INTERNATIONAL STANDARD

ISO 4210-5

Second edition
2023-01

Cycles — Safety requirements for bicycles —

Part 5: Steering test methods

Cycles — Exigences de sécurité pour les bicyclettes —

Partie 5: Méthodes d'essai de la direction

Reference number
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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).

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

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 second edition cancels and replaces the first edition (ISO 4210-5:2014), which has been technically revised.

The main changes are as follows:

— improvement of 4.1.1;

— improvement of 4.3;

— improvement of 4.4;

— increase in test torque for 4.6;

— improvement of 4.9.

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.

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 this document 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 should be used on public roads, national regulations apply.

Cycles — Safety requirements for bicycles —

Part 5:
Steering test methods

1 Scope

This document specifies the steering 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 4210-3:2023, *Cycles — Safety requirements for bicycles — Part 3: Common test methods*

3 Terms and definitions

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/

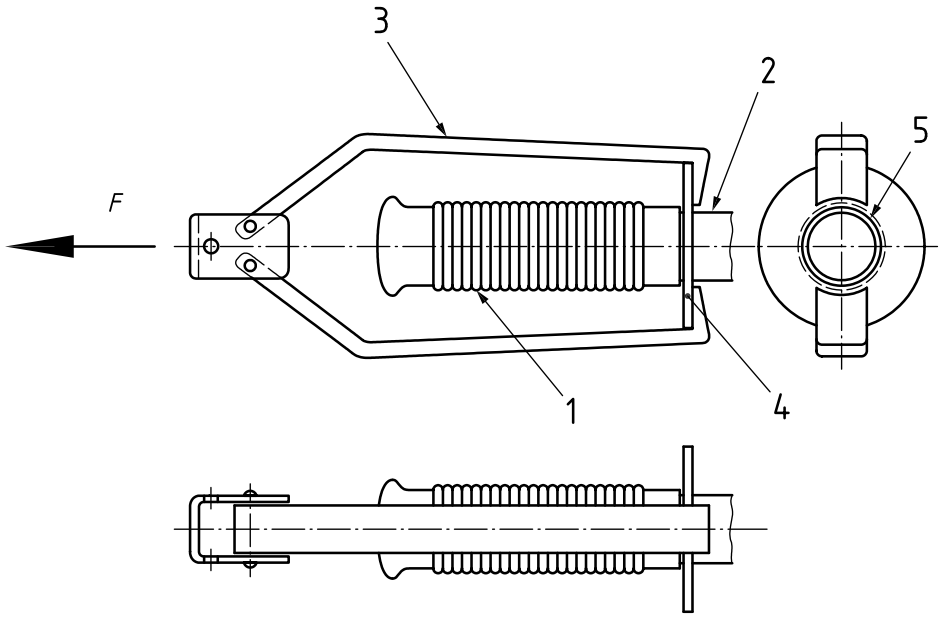
4 Test methods

4.1 Handlebar grips and plugs

4.1.1 Freezing test

Immerse the handlebar, with handlebar grips or plugs fitted, in water at room temperature for 1 h and then place the handlebar in a freezer until the handlebar is at a temperature lower than −5 °C. Remove the handlebar from the freezer and allow the temperature of the handlebar to reach −5 °C, and then apply a force of 70 N to the grip or plug in the loosening direction as shown in Figure 1. Maintain the force until the temperature of the handlebar has reached +5 °C. It shall be permitted to create a hole in the plug to allow for the testing fixture to be fitted so long as the hole does not affect the seat of the plug in the handlebar and the fixture does not contact the handlebar during the test.

Temperature is measured on the handlebar 3 cm from the grip towards the centre of the handlebar.



Key

1 handlebar grip
2 handlebar
3 drawing attachment
4 hooking ring
5 clearance
F force

NOTE The hooking ring can be divided.

Figure 1 — Example of handlebar grip drawing attachment

4.1.2 Hot water test

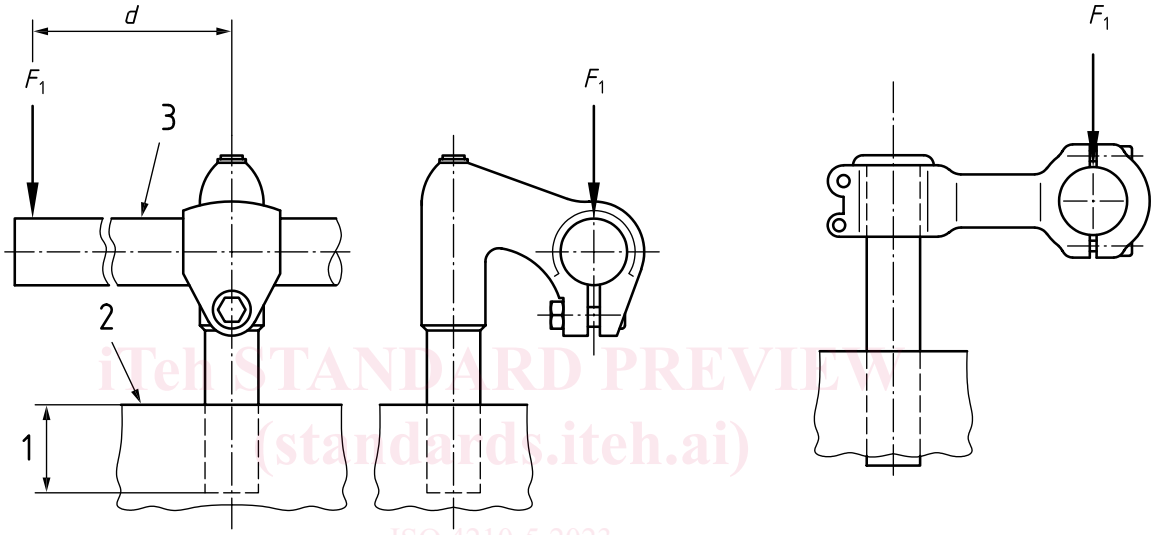
Immerse the handlebar, with handlebar grips fitted, in hot water of +60 °C ± 2 °C for 1 h. Remove the handlebar from the hot water, allow the handlebar to stabilize at ambient temperature for 30 min, and apply a force of 100 N to the grip in the loosening direction as shown in Figure 1. Maintain this force for 1 min.

4.2 Handlebar stem — Lateral bending test

For stems which have a quill for insertion into a fork steerer, clamp the quill securely in a fixture to the minimum insertion depth as specified in ISO 4210-2:2023, 4.7.3, or for stem extensions which clamp directly on to an extended fork steerer, attach the extension to a fork steerer according to the manufacturer's instructions and clamp this fork steerer securely in a fixture to the appropriate height. Assemble a straight test bar to the stem, and apply a force of F_1 at a distance of d laterally from the axis of the stem as shown in Table 1 and Figure 2. Maintain this force for 1 min.

Table 1 — Forces and distances on handlebars

Bicycle type	City and trekking bicycle	Young adult bicycle	Mountain bicycle	Racing bicycle
Force, F_1 N	600	600	1 000	1 000
Distance, d mm	300	300	300	230



a) Combined stem and quill **b) Stem extension**

Key

1 minimum insertion depth
2 clamping block
3 solid-steel bar
d distance
F_1 force

Figure 2 — Handlebar stem — Lateral bending test

4.3 Handlebar and stem assembly — Lateral bending test

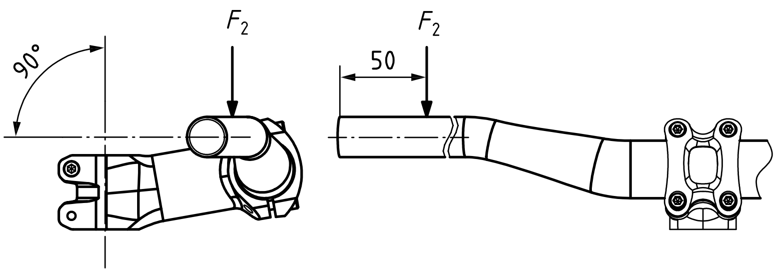
Assemble the handlebar and stem in accordance with the manufacturer's instructions. Align the grips portion of the handlebar in a plane perpendicular to the steerer axis [see Figure 3 a) or Figure 4 a)]. If perpendicular alignment is not achievable within the manufacturer's recommended range, then the alignment shall be as close as possible. If perpendicular alignment is achievable in multiple positions, or for stems with adjustable length or angle, fix the stem and handlebar in positions resulting in the maximum bending moment with respect to the steerer axis. For permanently connected handlebar and stem, e.g. by welding or brazing, install per manufacturer's instructions. For stems which have a quill for insertion into a fork steerer, clamp the quill securely in a fixture to the minimum insertion depth, or for stem extensions which clamp directly on to an extended fork steerer, attach the extension to a fork steerer according to the manufacturer's instructions and clamp this fork steerer securely in a fixture to the appropriate height. Apply a force of F_2 (see Table 2) at a distance of 50 mm from the free end of

the handlebar and parallel to the axis of the fork steerer as shown in Figure 3 or Figure 4. Maintain this force for 1 min.

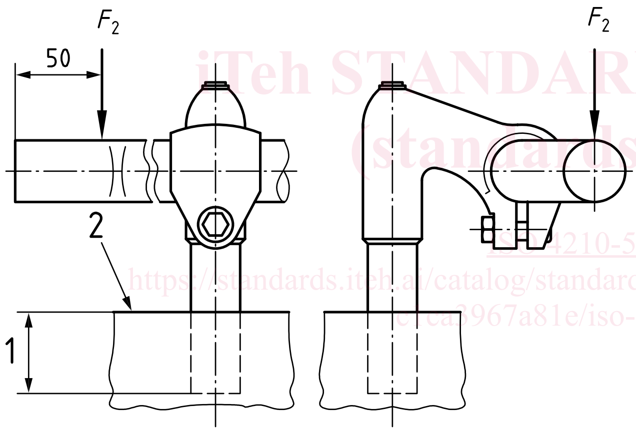
Table 2 — Forces on handlebars

Forces in newtons

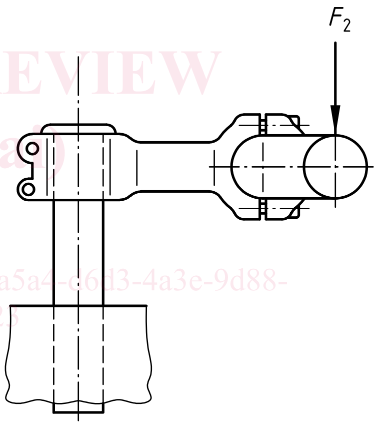
Bicycle type	City and trekking bicycle	Young adult bicycle	Mountain bicycle	Racing bicycle
Force, F_2	600	600	1 000	1 000



a) Orientation of adjustable handlebars



b) Combined stem and quill



c) Stem extension

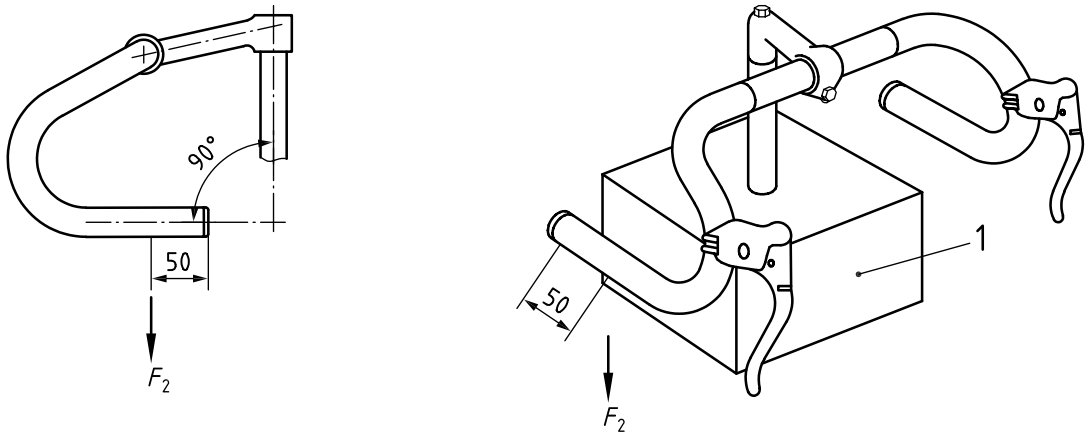
Key

1 minimum insertion depth

2 clamping block

F_2 force

Figure 3 — Handlebar and stem assembly — Lateral bending test



a) Orientation of adjustable handlebars

b) Position of applied forces

Key

1 clamping fixture

F_2 force

Figure 4 — Handlebar and stem assembly — Lateral bending test for drop handlebar

4.4 Handlebar stem — Forward bending test

4.4.1 Test method for stage 1

For stems which have a quill for insertion into a fork steerer, clamp the quill securely in a fixture to the minimum insertion depth, or for stem extensions which clamp directly on to an extended fork steerer, clamp the handlebar stem extension securely on to a suitable, solid-steel bar and clamp the bar in securely in a fixture, the projecting length of the bar not being critical.

Unless the handlebar and stem are permanently connected, e.g. by welding or brazing, assemble a test bar to the stem. The projecting length of the test bar is not critical.

Apply a force of F_3 through the handlebar in a forward and downward direction and at 45° to the axis of the quill or steel bar as shown in Figure 5 and maintain this force for 1 min. The forces are given in Table 3. Release the test force and measure any permanent deformation as specified in ISO 4210-2:2023, 4.7.6.3.2.

If the handlebar stem meets the requirement of ISO 4210-2:2023, 4.7.6.3.2, conduct stage 2 of the test.

Table 3 — Forces on stems

Forces in newtons

Bicycle type		City and trekking bicycle	Young adult bicycle	Mountain bicycle	Racing bicycle
Stage 1	Force, F_3	1 600	1 600	1 600	1 600
Stage 2	Force, F_4	2 000	2 000	2 600	2 300