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Cycles — Safety requirements for bicycles —

Part 6: Frame and fork test methods

*Cycles — Exigences de sécurité des bicyclettes —
Partie 6: Méthodes d'essai du cadre et de la fourche*

ICS 43.150

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

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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.

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ISO 4210-6 was prepared by Technical Committee ISO/TC 149, Cycles, Subcommittee SC 1, *Cycles and major sub-assemblies*.

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 & 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: Wheel and rim test methods*
- *Part 8: Pedal and drive system test methods*
- *Part 9: Saddle 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 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 standardisation of components.

If the bicycle is to be used on public roads, national regulations apply and it may be equipped with a lighting system.

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Cycles — Safety requirements for bicycles —

Part 6: Frame and fork test methods

1 Scope

This part of ISO 4210 specifies the frame and fork test methods for ISO 4210-2.

2 Normative references

The following referenced documents are indispensable for the application 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 4210-1:–¹), *Cycles – Safety requirements for bicycles – Part 1: Terms and definitions*

ISO 4210-2:–²), *Cycles – Safety requirements for bicycles – Part 2: Requirements for city & trekking, young adult, mountain and racing bicycles*

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

3 Terms and definitions

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

4 Frame Test methods

4.1 Frame – Impact test (falling mass)

4.1.1 General

Manufacturers of frames are permitted to conduct the test with a dummy fork (see Annex A) fitted in place of a front fork.

Where a frame is convertible for male and female riders by the removal of a bar, test it with the bar removed.

Where a suspension fork is fitted, test the assembly with the fork extended to its unloaded free length. Where a rear suspension system is incorporated in the frame, secure the suspension in a position equivalent to that which would occur with an 80 kg rider seated on the bicycle. For young adult bicycles secure the suspension in a position equivalent to that which would occur with an 40 kg rider seated on the bicycle; if the type of

1) To be published. (Revision of ISO 4210:1996)

2) To be published. (Revision of ISO 4210:1996)

3) To be published. (Revision of ISO 4210:1996)

suspension system does not permit it to be locked, then replace the spring/damper unit by a solid link of the appropriate size and with end fittings similar to those of the spring/damper unit.

4.1.2 Test method

Assemble a roller of mass less than or equal to 1 kg and with dimensions conforming to those shown in Figure 1 in the fork. The hardness of roller shall be not less than 60 HRC at impact surface. If a dummy fork is used in place of a fork the bar shall have a rounded end equivalent in shape to the roller. Hold the frame-fork or frame-bar assembly vertically with clamping to a rigid fixture by the rear-axle attachment points as shown in Figure 1.

Rest a striker of mass 22,5 kg on the roller in the fork drop-outs or on the rounded end of the dummy fork and measure the wheelbase. Raise the striker to a height of h_1 above the low-mass roller and release it to strike the roller or the steel bar at a point in line with the wheel centres and against the direction of the fork rake or rake of the bar. The drop heights are given in Table 1. The striker will bounce and this is normal. When the striker has come to rest on the roller or dummy fork, measure the wheelbase again.

If the fork fails, the frame shall be tested with a dummy-fork.

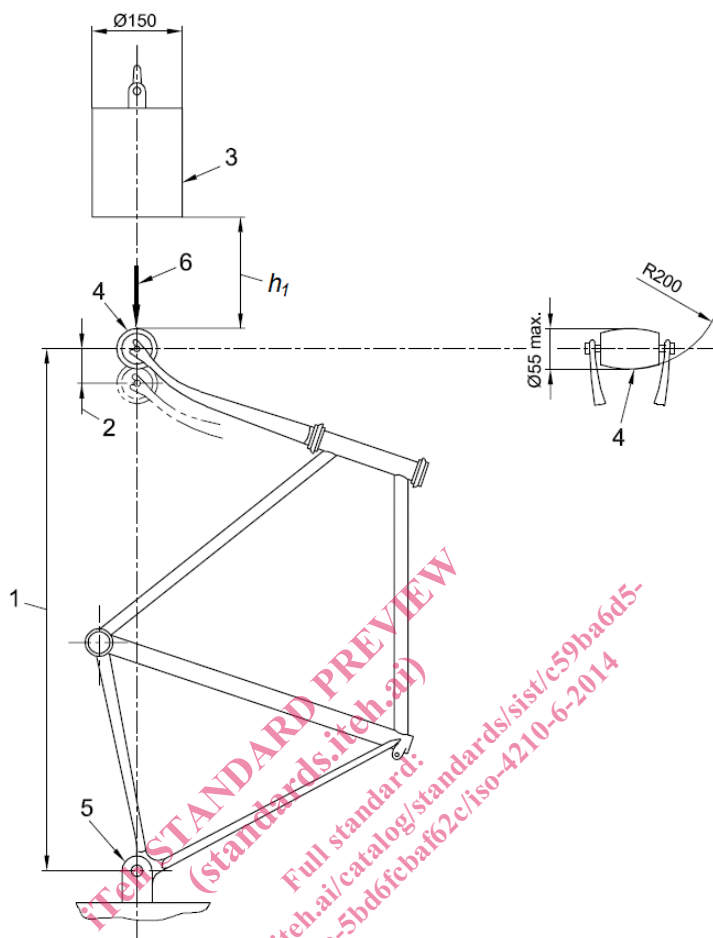
Table 1 — Drop heights

Dimensions in millimetres

Bicycle type	City and trekking bicycles	Young adult bicycles	Mountain bicycles	Racing bicycles
Drop height, h_1	180	180	360	212

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Dimensions in millimetres

**Key**

- h_1 Drop height
- 1 Wheelbase
- 2 Permanent deformation
- 3 22,5 kg striker
- 4 Low mass roller (1 kg max.)
- 5 Rigid mounting for rear axle attachment point
- 6 Direction of rearward impact

Figure 1 — Frame and front fork assembly: impact test (falling mass)

4.2 Frame and front fork assembly – Impact test (falling frame)

4.2.1 General

- a) Manufacturers of complete bicycles shall conduct the test with the frame fitted with the appropriate front fork.

For manufacturers of frames, if the fork intended for the frame is not available, it is permitted for the test to be conducted with the frame fitted with a fork which meets the requirements of the fork impact test as described in ISO 4210-2:–, 4.8.5.

Where a frame is convertible for male and female riders by the removal of a bar, test it with the bar removed.

Where a suspension fork is fitted, it shall be at its unloaded length prior to the impact. If the spring damper unit can be locked, it shall be locked in its unloaded length position. If the spring/damper cannot be locked, use one of the two following alternative procedures:

- b) secure the fork at its extended length by an external locking method, or
- c) replace the fork by a rigid fork which is known to meet the requirements of the impact test described in ISO 4210-2:–, 4.8.5 and of a length which is consistent with an 80 kg (in case of young adult bicycles, apply a 40 kg) rider seated in a normal riding position on the bicycle when it is equipped with the suspension fork.

Where a rear suspension system is incorporated in the frame, secure the spring/damper unit in a position equivalent to that which would occur with an 80 kg (in case of young adult bicycles, apply a 40 kg) rider seated on the bicycle; if the type of suspension system does not permit it to be locked, then replace the spring/damper unit by a solid link of the appropriate size and with end fittings similar to those of the spring/damper unit.

4.2.2 Test method

Conduct the test on the assembly used for the test in ISO 4210-2:–, 4.7.2 or, in the case of a frame manufacturer who does not make forks, with the same frame with a suitable fork fitted (see 4.2.1).

As shown in Figure 2, mount the frame-fork assembly at its rear axle attachment points so that it is free to rotate about the rear axle in a vertical plane. Support the front fork on a flat steel anvil so that the frame is in its normal position of use. Securely fix masses of M_1 , M_2 , and M_3 (Table 2) to the top of the steering head, the seat-post, and the bottom bracket respectively, as shown in Figure 2.

Measure the wheelbase with the three masses in place. Rotate the assembly about the rear axle until the distance between the low-mass roller and the anvil is h_2 then allow the assembly to fall freely to impact on the anvil.

Repeat the test and then measure the wheelbase again with the three masses in place and the roller resting on the anvil.

Table 2 — Drop heights and distribution of masses at seat post, steering head, and bottom bracket

Bicycle type	City and trekking bicycles	Young adult bicycles	Mountain bicycles	Racing bicycles
Mass 1 Seat-post, M_1 kg	50	40	30	30
Mass 2 Steering head, M_2 kg	10	10	10	10
Mass 3 Bottom bracket, M_3 kg	30	20	50	50
Drop height, h_2 mm	200	200	300	200