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**Cycles — Safety requirements for  
bicycles —**

Part 2:

**Requirements for city and trekking,  
young adult, mountain and racing  
bicycles**

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*Cycles — Exigences de sécurité des bicyclettes —*

*Partie 2: Exigences pour bicyclettes de ville et de randonnée, de jeune  
adulte, de montagne et de course*

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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](http://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](http://www.iso.org/patents)).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 149, *Cycles*, Subcommittee SC 1, *Cycles and major sub-assemblies*.

This first edition of ISO 4210-2, together with ISO 4210-3, ISO 4210-4, ISO 4210-5, ISO 4210-6, ISO 4210-7, ISO 4210-8, and ISO 4210-9, cancels and replaces ISO 4210:1996, which has been technically revised.

ISO 4210 consists of the following parts, under the general title *Cycles — Safety requirements for bicycles*:

- Part 1: *Terms and definitions*
- Part 2: *Requirements for city and trekking, young adult, mountain and racing bicycles*
- Part 3: *Common test methods*
- Part 4: *Braking test methods*
- Part 5: *Steering test methods*
- Part 6: *Frame and fork test methods*
- Part 7: *Wheels and rim test methods*
- Part 8: *Pedals and drive system test methods*
- Part 9: *Saddles and seat-post test methods*

## Introduction

This International Standard has been developed in response to demand throughout the world, and the aim has been to ensure that bicycles manufactured in compliance with this International Standard 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 to be used on public roads, national regulations apply.

For the purposes of improving repeatability and reproducibility, and considering the applicability to all types of bicycle and the size and influence of the operator, the machine test method reflects today's state of the art and is preferred to the track test method.

Unless there is evidence of improvement of the test track method in the future, this method will be made informative for the next revision. Users of the International Standard are invited to provide their feedback to ISO/TC 149/SC 1.

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# Cycles — Safety requirements for bicycles —

## Part 2:

# Requirements for city and trekking, young adult, mountain and racing bicycles

## 1 Scope

This part of ISO 4210 specifies safety and performance requirements for the design, assembly, and testing of bicycles and sub-assemblies having saddle height as given in [Table 1](#), and lays down guidelines for manufacturer's instructions on the use and care of such bicycles.

This part of ISO 4210 applies to young adult bicycles with maximum saddle height of 635 mm or more and less than 750 mm, city and trekking bicycles, mountain bicycles, and racing bicycles that have a maximum saddle height of 635 mm or more including folding bicycles (see [Table 1](#) and [Figure 1](#)).

This part of ISO 4210 does not apply to specialized types of bicycle, such as delivery bicycles, recumbent bicycles, tandems, BMX bicycles, and bicycles designed and equipped for use in severe applications such as sanctioned competition events, stunting, or aerobatic manoeuvres.

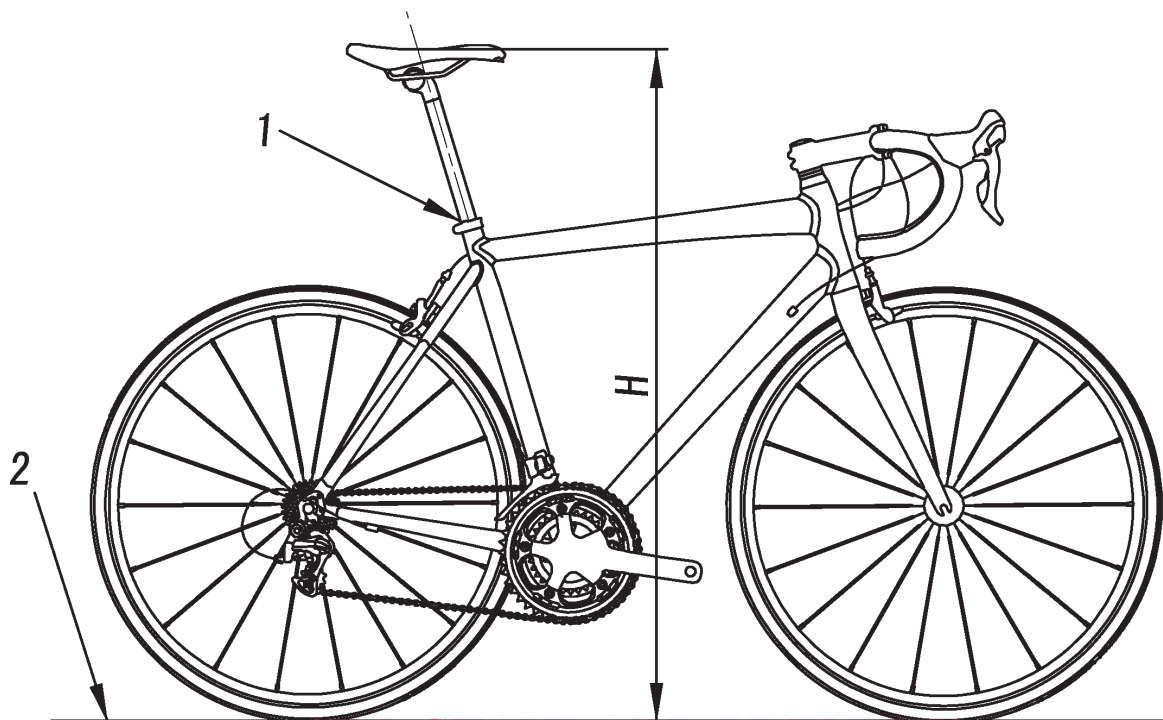
NOTE For bicycles with a maximum saddle height of 435 mm or less, see ISO 8124-1, and with a maximum saddle height of more than 435 mm and less than 635 mm, see ISO 8098.

**Table 1** — Maximum saddle height

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Dimensions in millimetres

Bicycle type	City and trekking bicycles	Young adult bicycles	Mountain bicycles	Racing bicycles
Maximum saddle height	635 or more	635 or more and less than 750	635 or more	635 or more



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**Key**

*H* maximum saddle height

1 minimum insertion-depth mark

2 ground plane

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**Figure 1 — Maximum saddle height**

**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 4210-1, *Cycles — Safety requirements for bicycles — Part 1: Terms and definitions*

ISO 4210-3:2014, *Cycles — Safety requirements for bicycles — Part 3: Common test methods*

ISO 4210-4:2014, *Cycles — Safety requirements for bicycles — Part 4: Braking test methods*

ISO 4210-5:2014, *Cycles — Safety requirements for bicycles — Part 5: Steering test methods*

ISO 4210-6:2014, *Cycles — Safety requirements for bicycles — Part 6: Frame and fork test methods*

ISO 4210-7:2014, *Cycles — Safety requirements for bicycles — Part 7: Wheel and rim test methods*

ISO 4210-8:2014, *Cycles — Safety requirements for bicycles — Part 8: Pedal and drive system test methods*

ISO 4210-9:2014, *Cycles — Safety requirements for bicycles — Part 9: Saddle and seat-post test methods*

ISO 5775-1, *Bicycle tyres and rims — Part 1: Tyre designations and dimensions*

ISO 5775-2, *Bicycle tyres and rims — Part 2: Rims*



ISO 6742-1, *Cycles — Lighting and retro-reflective devices — Part 1: Lighting and light signalling devices*

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

ISO 9633, *Cycle chains — Characteristics and test methods*

ISO 11243, *Cycles — Luggage carriers for bicycles — Concepts, classification and testing*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4210-1 apply.

## 4 Requirements

### 4.1 Toxicity

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

### 4.2 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.

NOTE Refer to ISO 13715:2000. ([standards.iteh.ai](https://standards.iteh.ai))

### 4.3 Security and strength of safety-related fasteners

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#### 4.3.1 Security of screws

Any screws used in the assembly of suspension systems, brackets attached to electric generators, brake mechanisms and mudguards to the frame or fork, and the saddle to the seat-post shall be provided with suitable locking devices, e.g. lock-washers, lock-nuts, thread locking compound, or stiff nuts. Fasteners used to assemble hub and disc brakes should have heat-resistant locking devices.

NOTE 1 The screws used to attach the hub generator are not included.

NOTE 2 For example, mechanical and physical properties of bolts are specified in ISO 898-1.

#### 4.3.2 Minimum failure torque

The minimum failure torque of bolted joints for the fastening of handle bars, handlebar stems, bar ends, saddle and seat-posts shall be at least 50 % greater than the manufacturer's recommended tightening torque.

#### 4.3.3 Folding bicycle mechanism

If folding bicycle 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.

## 4.4 Crack detection methods

Standardized methods should be used to emphasize the presence of cracks where visible cracks are specified as criteria of failure in tests specified in this part of ISO 4210.

NOTE For example, suitable dye-penetrant methods are specified in ISO 3452-1, ISO 3452-2, ISO 3452-3, and ISO 3452-4. In addition, white paint or surface treatment can be used to aid in detection for composite materials.

## 4.5 Protrusions

This requirement is 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 rider 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.

NOTE Handlebar ends are covered by the paragraph in 4.7.2.

## 4.6 Brakes

### 4.6.1 Braking systems

A bicycle shall be equipped with at least two independently actuated braking systems. At least one shall operate on the front wheel and one on the rear wheel. The braking systems shall operate without binding and shall be capable of meeting the braking performance requirements of 4.6.8.

Brake blocks containing asbestos shall not be permitted.

### 4.6.2 Hand-operated brakes

#### 4.6.2.1 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 manufacturer's instructions which levers operate the front and rear brakes [see also Clause 5 item b)].

#### 4.6.2.2 Brake lever grip dimensions

a) The brake lever similar to type A or type B

The dimension,  $d$ , measured between the outer surfaces of the brake lever in the region intended for contact with the rider's fingers and the handlebar or any other covering present shall cover a distance of not less than 40 mm as shown in Figure 2 a) and Figure 2 b) and conform to the following:

- on bicycles on which the minimum intended height of the saddle is 635 mm or more,  $d$  shall not exceed 90 mm;
- on bicycles on which the minimum intended height of the saddle is less than 635 mm,  $d$  shall not exceed 75 mm.

Conformance shall be established by the method detailed in ISO 4210-4:2014, 4.1.1. The range of adjustment on the brake lever should permit these dimensions to be obtained.

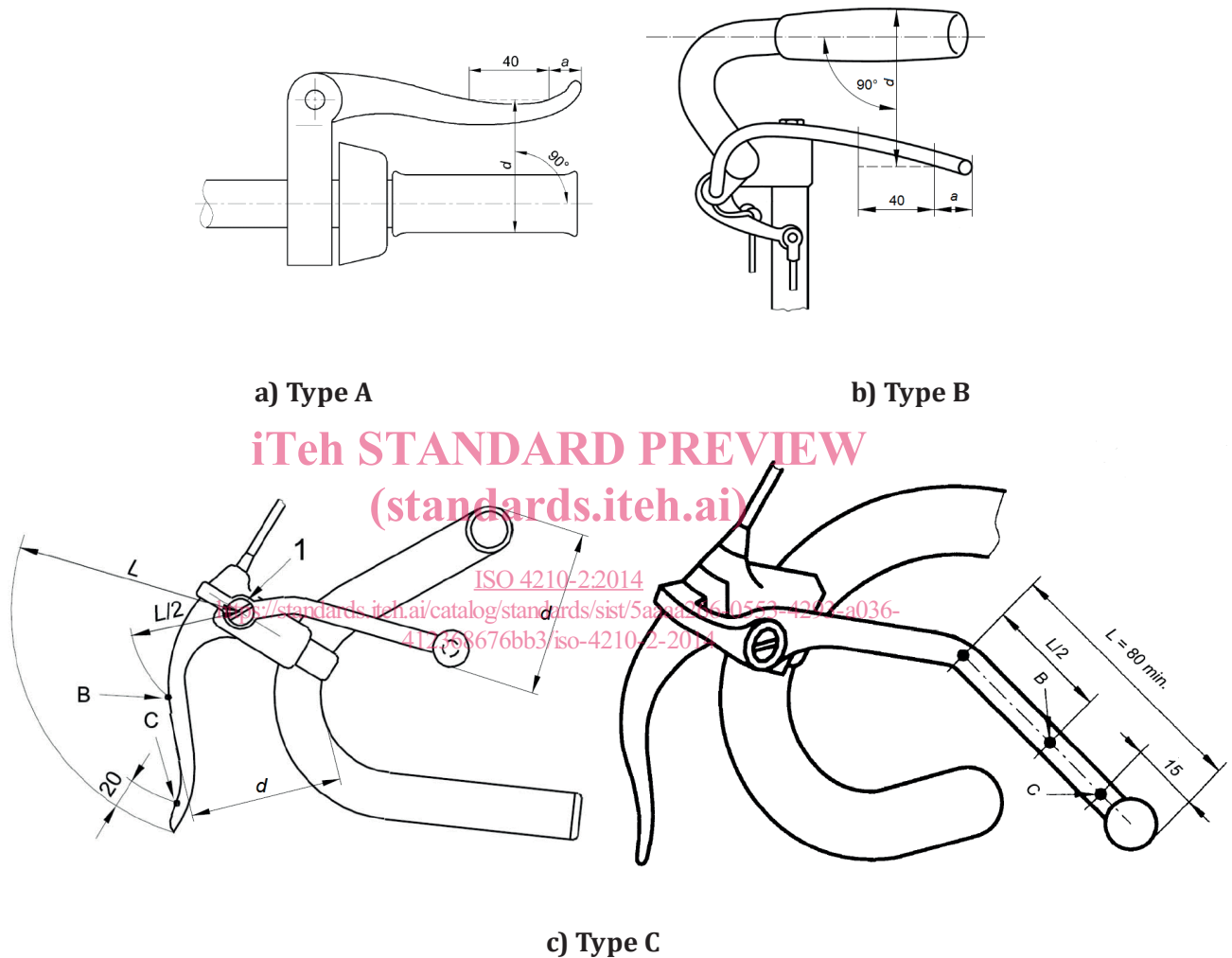
NOTE See Clause 5 item c) in relation to the minimum intended height of the saddle.

b) The brake lever similar to type C

It shall be possible to fit the dimension gauge shown in ISO 4210-4:2014, Figure 3 over the brake lever (or a secondary brake lever) and the handlebar grip or any other covering in at least one position between points *B* and *C* indicated in Figure 2 c), without causing any movement of the brake lever towards the handlebar. The dimension *d* shall not exceed 100 mm.

Conformance shall be established by the method detailed in ISO 4210-4:2014, 4.1.2. The range of adjustment on the brake lever should permit these dimensions to be obtained.

Dimensions in millimetres



**Key**

- 1 pivot
- a* distance between the last part of the lever intended for contact with the rider's fingers and the end of the lever
- B* point of  $L/2$
- C* point of 20 mm (in case of an extension brake lever, 15 mm) from the end of the lever
- d* brake lever grip dimension
- L* the distance between the centre of the lever pivot and the lever tip end

**Figure 2 — Brake lever grip dimensions**

#### 4.6.3 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 not less than 20 N or be otherwise treated to prevent unravelling.

NOTE See 4.3 in relation to fasteners.

#### 4.6.4 Brake-block and brake-pad assemblies — Security test

The friction material shall be securely attached to the holder, backing plate, or shoe and there shall be no failure of the braking system or any component thereof, and the brake shall meet the performance requirements of 4.6.8 when tested by the method specified in ISO 4210-4:2014, 4.3.

#### 4.6.5 Brake adjustment

Each brake shall be equipped with an adjustment mechanism, either manual or automatic.

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.

The brake blocks of a bicycle with rod brakes shall not come into contact with the rim of the wheels when the steering angle of the handlebars is set at 60°, nor shall the rods bend, or be twisted after the handlebars are reset to the central position.

#### 4.6.6 Hand-operated braking system — Strength test

When tested by the method described in ISO 4210-4:2014, 4.4, there shall be no failure of the braking system or of any component thereof.

#### 4.6.7 Back-pedal braking system — Strength test

##### 4.6.7.1 General

If the back-pedal braking system is fitted, the brake shall be actuated by the operator's foot applying force to the pedal in a direction opposite to that of the drive force. The brake mechanism shall function regardless 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 250 N. The force shall be maintained for 1 min in each position.

##### 4.6.7.2 Requirement

When tested in accordance with ISO 4210-4:2014, 4.5, there shall be no failure of the brake system or any component thereof.

#### 4.6.8 Braking performance

##### 4.6.8.1 General

Two test methods are specified to determine braking performance and experience has shown that either method is suitable and either can be used. One test method is the track test in which braking distance is measured directly with the progressive characteristics of the brakes being self-evident. The

alternative test method is a machine/rig base test in which braking force is measured and, from which, braking performance values are calculated. The progressive characteristics of the brake are determined by linearity measurements. A final, simple track test checks for smooth, safe, stopping characteristics.

Whichever method is used, there shall be compliance with 4.6.8.1.1 or 4.6.8.1.2.

NOTE See ISO 4210-4:2014, 4.6.5.7 item h), test method — simple track test.

**4.6.8.1.1 Track test**

When tested in accordance with ISO 4210-4:2014, 4.6.3, the bicycle shall fulfil the requirements shown in Table 2.

**Table 2 — Brake test velocities and braking distances**

Bicycle type	Condition	Velocity km/h	Brake in use	Maximum corrected braking distance m
City and trekking bicycles	Dry	25	Both	7
			Rear only	15
	Wet	16	Both	5
			Rear only	10
Young adult bicycles	Dry	25	Both	7
			Rear only	15
	Wet	16	Both	5
			Rear only	10
Mountain bicycles	Dry	25	Both	6
			Rear only	10
	Wet	16	Both	5
			Rear only	10
Racing bicycles	Dry	25	Both	6
			Rear only	12
	Wet	16	Both	5
			Rear only	10

**4.6.8.1.2 Machine test**

When tested in accordance with ISO 4210-4:2014, 4.6.5, the bicycle shall fulfil the requirements shown in Table 3.

**Table 3 — Calculated braking performance value**

Bicycle type	Condition	Brake in use	Minimum brak- ing performance value, $B_p$ $N$
City and trekking bicycles	Dry	Front only	340
		Rear only	220
	Wet	Front only	220
		Rear only	140