement is meant to avoid pinching or laceration of fingers between the key and the body of the toy and entrapment of the fingers in holes in the flukes of the key.

E.25 Springs

See [4.14](#).

These requirements are intended to prevent the pinching or crushing of fingers, toes and other parts of the body by toys with springs.

E.26 Sideways stability requirement

See [4.15.1.1](#) and [4.15.1.2](#).

These requirements are meant to minimize unexpected hazards, which could be caused by a toy that can easily tip over. They recognize two types of possible stability hazards: those associated with ride-on toys or seats where the feet can provide stabilization, and those situations where the feet are restricted by an enclosing structure. It takes into account the use of a child's legs as stabilizing means, and recognizes that a child instinctively learns to compensate for inclined positions.

E.27 Fore and aft stability

See [4.15.1.3](#).

This requirement relates to the stability of ride-on toys or seats in the front and back direction with respect to the rider, where the rider cannot easily use his/her legs for stabilization. It intends to ensure the fore and aft stability of, for example tricycles and rocking horses so that they do not overturn unexpectedly.

E.28 Overload requirements for ride-on toys and seats

See [4.15.2](#).

This requirement is meant to minimize unexpected hazards that could be caused by a toy that is not capable of withstanding an overload.

E.29 Stability of stationary floor toys

See [4.15.3](#).

This requirement intends to minimize hazards that might be caused by a toy, such as play furniture and toy chests, which tips over when a door, drawer or other movable portion is extended to its fullest travel.

E.30 Enclosures

See [4.16](#).

The purpose of these requirements is to reduce the possible risk of entrapment of children in toys that form enclosures, such as tents and toys chests and to avoid possible suffocation in head-enclosing toys such as space helmets.

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All toys forming a confined space into which a child can enter are covered by this requirement regardless of whether the toy is designed to hold a child or not. Even if ventilation is ensured, it has to be possible for a child to escape easily from the confinement without help from the outside.

E.31 Simulated protective equipment such as helmets, hats and goggles

See [4.17](#).

These requirements are meant to minimize hazards that might be caused, for example by goggles or space helmets, if the material from which they are constructed fails, or by toys that simulate protective equipment such as sports helmets and pads, if the wearer uses the article as real protective equipment rather than as a toy.

Items such as swimming goggles and diving masks, which do offer protection to a child, are not considered as toys and are not covered by this part of ISO 8124.

Sunglasses intended for children are not considered as toys, since they are required to offer protection against ultraviolet light. However, sunglasses for dolls, teddy bears, etc., which are too small for children to wear, are considered as toys.

E.32 Projectile toys

See [4.18](#)

These requirements relate to certain, but not all, potentially unexpected hazards that might be caused by projectile firing toys and by the firing of improvised projectiles from such toys. Toys that are designed to fly (e.g. wind-up elastic band powered aeroplanes and remote controlled helicopters) do not present the same degree of hazard and are not within the scope of the projectile requirements.

Certain well-recognized hazards that are inherent in toy versions of traditional weapons such as slingshots, catapults and boomerangs are not covered by these requirements.

In general, projectiles having a range of less than 300 mm are not considered to possess sufficient energy to pose a risk of injury and are therefore exempt from the majority of requirements apart from those relating to small parts. A more conservative approach was taken in the case of projectiles that are small parts because these have featured in injury data from around the world. One of the injury mechanisms for small part projectiles involves accidentally launching the projectile into the mouth/airways. This injury mechanism does not exist for projectiles that can only launch a very short distance and so an exemption is included for projectiles that have a maximum range not greater than 100 mm. These projectiles would most commonly be seen on play sets where an initial action triggers the release of projectile(s) (e.g. boulders, car parts, etc.) that travel relatively minor distances. Play sets such as these have been sold for many years without history of injury. Other types of toys that launch a projectile only very small distances are considered to present an equivalent risk of airway obstruction to other types of small parts and so are addressed by the applicable non-projectile requirements of this standard.

Projectiles with suction cups as a contact surface have been involved in fatal accidents which are unrelated to the discharge mechanism. The reported instances have been with projectiles less than 57 mm in length where the suction cup is significantly larger in diameter than the shaft of the projectile. The projectile can enter the throat in a shaft down orientation which actually assists to orientate the suction cup in a manner ideally suited to seal the airway. The shaft first orientation makes the obstruction almost impossible to clear since there is nothing for a first-responder to grip. Suction cup projectiles that enter the airway shaft first are easier to inhale further than to expel owing to the shape of the suction cup and flexibility around its periphery. It has a type of barbed effect. No such effect is possible on suction cup designs where the suction cup is adjacent to a collar or shaft that is of a similar or greater diameter. A requirement that projectiles with suction cup tips be more than 57 mm long has been included to help prevent projectiles with suction cups entering the upper airways and to aid removal should the projectile enter the airway with the suction cup first.. There have been no reported cases of injury where the length of the projectile is 57 mm or greater. The hazard does not occur with projectiles where the suction cup diameter is the same as or less than that of the collar or shaft so projectiles of

this nature are exempted from the requirement. This is supported by the lack of incident data for such projectiles with a shaft diameter of approximately 12 mm of which hundreds of millions have been sold according to toy manufacturers and which have not been observed to be present in accident and injury statistics relating to asphyxiation.

The method of clamping the projectiles with suction cups specified in 5.24.6.5 (tension test for a projectile with a suction cup) will allow the clamps to be attached to suction cup projectiles of the shortest permissible length (57 mm) and will also ensure that any weak points of the shaft are detected (i.e. weak points that, when subjected to a tension force, could result in a broken shaft section with a suction cup that has a total length of less than 57 mm). In the case of projectiles where the projectile is not moulded in one piece, it is critical that the suction cup is not clamped to the shaft during the tests. To help avoid this situation the possibility of gluing the suction cup to a flat surface has been permitted.

A projectile toy which has stored energy is typically a gun or other spring-loaded device, for example a cross bow. A bow held by the child in a bow and arrow set or a pea-shooter are examples of projectile toys without stored energy. The bow from a bow and arrow set is defined as a discharge mechanism but since it is incapable of storing energy independent of the user, the toy is classified as a projectile toy without stored energy.

In designs where the projectile is propelled by the user including by means of a discharge mechanism incapable of storing energy independent of the user, the projectile toy should be regarded as a projectile toy without stored energy even though the design of the discharge mechanism may determine the kinetic energy.

Examples of discharge mechanisms incapable of storing energy independent of the user include, but are not limited to; bellows-powered air systems (non-pressurized) and certain friction-type launchers where the user forces the projectile through a constricted opening either manually or with mechanical assistance (i.e. using a lever).

Friction-type launchers are a unique mechanism in that by their very design and material type are able to store energy. However, for purposes of this standard, friction type launchers that cannot launch a projectile without an input force provided by the user are considered to be discharge mechanisms without stored energy. For example, this can be determined by observing the seated position of the projectile in the following examples of friction-type launchers:

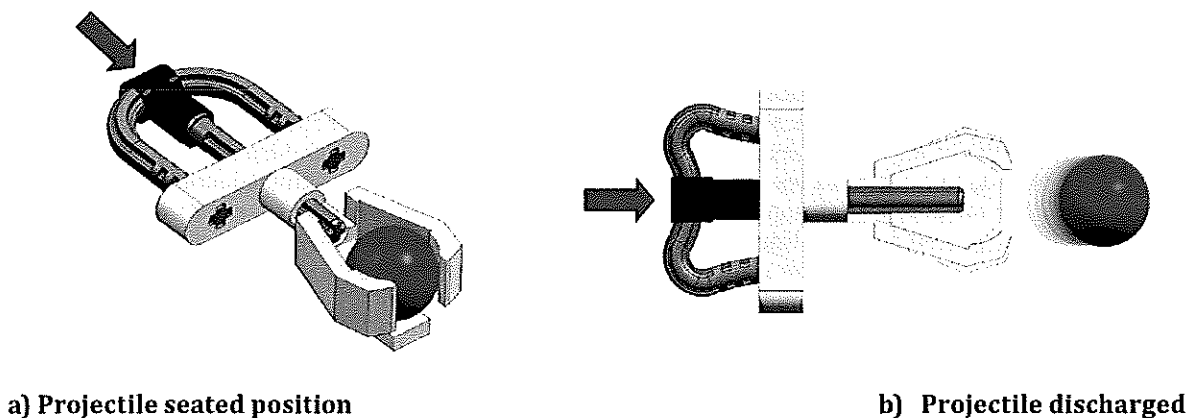


Figure E.1 — Example A of non-stored energy friction-type launcher

The information in B.2.15 (projectile toys) does not apply to:

- projectile toys where it would be considered unreasonable to aim at the eyes or face of the user or a third party; or
- projectile toys intended to be thrown towards people e.g. flying discs, balls and similar objects.

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Examples of toys that would be considered unreasonable to aim at the eyes or face include projectiles that, by design, are only able to be launched along a surface or toys where the face is prevented from being placed close to the projectile's trajectory.

Clause 4.18.3 b) (projectile toys with stored energy) imposes a maximum limit on kinetic energy per area of contact, also known as Kinetic Energy Density (KED). KED is conceptually closely aligned with the real life mechanism that determines whether an eye injury is likely to occur. Sophisticated modelling of eye injury mechanisms combined with expert advice has led to the identification of a KED maximum value of 2 500 J/m² as the value where the risk of significant injury to the eye (e.g. hyphema) is effectively zero. However, in the case of sharp-pointed projectiles where there is a risk of penetrative eye injury, KED is not a good predictor of eye injury potential. Therefore, in order to prohibit projectile tips that are not sufficiently rounded, a cylindrical gauge test has been introduced that is based upon the 2 mm tip radius specified in previous versions of ISO 8124-1.

When measuring the contact area (5.15.1.3.3, determination of kinetic energy per area of contact) the average of a minimum of 10 measurements is taken so as to minimize variations due to the skill of the operator or inconsistency of the toy. The wall impact test (5.15.2, apparatus) is less prone to operator variation and so 3 measurements are made which is in line with a similar requirement in ASTM F963. For the determination of maximum velocity (5.15.1.3.1, determination of velocity) the minimum time from 5 measurements is used which is in line with the existing ISO 8124-1, EN 71-1 and ASTM F963 standards.

Corners will naturally be formed at the junction of two adjacent surfaces and where these are adjacent leading edges they must have a minimum radius of 0,25 mm if the contact areas are made from a rigid material and the projectile toy has stored energy. This requirement is intended to soften the corners on surfaces that in some planes would be regarded as flat or blunted and in other planes have the appearance of being "sharp". This "softening" of edges is not considered necessary (or practical) for projectiles made of paper or paperboard and so projectiles made of these materials are exempted from this requirement.

Discharge mechanisms should be designed to minimize the ability to discharge any potentially hazardous improvised projectiles (for example pencils, nails, stones) without modification by the user. If possible, the discharge mechanism and the intended projectile should be designed such that the loading interface is specifically designed to only accept the intended projectiles. This can be achieved by adding keyways peculiar to the projectile and matching the discharge mechanism or by specific design of the locking mechanism to hold the projectile in place prior to firing.

It is recognized that manufacturers cannot determine every possible way in which a child may improvise a projectile from commonly available products but in order to facilitate the consistent interpretation of this clause, a standard set of typical improvised projectiles has been specified. Improvised projectiles that travel relatively minor distances would likely have little appeal to children and so improvised projectiles that have a range of less than 300 mm are exempt from the requirements. However, this exemption does not imply that improvised projectiles with a range greater than 300 mm should be automatically regarded as appealing to children or hazardous. Such improvised projectiles must still be evaluated to determine whether they can be launched in a potentially hazardous manner taking into account other relevant factors as mentioned in 4.18.3 e).

The requirements relating to arrows are intended to cover the potential risks associated with those that are 150 mm or longer, intended to be discharged by children e.g. in role play. For bows and arrows, the 150 N pull force is based on the 95th percentile pull force a 13 year old male child can apply, pulling from a standing position with one hand, on a door knob at a height of 1 300 mm (reference: McClelland 1976, UK and Childata, UK Department of Trade and Industry, datasheet 151). The 70 cm maximum distance is based on the length of an arm (to grip) of a 13-year-old male (reference: Childata, UK Department of Trade and Industry, datasheet 54).

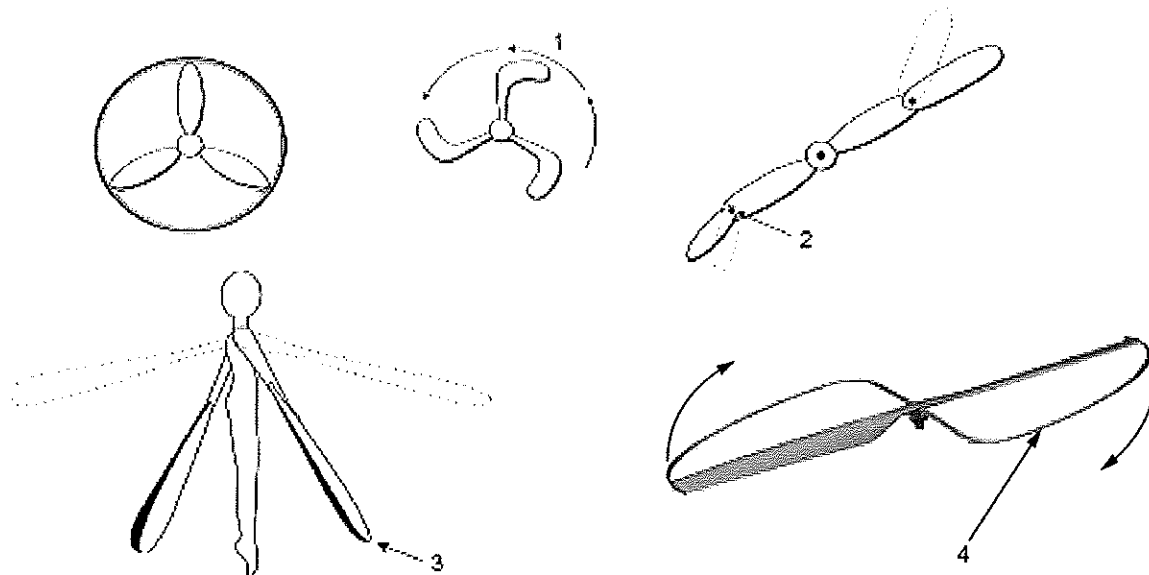
The specific requirements for arrows in 4.18.4.3 (arrows (e.g. bow and arrow set)) are not intended to apply to bows and arrows that are miniature representations, for example those supplied with action figurines.

The wall impact test has been included since it is considered to represent a foreseeable use (abuse) that the toy will be subject to. The usual use/abuse test regime might not adequately simulate the possible damage that might occur following the point blank discharge of a projectile into solid ground or solid wall.

E.33 Rotors and Propellers

See 4.19

The requirements for rotors and propellers are intended to minimize the risk of eye injury from the horizontally spinning blades. Examples of designs that are considered to minimize risk of eye injury are shown in Figure E.2 below.



Key

- 1 direction of rotation
- 2 loose fit rivet
- 3 resilient material
- 4 plastic wire protector

Figure E.2 — Examples of designs that are considered to minimize risk of eye injury

E.34 Aquatic toys

See 4.20.

These requirements are intended to reduce the risk of drowning due to the sudden loss of buoyancy of inflatable aquatic toys if air is released through the inlet. They also aim at informing adults and children of the dangers of using these toys in deep water. This part of ISO 8124 covers inflatable toys intended to bear the mass of a child and used for play in shallow water and generally under the supervision of an adult.

Stoppers on valves should not become detached and they should be protected against being inadvertently removed. Non-return valves are often provided to facilitate the inflation of the toy.

Other products, such as large inflatable boats, which by virtue of their size and design are intended to be used in deep water, are not covered. Arm bands and similar flotation aids are exempted, as they are considered to be swimming aids and not toys.

Bathroom toys are generally used indoors in a bathtub and are not covered by this clause, nor are inflatable beach balls, which are primarily used on the beach and not in the water.

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E.35 Braking

See 4.21.

The purpose of these requirements is to prevent accidents due to insufficient braking capabilities of toy vehicles. They specify that all ride-on toys with a free-wheeling facility shall be equipped with a brake. Excluded are toys with a direct transmission, e.g. tricycles with pedals on the front wheel, pedal cars and also electrically driven cars where the child's feet are free and can be used to brake the vehicle.

In assessing free-wheeling, it is often convenient and more practical to test the toy on a 10° slope and establish whether it accelerates down the slope. It should only be necessary in case of uncertainty to use a formula to calculate free-wheeling facilities.

The complete formula for calculating the free-wheeling facility is Formula (E.1):

$$\begin{aligned} & (m + 25) \cdot g \cdot \sin 10^\circ \\ &= (m + 25) \cdot g \times 0,173 \\ &= (m + 25) \times 1,70 \end{aligned} \tag{E.1}$$

where m is the mass of the toy vehicle.

E.36 Toy bicycles

See 4.22.

This part of ISO 8124 covers bicycles with a maximum saddle height up to 435 mm. These small bicycles are not intended to — and should not — be used in the streets or on the highway.

Legal requirements may exist in certain countries regarding the equipment and/or use of bicycles for young children.

E.37 Speed limitation of electrically driven ride-on toys

See 4.23.

Please note that certain countries may have speed limitations for electrically driven ride-on toys in their national legislation.

E.38 Liquid-filled toys

See 4.25.

These requirements are intended to reduce the risks related to punctured teethers and similar products, and where a child can come into contact with liquids which are contaminated or become contaminated due to a puncture.

When leakage occurs when tested in accordance with 5.19 (leakage of liquid-filled toys), the following may be taken into account in assessing the potential hazards of the liquid.

- a) Aqueous liquids:
 - ease with which the leakage occurred;
 - microbiological quality of the liquid (e.g. presence of known pathogenic organisms);

- use of chemical preservatives (only those preservatives permitted for use in foodstuffs; note that quantitative limits may not apply in the case of small volumes of liquid);
 - other dissolved substances (e.g. colours etc.).
- b) Non-aqueous liquids (other national legislation may apply in the case of some non-aqueous liquids):
- ease with which the leakage occurred;
 - nature and identity of the liquid;
 - volume of the liquid;
 - toxicity of the liquid;
 - flammability of the liquid;
 - effect of the liquid on other materials onto which it might leak.

NOTE This requirement does not apply to electrolytes in batteries. Nor does it apply to paints, fingerpaints or similar items in containers.

The warning required in 4.25 (liquid-filled toys) is intended to make parents aware of the risk associated with giving a child a teether which is so cold that it could harm the child.

E.39 Mouth-actuated toys

See 4.26.

These requirements are intended to prevent mouth-actuated toys or their mouthpieces from being unintentionally inhaled and causing the user to asphyxiate.

It is essential that such toys, as well as removable or detachable mouthpieces of toys (e.g. the mouthpiece of a trumpet), are not so small that they can be unintentionally swallowed or inhaled.

To ascertain that small parts do not come loose when a mouth-actuated toy such as a harmonica or whistle is being used, such toys are subjected to a sucking and blowing test where a specified volume of air is forced through the toy.

This requirement applies regardless of the age of the child for whom the toy is intended.

E.40 Percussion caps specifically designed for use in toys

See 4.28.

These requirements are intended to reduce the risk of damage to the eyes from sparks, flames and glowing parts caused by toy percussion caps accidentally exploding outside the toy weapon, or by excessively dangerous explosive behaviour of properly used caps due to inadequate construction or manufacturing. They also apply to injuries caused by the simultaneous reactions of a larger number of caps.

E.41 Hemispheric-shaped toys

See 4.5.8.

The purpose of this requirement is to address suffocation risks presented by certain shapes (half a ball or egg, or a bowl) which can be placed over a young child's nose and mouth forming an airtight seal. The available data indicate that the children involved in fatalities were between the ages of 4 months and 24 months while incidents involved children up to 36 months of age.

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The staff of the US Consumer Product Safety Commission analysed the incident data and came to conclusions regarding the dimensions of the containers involved in these incidents, as shown in [Table E.2](#):

Table E.2 — Dimensions of containers involved in incidents

Diameter range	69 mm to 97 mm
Depth range	41 mm to 51 mm
Volume range	100 ml to 177 ml

The work group observed children with cups in the diameter range of 51 mm to 114 mm. Based on these observations and the dimensions of the cups involved in the incidents, it was concluded that the size range of interest is 64 mm to 102 mm.

The two hole positions described in [Figure 12 a\)](#) and [Figure 12 b\)](#) are intended to minimize the likelihood of both holes becoming blocked simultaneously.

The size of the opening is specified to prevent a vacuum from forming. The openings are not intended as breathing holes.

E.42 Acoustic requirements

See [4.29](#).

These requirements are intended to reduce the risk of damage to hearing due to high continuous and impulse noise levels. They apply only to toys which are designed to emit sound, i.e. toys that have sound-producing features such as electric or electronic devices, percussion caps and rattling components.

The requirements in [4.29 a\)](#) and [4.29 b\)](#) are intended to address those hazards presented by continuous sounds (e.g. speech and music). These hazards are chronic and typically manifest themselves after years of exposure.

The requirements in [4.29 c\)](#) to [4.29 f\)](#) are intended to address those hazards presented by impulsive sounds (e.g. percussion caps and bursting balloons), which can be especially hazardous. Permanent damage to hearing may occur after only one exposure to high impulsive sound levels.

Impulsive sound level requirements have been broken down into two categories: explosive action and non-explosive action. A higher decibel level is allowed for those toys which produce impulsive sounds as a result of explosive action. This higher level is allowed because of the inability of the human ear to respond to waveforms with rapid rise-times such as these.

Close-to-the-ear toys are tested at 50 cm to minimize measurement error. The allowable decibel levels have been adjusted downward to compensate for the closer use distance.

Acoustic toys shall also comply with all other relevant requirements in this part of ISO 8124.

E.43 Age-break terminology

This part of ISO 8124 uses the following age-break terminology: “for children under 18 months”, “for children 18 months and over”, “for children under 36 months”, “for children 36 months and over”, “for children 18 months and over but under 36 months”, etc. This clause of the rationale clarifies how test methods shall be applied to these age ranges.

For example, a toy which has been suitably age-graded and labelled “18+”, or “For 18 months and over”, or “For ages 18 to 24 months” would not be tested against requirements applicable to “children under 18 months”.

If test parameters are denoted as shown in [Table E.3](#), and a toy has been suitably age-graded and labelled for example “For children 24 to 36 months” or “24–36 months”, the 25 kg load would be applicable.

Table E.3 — Test parameters for age-grading and labelling

Age group	Load kg
Under 36 months	25 ± 0,2
36 months and over	50 ± 0,5

Toys intended for children spanning more than one age range should be tested to the most onerous requirements. For a toy suitably age-graded and labelled, for example “2–5 years”, the 50 kg load would be applicable, as shown in [Table E.3](#).

If the word “years” is used instead of “months”, the conventions stated above apply in the same manner. For example, the statement “under 3 years” should be interpreted to be equivalent to “under 36 months”.

E.44 Toy scooters

See [4.30](#).

A body mass of 20 kg corresponds approximately to the average mass of a child of 5 years. A body mass of 50 kg corresponds approximately to the average mass of a child of 14 years.

It has been considered necessary to divide toy scooters into two body mass groups, and the body mass limit of 20 kg is the same that is used for toy roller skates, etc. The higher limit for toy scooters is 50 kg. It should be noted that the European Standard for scooters used as sports equipment starts at 35 kg and, therefore, there will be two types of scooters for the body mass group of 35 kg to 50 kg – those with a CE-marking and those without.

It has not been considered necessary to require brakes for toy scooters intended for children of 5 years or under, as they do not normally travel with great speed and are not able to operate a brake effectively. The requirement for the front wheel diameter is intended to reduce the risk of the rider falling over when the scooter runs over small stones or similar objects.

E.45 Magnets

See [4.31](#).

These requirements are intended to address the hazards associated with ingestion of strong magnets [e.g. neodymium iron boron type magnets (NIB)], that are capable of causing intestinal perforation or blockage. These hazards are additional to those associated with small parts, such as suffocation or asphyxiation (see [E.6](#), small parts). These requirements apply regardless of the age of the intended user.

Magnets found by children can be ingested. If more than one magnet, or one magnet and a ferromagnetic object (for example an iron or nickel object) is ingested, the objects can attract each other across intestinal walls and cause perforation or blockage, which can cause severe injuries that can be fatal.

Multiple incidents, including at least one fatality, have been reported involving ingestion of magnets resulting in perforation or blockage of the intestines. These incidents have involved children younger and older than 3 years of age. Medical signs associated with intestinal perforation or blockage can easily be misinterpreted since many children exhibit only flu-like symptoms. Such misinterpretations have caused delays in the medical treatment and led to serious consequences for children.

For the purpose of this International Standard, magnets or magnetic components that can be ingested are identified using the small parts cylinder. The small parts cylinder was originally designed to identify small parts in toys intended for children under 3 years of age, which are capable of causing suffocation or asphyxiation. It was not designed for identifying objects that can be ingested by older children. The decision to use the small parts cylinder also for assessment of magnets or magnetic components that can

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be ingested was made for practical reasons: the cylinder is a well known test template and it provides a safety margin since the magnets and magnetic components that have been involved in incidents all fit into the cylinder with a large margin. This same principle has been applied in the requirements for expanding materials.

The risk of magnets attracting each other across intestinal walls is a function of magnet strength. A limit value in the form of a magnetic flux index has been introduced to define what a sufficiently weak magnet is. Analysis of the data indicates that only the small, powerful NIB type magnets have been involved in the known incidents. Further analysis has determined that magnets with a magnetic flux index less than $50 \text{ kG}^2\text{mm}^2$ ($0,5 \text{ T}^2\text{mm}^2$) are considered appropriate to ensure, with a safety margin, that powerful magnets of this type will not be permitted for use in toys if they fit entirely within the small parts cylinder. By introducing the flux index limit, the risk of injuries with magnets will be minimized. As additional data becomes available in the future, this limit will be assessed to determine whether it is still appropriate.

Two or more magnets can attract each other and form a compound magnet with a higher flux index than each single magnet. The flux index will not double if two equally strong magnets are attracted to each other, and the increase in flux index will be relatively smaller for every new magnet that is added and will depend on magnetic material, shape, cross-section, etc. Ingestion of multiple magnets has only been observed with stronger magnets and there is no incident data regarding weak magnets close to the flux index limit forming a (stronger) compound magnet. Therefore, no additional test for compound magnets is introduced.

Toys that contain magnets and which can be expected to become wet during normal and foreseeable use are subjected to a soaking test to ensure that glued magnets do not detach when the toy is wet. Also, wooden toys are subjected to the test since the properties of wood (such as size of holes) can change even with changes in air humidity.

In some cases, magnets are recessed and therefore cannot be subjected to the normal torque and tension tests. Examples of toys have been found where a magnet has become detached by another magnet. A tension test for magnets has been introduced to minimize the risk that such magnets become detached during normal and foreseeable play.

For toys that comprise only one magnetic component, that toy is considered to meet the definition of a magnetic component (see [3.42](#), magnetic component).

Functional magnets in toys are not considered to present the same risk as magnets that form part of the play pattern. The use of magnets in these components may not be recognized, as they will be present inside electrical motors or in relays in electronic circuit boards. None of the reported incidents has been linked to magnets released from electrical or electronic components.

Magnetic/electrical experimental sets that are intended for children 8 years and over are excluded from the requirements in [4.31.2](#) (all other toys with magnets and magnetic components) and instead they are required to carry the prescribed warning. The exception applies to only the more advanced experimental sets that include building of electrical motors, loudspeakers, doorbells, etc., i.e. products that require both magnetism and electricity for their function. It should be noted that the warning aligns with the requirements of EN 71-1 but not ASTM F963. However, magnetic/electrical experimental sets that carry the ASTM F963 warning will be in compliance with the ISO warning since the ASTM F963 text is considered to be "comparable". Magnetic/electrical experimental sets that are intended for children under 8 years are, therefore, required to comply with the requirements in [4.31.2](#).

Annex F **(informative)**

Bath toy projection design guidelines

The guidelines below (1 to 5) are intended to address the hazard presented by vertical or nearly vertical, rigid projections on bath toys and are intended to minimize the risk of injury to the genital and anorectal area if a child were to sit or fall onto the bath toy projection while in an unclothed or minimally clothed state. Some examples of these potentially hazardous projections include, but are not limited to, rigid fins of fish, rigid hulls, funnels, and masts of boats.

Incident data with specific product dimensions and projection characteristics is not widely available; however, injury data does indicate a number of penetration- and impalement-related injuries resulting from unclothed or minimally clothed children slipping on the wet surfaces of bathtubs and then sitting or falling onto rigid projections on products identified as bath toys.

It is important that the design of a bath toy be developed with consideration of the shapes, dimensions, and materials of any projections on the toy such that penetration and impalement hazards are minimized. Examples of good design practices include the following:

- 1) **Non-vertical projections:** It is preferable to have projections designed, such that they are always non-vertical when the toy is evaluated in all its stable positions including consideration of the potential positions the toy can rest on the bottom of a bath tub, with or without water present in the bath tub, to produce a vertical or nearly vertical projection.
- 2) **Instability:** If a toy topples over when force is applied to the end of the vertical projection, both when the bath toy is empty and filled with water, then the vertical projection is unlikely to be hazardous.
- 3) **Inaccessibility:** Vertical projections can be protected by suitable means to minimize possible injury. A protected projection is one that has adequate adjacent structure (ribs, housings, or other permanent components) to render the projection unlikely to cause penetration or impalement hazards.
- 4) **Flexibility:** Vertical projections can be designed to be flexible to minimize possible injury. This can be done through the choice of materials, a design which bends or compresses, or the dimensions of the projection.
- 5) **Dimensions:** The dimensions such as diameter or thickness of vertical projections can be sized large enough to minimize the potential to cause injury.

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