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**Cycles — Safety requirements for  
bicycles —**

**Part 9:  
Saddles and seat-post test methods**

*Cycles — Exigences de sécurité pour les bicyclettes —*

*Partie 9: Méthodes d'essai des selles et des tiges de selles*

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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 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](http://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 4210-9:2014), which has been technically revised.

The main changes are as follows:

- improvement of [4.3.1](#);
- addition of [4.3.2](#);
- improvement of [4.4](#);
- addition of test condition for dropper/suspension dropper seat-post in [4.5](#);
- [4.5.3](#) has been changed to be only applicable if the seat-post is known to be constructed from composite materials;
- addition of [4.5.4](#).

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](http://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.

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# Cycles — Safety requirements for bicycles —

## Part 9: Saddles and seat-post test methods

### 1 Scope

This document specifies saddle and seat-post 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 General

If a suspension seat-post is involved, the test may be conducted with the suspension system either free to operate or locked. If it is locked, the pillar shall be at its maximum length.

#### 4.2 Saddle/seat-post — Security test

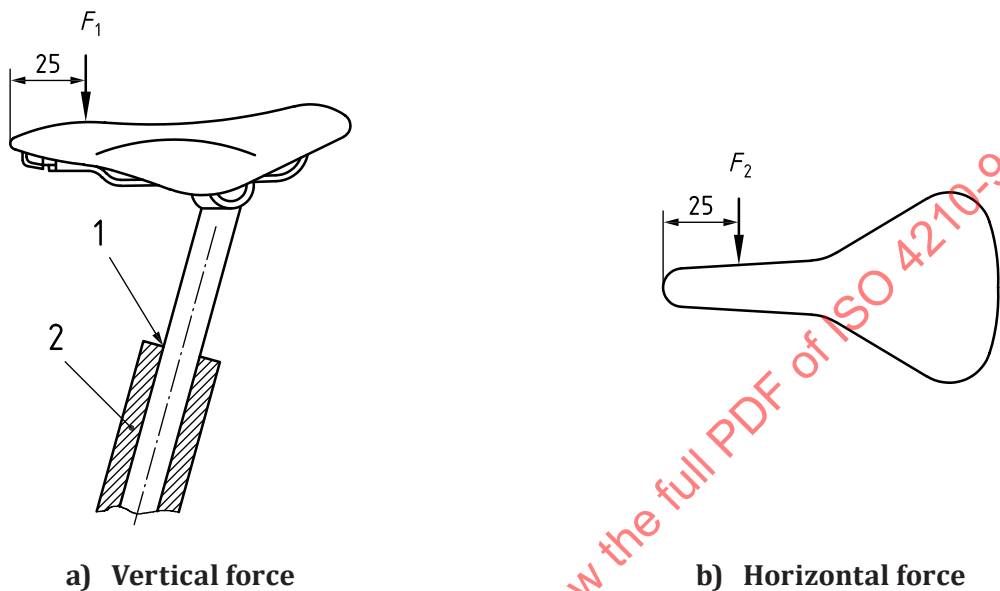
With the seat-post correctly assembled to the bicycle frame at minimum insertion depth of the seat-post, as specified in ISO 4210-2:2023, 4.15.2, and the clamps tightened to the torque recommended by the bicycle manufacturer, apply a force of  $F_1$  vertically downwards at a point 25 mm from either the front or rear of the saddle, whichever produces the greater torque on the saddle clamp. The saddle shall be positioned in the seat-post clamp assembly as defined by the saddle manufacturer's rail markings or instructions. Maintain this force for 1 min. Remove this force and apply a lateral force of  $F_2$  horizontally at a point 25 mm from either the front or rear of the saddle and maintain this force for 1 min, whichever produces the greater torque on the clamp (see [Figure 1](#)). The forces are given in [Table 1](#). The fixture shall be such that it does not damage the surface of the saddle.

Table 1 — Forces on saddle

Forces in newtons

Bicycle type	City and trekking bicycle	Young adult bicycle	Mountain bicycle	Racing bicycle
Vertical force, $F_1$	650	650	650	650
Horizontal force, $F_2$	250	250	250	250

Dimensions in millimetres



- Key**
- 1 minimum insertion-depth mark
  - 2 bicycle frame
  - $F_1$  vertical force
  - $F_2$  horizontal force

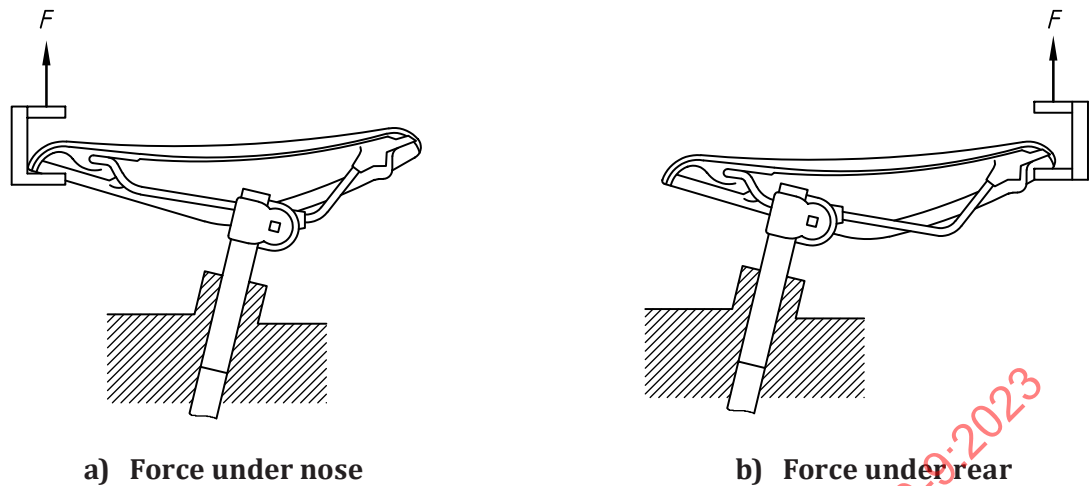
Figure 1 — Saddle/seat-post — Security test

4.3 Saddle and saddle rail — Static strength test

4.3.1 Saddle — Static strength test

Position the saddle in its maximum forward position [Figure 2 a)] for force under the nose loading, as defined by the saddle manufacturer’s rail markings or instructions, into a suitable fixture representative of a seat-post clamp assembly. For the force under the rear of the saddle loading [Figure 2 b)], position the saddle in its maximum rearward direction as defined by the saddle manufacturer’s rail markings or instructions, into a suitable fixture representative of a seat-post clamp assembly. Tighten the clamps to the torque recommended by the bicycle manufacturer, and apply forces of 400 N in turn under the rear and nose of the saddle cover, as shown in Figure 2, ensuring that the force is not applied to any part of the chassis of the saddle. The load application point shall be on the longitudinal plane of the saddle at 25 mm from the back (front) of the saddle. If the saddle design is such that it cannot accept a centreline load application, the load shall be symmetrically applied at two points of the saddle. Loading on the rear of the saddle shall be symmetrical about its longitudinal axis, as shown in Figure 3. The forces shall be maintained for 1 min in each position.

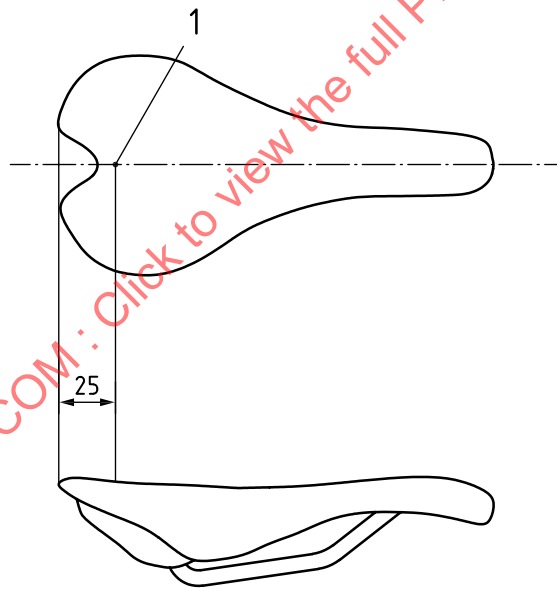


**Key**

$F$  force, 400 N

**Figure 2 — Saddle — Static strength test**

Dimensions in millimetres

**Key**

1 loading point

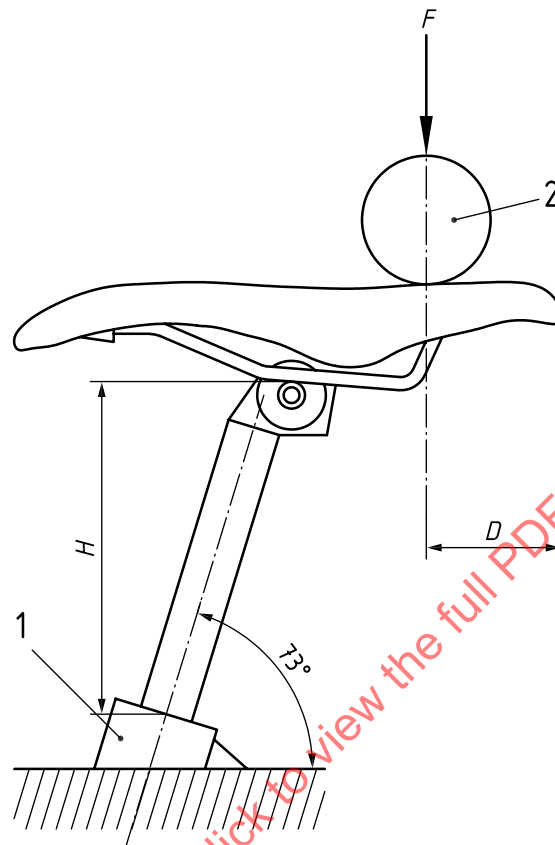
**Figure 3 — Saddle — Load application point of static strength test**

#### 4.3.2 Saddle rail (composite) — Static strength test

Insert the seat-post to  $H$ , where by the saddle rails (horizontal centre) are 75 mm from the insertion point or the minimum permitted by the seat-post designed into the fixture. The fixture shall be a rigid mount with its axis at  $73^\circ$  to the horizontal.

Adjust the saddle to have its upper surface in a horizontal plane and then position the saddle in its maximum rearward direction as defined by the saddle manufacturer's rail markings or instructions. Tighten the clamps to the maximum torque recommended by the bicycle manufacturer.

Apply a load of 1 200 N to the saddle at a point  $D = 50$  mm from the rear of the saddle on the longitudinal plane of the saddle. The load application shall be applied using a cylinder of 300 mm long  $\times$  80 mm diameter (Figure 4). Load the saddle until the load is met and then hold for a duration of one minute. If the saddle surface is without padding, it shall be acceptable to add 10 mm of rubber padding (50 shore A) to the cylindrical load head when conducting the static strength test.



#### Key

- 1 rigid mount
- 2 cylinder load head (length = 300 mm, diameter = 80 mm)
- $D$  load point from end of saddle, 50 mm
- $F$  load, 1 200 N
- $H$  seat-post height within fixture

Figure 4 — Composite saddle rail test

## 4.4 Saddle and seat-post assembly — Fatigue test

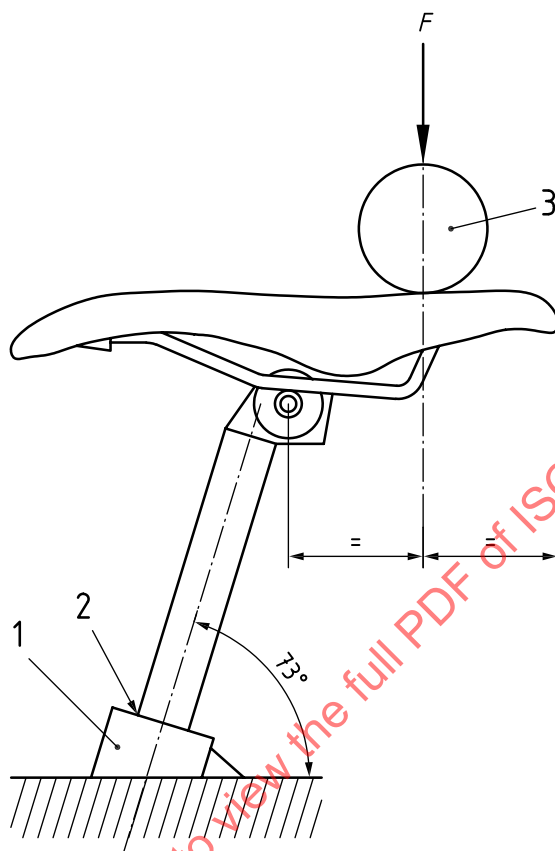
### 4.4.1 General

A saddle shall be tested in combination with a compatible seat-post or, in the case of a complete bicycle, with the seat-post supplied by the bicycle manufacturer.

### 4.4.2 Test method

Insert the seat-post to its minimum insertion depth, as specified in ISO 4210-2:2023, 4.15.2, in a rigid mount representative of that on the bicycle and with its axis at  $73^\circ$  to the horizontal. The saddle shall be positioned in the seat-post clamp assembly in a maximum rearward direction as defined by the saddle manufacturer's rail markings or instructions. Adjust the saddle to have its upper surface in a horizontal plane and tighten the clamp to the torque recommended by the bicycle manufacturer. Apply a repeated,

vertically-downward force of 1 000 N for 200 000 cycles, in the position shown in [Figure 5](#), by means of a pad 300 mm long  $\times$  80 mm diameter to prevent localized damage of the saddle cover. The maximum test frequency shall be maintained as specified in ISO 4210-3:2023, 4.5.



#### Key

- 1 rigid mount
- 2 minimum insertion-depth mark
- 3 pad (length = 300 mm, diameter = 80 mm)
- $F$  repeated, vertically-downward force, 1 000 N

**Figure 5 — Saddle and seat-post clamp fatigue test**

## 4.5 Seat-post — Fatigue test and static strength test

### 4.5.1 General

In the following test, if a suspension seat-post is involved, the test shall be conducted with the suspension system adjusted to give maximum resistance. If a dropper seat-post is involved, the duration of test shall be conducted at the maximum adjusted height.

### 4.5.2 Test method for stage 1 (fatigue test)

A seat-post shall be inserted to the minimum insertion depth (as specified in ISO 4210-2:2023, 4.15.2) in a suitable fixture with a representative seat collar and clamped to the manufacturer's recommended torque. The seat-post shall be fixed at an angle of 73° from horizontal, as shown in [Figure 7](#) (for seat-posts known to be constructed from composite materials) or in [Figure 6](#) (for all other seat-posts).

Secure an extension device (saddle dummy) to the saddle attachment point by the appropriate attachment fitting such that the saddle dummy extends rearwards horizontally to permit the

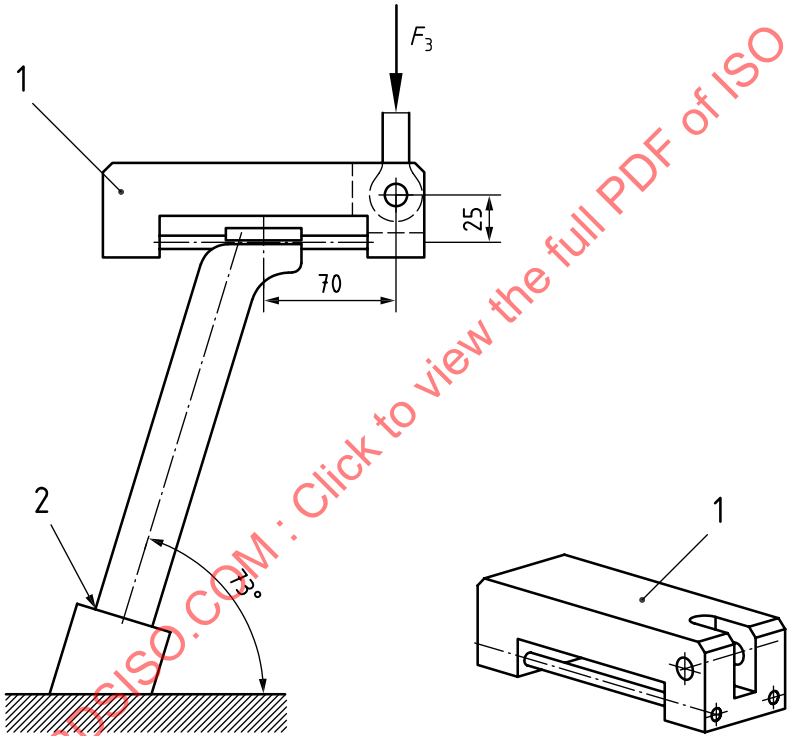
application of a vertical test force at a distance of 70 mm from the centre of the saddle clamp, as shown in [Figure 6](#) or [Figure 7](#).

Apply a repeated, vertically downward, dynamic force of  $F_3$  to the point described above and shown in [Figure 6](#) or [Figure 7](#) for 100 000 cycles. The forces are given in [Table 2](#). The maximum test frequency shall be maintained as specified in ISO 4210-3:2023, 4.5.

Table 2 — Forces on seat-post

Forces in newtons

Bicycle type	City and trekking bicycle	Young adult bicycle	Mountain bicycle		Racing bicycle
Force, $F_3$	1 000	1 000	Dropper/ Suspension Dropper	Rigid/ Suspension	1 200
			1 130	1 200	



- Key**
- 1 saddle dummy
  - 2 minimum insertion-depth mark
  - $F_3$  repeated, vertically downward, dynamic force

Figure 6 — Seat-post — Fatigue test