INTERNATIONAL STANDARD

ISO 4210-3

Second edition
2023-01

Cycles — Safety requirements for bicycles —

Part 3: Common test methods

Cycles — Exigences de sécurité pour les bicyclettes —

Partie 3: Méthodes d'essai communes

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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).

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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).

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This second edition cancels and replaces the first edition (ISO 4210-3:2014), which has been technically revised.

The main changes are as follows:

— improvement of 4.2.1;

— improvement of 4.3;

— improvement of A.2;

— addition of Annex C.

A list of all parts in the ISO 4210 series can be found on the ISO website.

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.

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Introduction

This document was developed in response to a demand throughout the world. The aim is to ensure that bicycles manufactured in conformity with this document will be as safe as is practically possible. The tests are 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 is limited to safety considerations and has specifically avoided standardization of components.

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

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Cycles — Safety requirements for bicycles —

Part 3:
Common test methods

1 Scope

This document specifies the common test methods for ISO 4210-2.

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 4210-1, *Cycles — Safety requirements for bicycles — Part 1: Vocabulary*

ISO 4210-2:2023, *Cycles — Safety requirements for bicycles — Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles*

ISO 4210-4:2023, *Cycles — Safety requirements for bicycles — Part 4: Braking test methods*

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3 Terms and definitions

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

ISO and IEC maintain terminological 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/

4 Test methods

4.1 Brake tests and strength tests

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 ISO 4210-2:2023, 4.6.3 to 4.6.6 and ISO 4210-4:2023, 4.2 and 4.6.3.3.

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 ISO 4210-2:2023, 4.7 to 4.12, and ISO 4210-2:2023, 4.13.2, 4.15 and 4.19.2.

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 these tests on the same sample with the sequence of testing being fatigue, static, and impact.

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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. It should be noted that 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.

4.1.4 Maximum permissible error tolerances of test conditions for brake tests and strength tests

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

— Forces and torques: 0/+5 %

— Masses: ±1 %

— Dimensions: ±1 mm

— Angles: ±1°

— Time duration: ±5 s

— Temperatures: ±2 °C

— Pressures: ±5 %

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4.2 Front mudguard test methods

4.2.1 Front mudguard with stays test methods

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4.2.1.1 Test method — Minimal tangential strength

Insert a 12 mm-diameter steel rod between the spokes, in contact with the rim and below the front mudguard stays. Rotate the wheel to apply a tangentially upward force of 160 N against the front mudguard stays; maintain this force for 1 min, as shown in Figure 1.

Remove the rod and verify the assembly as described in ISO 4210-2:2023, 4.11.

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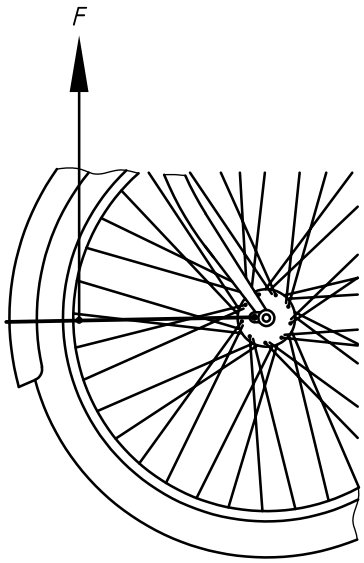

Key

F tangentially upward force, 160 N

Figure 1 — Front mudguard — Tangential obstruction test

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4.2.1.2 Test method — Mudguard stays impact test

Mount a 12 mm diameter steel rod at one end of a lever arm which is able to rotate freely around the wheel axis, as shown in Figure 2, so that when placed between the spokes, the rod makes contact with the rim. Ensure that the steel rod is long enough to come in contact with both left and right mudguard stay(s).

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Ensure that the assembly of steel rod and lever arm is balanced around the wheel axle, so that it is in equilibrium before the mass is applied.

Measure the distance, L_1, between the rod axis and wheel axis. The release height, h, is the vertical distance from the upper surface of the steel rod to the point where the steel rod hits the mudguard stays.

At the other end of the lever arm arrange for a weight with a mass, m, to be attached at distance, L_2, from the wheel axis, such that the impact has an energy, E of 36,8 J (e.g. m = 10 kg, L_2 = 1,5 × L_1, and h = 250 mm).

If different dimensions are required, the impact energy can be determined using Formula (1), where h has a minimum value of 100 mm:

$$E = 9{,}81 \times \frac{L_2}{L_1} \times m \times h \tag{1}$$

Accelerate the rod, together with the wheel, by releasing the mass so that the rod impacts the mudguard stays.

Remove the rod and verify the assembly as described in ISO 4210-2:2023, 4.11.

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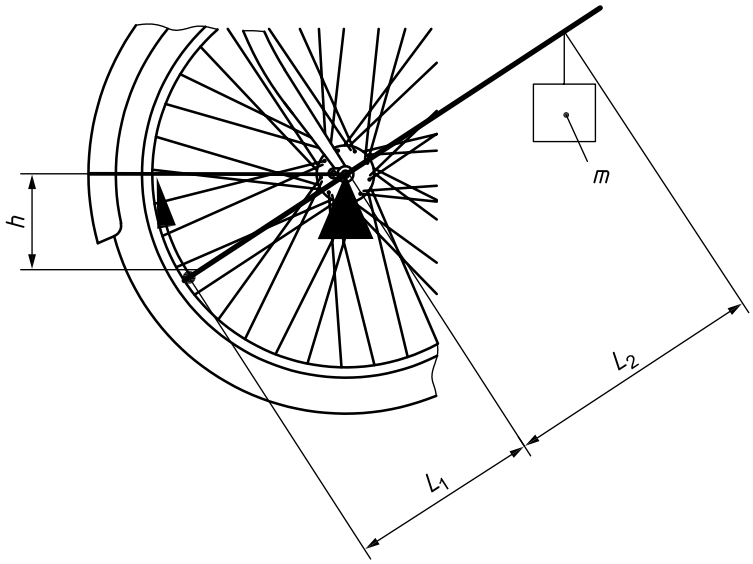

Key

h height

L_1 distance between the rod axis and wheel axis

L_2 ($L_2 = 1{,}5 \times L_1$)

m mass of the weight

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Figure 2 — Front mudguard — Mudguard stays impact test

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4.2.2 Front mudguard without stays test method

Press the front mudguard at a distance of 20 mm from its free end with a 20 mm diameter, flat-ended tool radially towards the tyre with a force of 80 N as shown in Figure 3.

While the force is maintained, verify the assembly as described in ISO 4210-2:2023, 4.11.

4.2.3 Front mudguard — Wheel blocking verification test

Press the front mudguard with a 20 mm diameter flat-ended tool radially towards the tyre with a force of 80 N. The pressure should be applied with the tool axis 20 mm from the bottom end of the mudguard (not taking the flap into consideration), as shown in Figure 3 (same setup for mudguards without stays).

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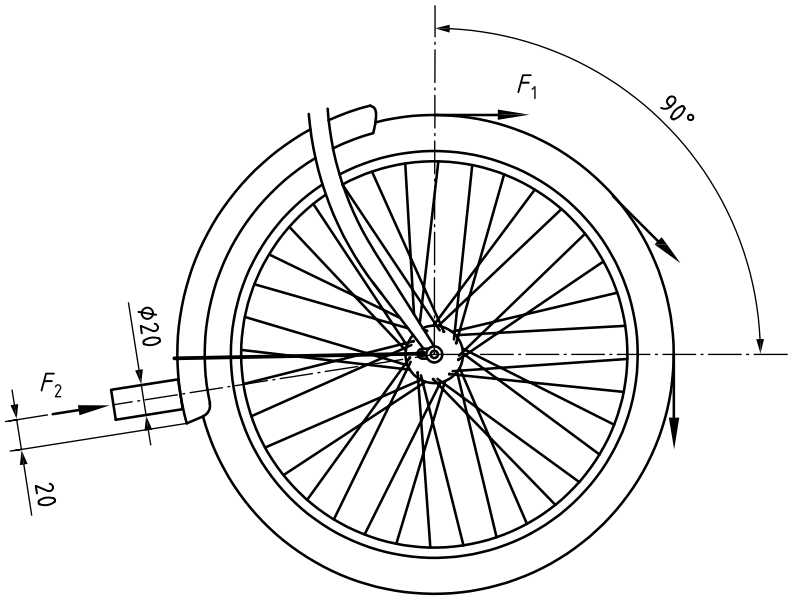
Dimensions in millimetres



Key

F_1 force, 100 N

F_2 force, 80 N

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Figure 3 — Front mudguard — Wheel blocking verification test

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While the force is maintained, apply a tangential force of 100 N for 90° of wheel rotation on the outer circumference of the wheel in the direction of forward movement of the bicycle and determine whether or not any damage to the front mudguard adversely affects wheel rotation (blocking of the wheel) or the steering.

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4.3 Road test on a fully assembled bicycle test methods

First, check and adjust, if necessary, each bicycle selected for the road test to ensure that the steering and wheels rotate freely without slackness and that brakes are correctly adjusted and do not impede wheel rotation. Check and adjust wheel alignment and, if necessary, inflate tyres to the maximum inflation pressure. Check and correct, if necessary, transmission-chain adjustment, and check any gear controls for correct and free operation.

Carefully adjust the saddle and handlebar positions to suit the rider.

The test shall be carried out with the permissible total mass specified by the manufacturer in ISO 4210-2:2023, Clause 5 item h). If a luggage carrier is fitted, it shall be loaded with the maximum load as indicated by the manufacturer. Ensure that the bicycle is ridden for at least 1 km.

NOTE 1 For structural integrity of a fully assembled bicycle, see Annex A.

NOTE 2 For steering flutter test, see Annex C.

4.4 Durability test of marking

Rub the marking by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked in petroleum spirit.

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