
Cycles — Safety requirements for bicycles for young children

*Cycles — Exigences de sécurité pour les bicyclettes pour jeunes
enfants*

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Foreword

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

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

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

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

This document was prepared by Technical Committee ISO/TC 149, *Cycles*, Subcommittee SC 1, *Cycles and major sub-assemblies*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 333, *Cycles*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 8098:2014), which has been technically revised.

The main changes are as follows:

- addition of the terms "[3.3](#) conventional brake-lever", "[3.4](#) parallel brake-lever", and "[3.19](#) wheel and tyre assembly";
- improvement of [4.4.2](#) Minimum failure torque;
- addition of [4.7.2.3.2](#) Parallel brake-lever;
- improvement of [4.8.1](#) Handlebar — Dimensions and end fittings;
- improvement of [4.8.2](#) Handlebar grips;
- "Wheels" and "Rims, tyres and tubes" are merged as "[4.11](#) Wheels and tyre assembly";
- improvement of [4.11.2](#) Wheel and tyre assembly — Clearance;
- improvement of [4.12.6](#) Crank assembly — Fatigue tests;
- improvement of [4.14](#) Chain-wheel and belt-drive protective device.

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

Introduction

This document has been developed in response to demand throughout the world, and the aim has been to ensure that bicycles manufactured in conformity with it will be as safe as is practically possible. The tests have been designed to ensure the strength and durability of individual parts as well as of the bicycle as a whole, demanding high quality throughout and consideration of safety aspects from the design stage onwards.

The scope has been limited to safety considerations and has specifically avoided standardization of components.

If the bicycle is used on public roads, national regulations apply.

For safety requirements for toy bicycles intended for very young children see national regulations and standards.

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Cycles — Safety requirements for bicycles for young children

1 Scope

This document specifies safety and performance requirements and test methods for the design, assembly and testing of fully assembled bicycles and sub-assemblies for young children. It also provides guidelines for instructions on the use and care of the bicycles.

This document is applicable to bicycles with a maximum saddle height of more than 435 mm and less than 635 mm, propelled by a transmitted drive to the rear wheel.

It is not applicable to special bicycles intended for performing stunts (e.g. BMX bicycles).

NOTE For bicycles with a maximum saddle height of 435 mm or less, see national regulations for ride-on toys, and with a maximum saddle height of 635 mm or more, see ISO 4210-1 to ISO 4210-9[5]-[13].

2 Normative references

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

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 6742-2, *Cycles — Lighting and retro-reflective devices — Part 2: Retro-reflective devices*

ISO 8124-1:2018, *Safety of toys — Part 1: Safety aspects related to mechanical and physical properties*

ISO 11243, *Cycles — Luggage carriers for bicycles — Requirements and test methods*

3 Terms and definitions

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

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

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

3.1

bicycle

two-wheeled vehicle that is propelled solely or mainly by the muscular energy of the person on that vehicle, in particular by means of pedals

[SOURCE: ISO 4210-1:2023, 3.1.1]

3.2

brake-lever

lever that operates a braking device

[SOURCE: ISO 4210-1:2023, 3.4.2]

3.3

conventional brake-lever

brake-lever (3.2) with a rotational axis perpendicular to the handlebar

3.4

parallel brake-lever

brake-lever (3.2) with rotational axis parallel to the handlebar

3.5

braking force

tangential rearward force between the tyre and the ground or the tyre and the drum or belt of the test machine

[SOURCE: ISO 4210-1:2023, 3.4.4]

3.6

crank assembly

assembly consisting of the drive side and the non-drive side crank arm the bottom-bracket spindle or crank spindle, and all component of the drive system that are affixed to the crankset

[SOURCE: ISO 4210-1:2023, 3.8.2, modified — EXAMPLE has been removed.]

3.7

exposed protrusion

protrusion which through its location and rigidity could present a hazard to the rider either through heavy contact with it in normal use or should the rider fall onto it in an accident

[SOURCE: ISO 4210-1:2023, 3.2.3]

3.8

fracture

unintentional separation into two or more parts

[SOURCE: ISO 4210-1:2023, 3.2.4]

3.9

highest gear

gear ratio which gives the greatest distance travelled for one rotation of the cranks

[SOURCE: ISO 4210-1:2023, 3.8.4]

3.10

lowest gear

gear ratio which gives the shortest distance travelled for one rotation of the cranks

[SOURCE: ISO 4210-1:2023, 3.8.5]

3.11

maximum inflation pressure

maximum tyre pressure recommended by the tyre or rim manufacturer for a safe and efficient performance, and if the maximum rim pressure was marked on both the tyre and rim, maximum tyre pressure according to the lower marked maximum inflation pressure on the rim or tyre

[SOURCE: ISO 4210-1:2023, 3.7.3, modified — Note 1 to entry has been removed.]

3.12

maximum saddle height

vertical distance from the ground to the point where the top of the seat surface is intersected by the seat-post axis, measured with the seat in a horizontal position and with the seat-post set to the minimum insertion-depth mark

[SOURCE: ISO 4210-1:2023, 3.2.6]

3.13**tread surface**

surface of a pedal that is presented to the underside of the foot

[SOURCE: ISO 4210-1:2023, 3.8.6]

3.14**quick-release devices**

lever actuated mechanism that connects, retains, or secures a wheel or any other component

[SOURCE: ISO 4210-1:2023, 3.2.8]

3.15**stabilizers**

removable auxiliary wheels fitted to enable the rider to balance

3.16**toe-clip**

device attached to the pedal to grip the toe end of the rider's shoe but permitting withdrawal of the shoe

[SOURCE: ISO 4210-1:2023, 3.8.8]

3.17**toe-strap**

device to securely locate a rider's shoe on a pedal

3.18**visible crack**

crack which results from a test where that crack is visible to the naked eye

[SOURCE: ISO 4210-1:2023, 3.2.11]

3.19**wheel and tyre assembly**

assembled wheel fitted with tyre and wheel include all necessary parts for its intended use

[SOURCE: ISO 4210-1:2023, 3.7.7]

4 Requirements and test methods

4.1 Brake tests and strength tests — Special requirements

4.1.1 Brake tests to which special requirements apply

Brake tests to which maximum permissible error requirements apply, as in [4.1.4](#), are those specified in [4.7.2.3](#) to [4.7.8.4](#) inclusive.

4.1.2 Strength tests to which special requirements apply

Strength tests to which maximum permissible error requirements apply, as in [4.1.4](#), are those involving static, impact or fatigue loading as specified in [4.8](#) to [4.13](#) inclusive and [4.15](#).

4.1.3 Numbers and condition of specimens for the strength tests

In general, for static, impact and fatigue tests, each test shall be conducted on a new test sample, but if only one sample is available, it is permissible to conduct all of the tests on the same sample with the sequence of testing being fatigue, static and impact.

When more than one test is conducted on the same sample, the test sequence shall be clearly recorded in the test report or record of testing.

If more than one test is conducted on the same sample, earlier tests can influence the results of subsequent tests. Also, if a sample fails when it has been subjected to more than one test, a direct comparison with single testing is not possible.

In all strength tests, specimens shall be in the fully finished condition.

It is permitted to carry out tests with dummy assemblies such as a fork or handlebar when carrying out frame or handlebar stem tests.

4.1.4 Tolerances

Unless stated otherwise, maximum permissible error tolerances based on the nominal values shall be as follows:

- Forces and torques: 0/+5 %
- Masses and weights: ± 1 %
- Dimensions: ± 1 mm
- Angles: $\pm 1^\circ$
- Time duration: ± 5 s
- Temperatures: ± 2 °C
- Pressures: ± 5 %

4.1.5 Fatigue test

The force for fatigue tests shall be applied and released progressively, and not exceed 10 Hz. The tightness of fasteners according to manufacturer's recommended torque can be re-checked not later than 1 000 test cycles to allow for the initial settling of the component assembly. (This is considered applicable to all components, where fasteners are present for clamping.) The test bench shall be qualified to meet dynamic requirements of [4.1.4](#).

NOTE Examples of suitable methods are listed in Reference [\[14\]](#).

4.1.6 Plastic material test ambient temperature

All strength tests involving any plastic materials shall be pre-conditioned for two hours and tested at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$.

4.1.7 Impact test

For all vertical impact test, the striker shall be guided in such a way that the efficiency will allow a value of at least 95 % of the free velocity.

NOTE See [Annex B](#).

4.2 Toxicity

Any items which come into intimate contact with the rider (i.e. causing any hazard due to sucking or licking) shall comply with national regulations specific to children's products.

4.3 Sharp edges

Exposed edges that could come into contact with the rider's hands, legs etc., during normal riding or normal handling and normal maintenance shall not be sharp, e.g. deburred, broken, rolled or processed with comparable techniques.

4.4 Security and strength of safety-related fasteners

4.4.1 Security of screws

Any screws used in the assembly of suspension systems, bracket attached electric generators, brake-mechanisms and mud-guards to the frame or fork, shall be provided with suitable locking devices to prevent unintentional loosening, e.g. lock-washers, lock-nuts, thread locking compound or stiff nuts. Screws used to attach hub-generator are not included.

Fasteners used to assemble hub and disc brakes should have heat-resistant locking devices.

4.4.2 Minimum failure torque

The minimum failure torque of bolted joints for the fastening of handlebars, handlebar-stems, bar-ends, saddles and seat-posts shall be at least 20 % greater than the manufacturer's maximum recommended tightening torque.

4.4.3 Quick-release devices

Quick-release devices shall not be fitted. This requirement does not apply to the seat-tube clamp.

4.4.4 Foot location devices

Toe-straps and toe-clips shall not be fitted.

4.4.5 Folding bicycle mechanism

If folding bicycles mechanism is provided, it shall be designed so that the bicycle can be locked for use in a simple, stable, safe way and when folded no damage shall occur to any cables. No locking mechanism shall contact the wheels or tyres during riding, and it shall be impossible to unintentionally loosen or unlock the folding mechanisms during riding.

4.5 Crack detection methods

Standardised methods should be used to emphasize the presence of cracks where visible cracks are specified as criteria of failure in tests specified in this document.

NOTE For example, suitable dye-penetrant methods are specified in ISO 3452-1 to ISO 3452-4[1][2][3][4].

4.6 Exposed protrusions

These requirements are intended to address the hazards associated with the users of bicycles falling on projections or rigid components (e.g. handlebars, levers) on a bicycle possibly causing internal injury or skin puncture.

Tubes and rigid components in the form of projections which constitute a puncture hazard to the user should be protected. The size and shape of the end protection has not been stipulated, but an adequate shape shall be given to avoid puncturing of the body. Screw threads which constitute a puncture hazard shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.

4.7 Brakes

4.7.1 Braking-systems

Bicycles, whether or not fitted with a fixed transmitted drive, shall be equipped with at least two independently actuated braking systems, one system operating on the front wheel and one on the rear. The decision on whether the rear braking system is operated by the rider's hand or foot should be made in accordance with the legislation, custom or preference of the country to which the bicycle has to be supplied.

Brake-blocks containing asbestos shall not be permitted.

4.7.2 Hand-operated brakes

4.7.2.1 Brake-lever position

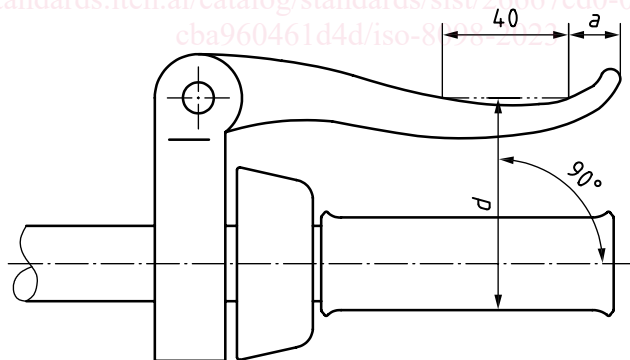
The brake-levers for front and rear brakes shall be positioned according to the legislation or custom and practice of the country in which the bicycle is to be sold, and the bicycle manufacturer shall state in the users instruction manual which lever operates the front brake and which operates the rear brake, see also [Clause 5 b\)](#).

4.7.2.2 Brake-lever grip dimensions

4.7.2.2.1 Requirement

The maximum grip dimension, d , measured between the outer surfaces of the brake-lever and the handlebar, or the handlebar-grip or any other covering where present, shall not exceed 75 mm over a distance of 40 mm as shown in [Figure 1](#). For dimension a , see [4.7.2.2.2](#).

The brake-lever may be adjusted to permit these dimensions to be obtained.



Key

- a distance between the last part of the lever intended for contact with the rider's fingers and the end of the lever
- d brake-lever grip dimension - non activated

Figure 1 — Brake-lever grip dimensions

4.7.2.2.2 Test method

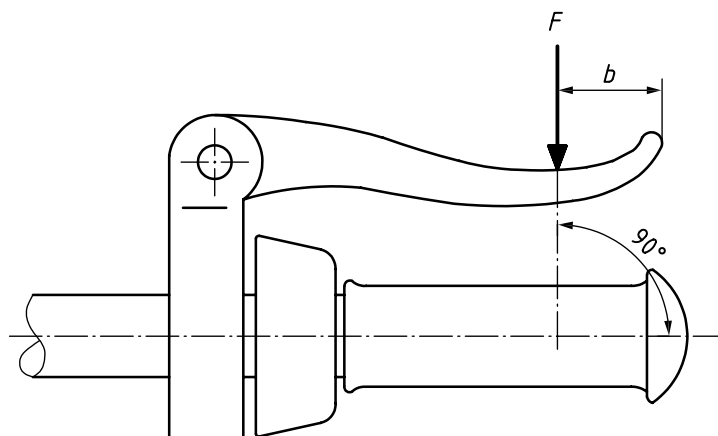
Fit the gauge illustrated in [Figure 2](#) over the handlebar and handlebar-grip and the brake-lever as shown in [Figure 3](#) so that the face A is in contact with the handlebar grip and the side of the brake-lever. Ensure that the face B is in uninterrupted contact with the part of the brake-lever which is intended for contact with the rider's fingers and that the gauge does not cause any movement of the brake-lever towards the handlebar or handlebar-grip. Measure the distance a , the distance between the last part of the lever intended for contact with the rider's fingers and the end of the lever (see [4.7.2.2.1](#) and [4.7.2.3](#)).



A perspective view of the mechanical assembly. It shows the vertical support plate with a circular hole at the top. A horizontal shaft passes through the center of the assembly. On the left, a curved arm is attached to the support plate. On the right, a vertical rectangular block is mounted on the shaft, featuring a semi-circular end. A small circular feature is visible on the front face of this block. The drawing uses solid lines for visible edges and a dashed line for the hidden part of the shaft.

4.7.2.3 Brake-levers — Position of applied force

For the purposes of all braking tests in this document, the test force shall be applied at a distance, b , which is equal to either dimension a as determined in [4.7.2.2.2](#) or 25 mm from the free end of the brake-lever, whichever is the greater (see [Figure 4](#)).



Key

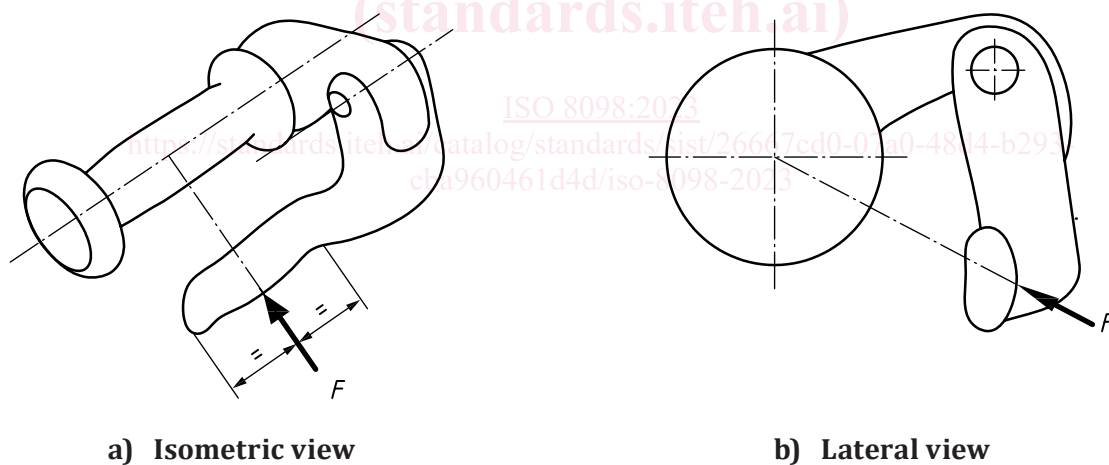
F applied force

$b \geq 25 \text{ mm}$

Figure 4 — Position of applied force on brake-lever

4.7.2.3.2 Parallel brake-lever

For the purposes of all braking tests in this document, the test force shall be applied at mid-distance of the lever grip length (see [Figure 5](#)).



a) Isometric view

b) Lateral view

Key

F applied force

Figure 5 — Position of applied force on parallel brake-lever

4.7.3 Attachment of brake assembly and cable requirements

Cable pinch-bolts shall not sever any of the cable strands when assembled to the manufacturer's instructions. In the event of a cable failing, no part of the brake mechanism shall inadvertently inhibit the rotation of the wheel.

The cable end shall either be protected with a cap that shall withstand a removal force of 20 N or be otherwise treated to prevent unravelling.

NOTE See [4.4](#) in relation to fasteners.

4.7.4 Brake-block and brake-pad assemblies — Security test

4.7.4.1 Requirement

The friction material shall be securely attached to the holder, backing-plate, or shoe and there shall be no failure of the assembly when tested by the method specified in [4.7.4.2](#). The brake system shall be capable of meeting the strength test specified in [4.7.7](#) and the braking performance specified in [4.7.8](#).

4.7.4.2 Test method

Conduct the test on a fully assembled bicycle with the brakes adjusted to a correct position with a rider or equivalent mass on the saddle. The combined mass of the bicycle and rider (or equivalent mass) shall be 30 kg.

Actuate each brake-lever with a force of 130 N applied at the point as specified in [4.7.2.3](#) or a force sufficient to bring the brake-lever into contact with the handlebar grip, whichever is the lesser. Maintain this force while subjecting the bicycle to five forward and five rearward movements, each of which is not less than 75 mm distance.

4.7.5 Brake adjustment

Each brake shall be capable of adjustment with or without the use of a tool to an efficient operating position until the friction material has worn to the point of requiring replacement as recommended in the manufacturer's instructions.

Also, when correctly adjusted, the friction material shall not contact anything other than the intended braking surface.

If brake adjustment can be achieved without the use of a tool, the adjuster shall be designed to prevent for incorrect use or incorrect operation.

4.7.6 Back-pedal brake

Back-pedal brakes shall be actuated by the rider's foot pedalling in the opposite direction to the drive force. The brake mechanism shall function independently of any drive gear positions or adjustments. The differential between the drive and brake positions of the crank shall not exceed 60°.

The measurement shall be taken with the crank held against each position with a pedal force of at least 140 N. The force shall be maintained for 1 min in each position.

4.7.7 Braking-system — Strength tests

4.7.7.1 Hand-operated brake — Requirement

When tested by the method described in [4.7.7.2](#), there shall be no failure of the braking-system or of any component thereof.

4.7.7.2 Hand-operated brake — Test method

Conduct the test on a fully assembled bicycle. After it has been ensured that the braking system is adjusted according to the recommendations in the manufacturer's instructions, apply a force at the point specified in [4.7.2.3](#) and normal to the axis of handlebar in the grip area in the plane of travel of the lever, as shown in [Figure 4](#) and [Figure 5](#). The force shall be 300 N, or a lesser force required to bring:

- a) a cable-brake lever into contact with the handlebar grip or the handlebar where the manufacturer does not fit a grip, or
- b) a rod-operated brake lever level with the upper handlebar grip surface.