INTERNATIONAL STANDARD

**ISO 4210-7**

First edition
2014-07-01

# Cycles — Safety requirements for bicycles —

## Part 7: Wheels and rims test methods

*Cycles — Exigences de sécurité des bicyclettes —*

*Partie 7: Méthodes d'essai des roues et des jantes*

Reference number
ISO 4210-7:2014(E)



ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

# Contents

Page

# 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 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 4210-7, together with ISO 4210-1, ISO 4210-2, ISO 4210-3, ISO 4210-4, ISO 4210-5, ISO 4210-6, 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 rims 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.

# Cycles — Safety requirements for bicycles —

# Part 7:
# Wheels and rims test methods

## 1 Scope

This part of ISO 4210 specifies wheel and rim test methods for ISO 4210-2.

## 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 4210-2:2014, *Cycles — Safety requirements for bicycles — Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles*

ISO 4210-3:2014, *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.

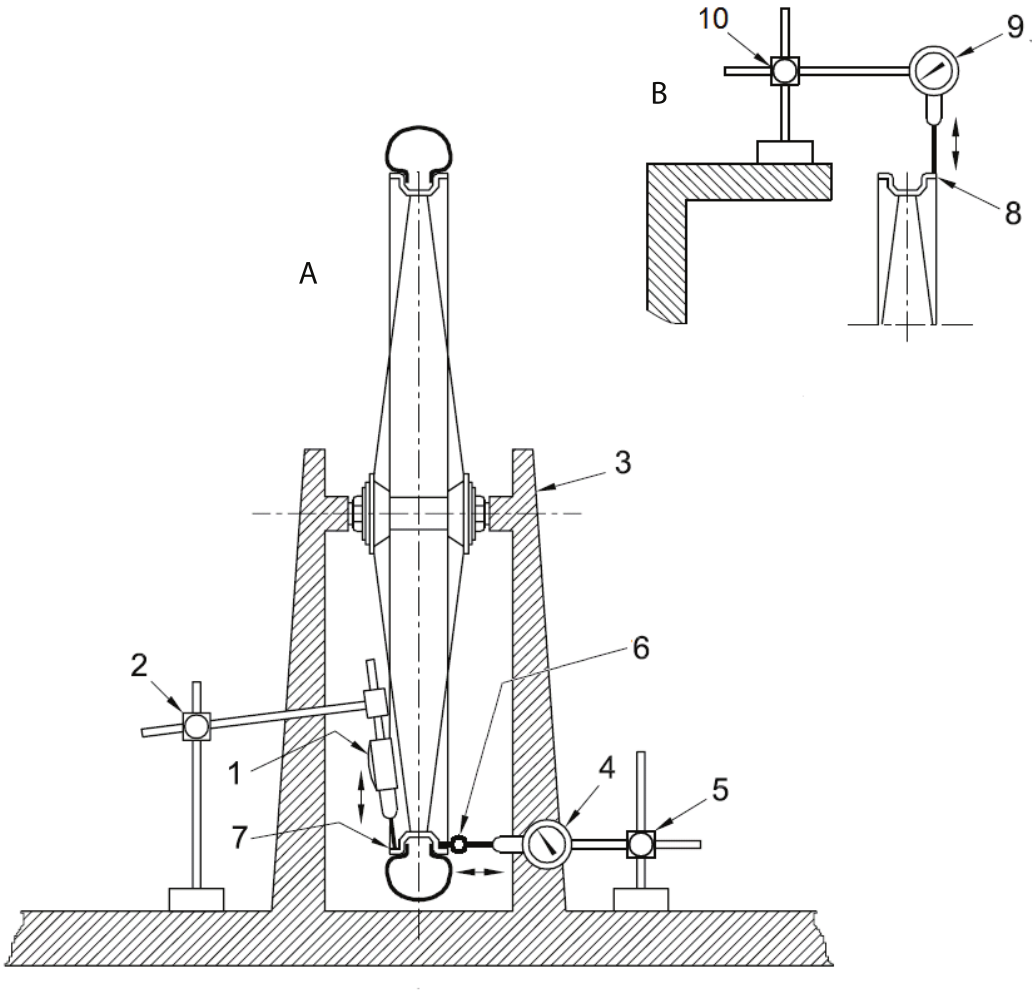
## 4 Test methods

### 4.1 Rotational accuracy

The run-out tolerances represent the maximum variation of the position of the rim when measured perpendicular to the axle at a suitable point along the rim (see Figure 1 and Figure 2) (i.e. full indicator reading) of a fully assembled and adjusted wheel during one complete revolution about the axle without axial movement. Both sides of the rim shall be measured and the maximum value shall be taken as result.

For city and trekking, mountain, and young adult bicycles, the measurement of both axial run-out (lateral) and radial run-out (concentricity) shall be done with a tyre fitted and inflated to the maximum inflation pressure, but for rims where concentricity cannot be measured with the tyre fitted, it is permissible to make measurements with the tyre removed.

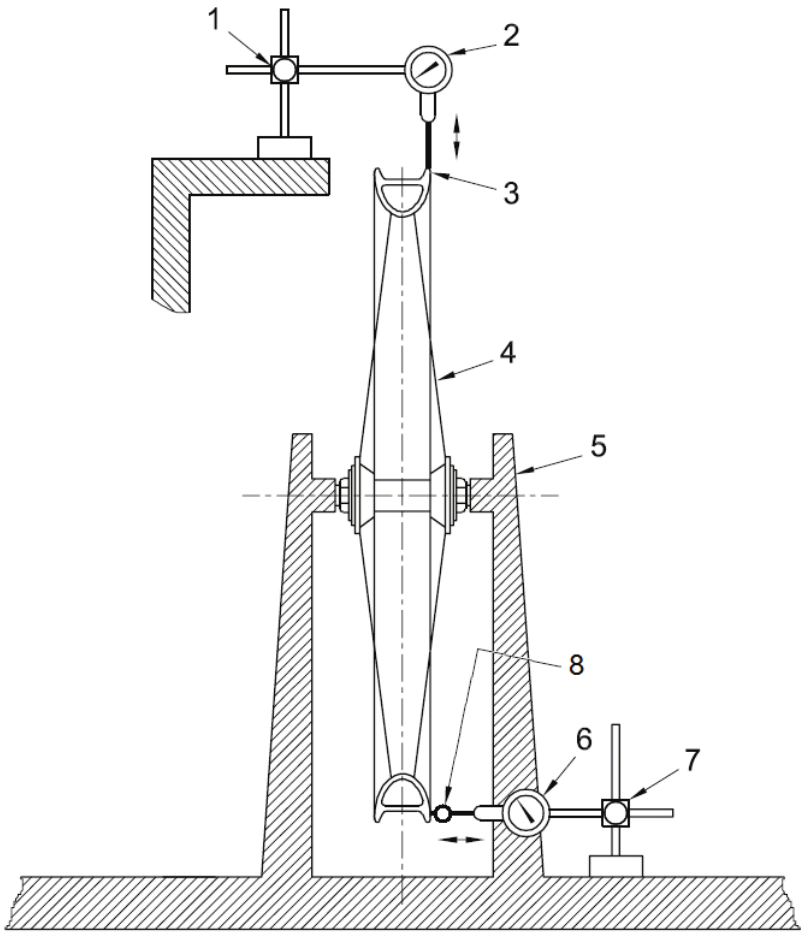
For racing bicycles, the measurement of both axial run-out (lateral) and radial run-out (concentricity) shall be measured at the same time as shown in Figure 2 and a tyre is not required to be fitted.




**Key**

| | | | |
|---|---|---|---|
| A | rim with tyre | 5 | instrument stand |
| B | rim without tyre | 6 | roller indicator |
| 1 | dial-gauge (concentricity) | 7 | rim with tyre |
| 2 | instrument stand | 8 | rim without tyre |
| 3 | hub axle support | 9 | dial-gauge (concentricity; alternative positions) |
| 4 | dial-gauge (lateral run-out) | 10 | instrument stand |

**Figure 1 — Wheels/tyre assembly— Rotational accuracy for city and trekking, young adult, and mountain bicycles**




**Key**

| | | | |
|---|---|---|---|
| 1 | instrument stand | 5 | hub axle support |
| 2 | dial-gauge (concentricity) | 6 | dial-gauge (lateral run-out) |
| 3 | rim | 7 | instrument stand |
| 4 | spoke | 8 | roller indicator |

**Figure 2 — Wheel — Rotational accuracy for racing bicycles**

## 4.2 Wheel/tyre assembly — Static strength test — Test method

Clamp and support the wheel suitably as shown in Figure 3. Apply a pre-load of 5 N on the rim at one spoke perpendicular to the plane of the wheel as shown in Figure 3. Record the zero position of the rim at the point of load application as shown. Then apply a static force of $F$ given in Table 1 for a duration of 1 min. Reduce the load to 5 N and allow a 1 min settling time. After this settling time and with the 5 N load still applied, re-measure the position of the rim.

The wheel shall be fitted with the appropriate size tyre and inflated to the maximum inflation pressure.

In the case of a rear wheel, apply the force from the sprocket side of the wheel as shown in Figure 3.

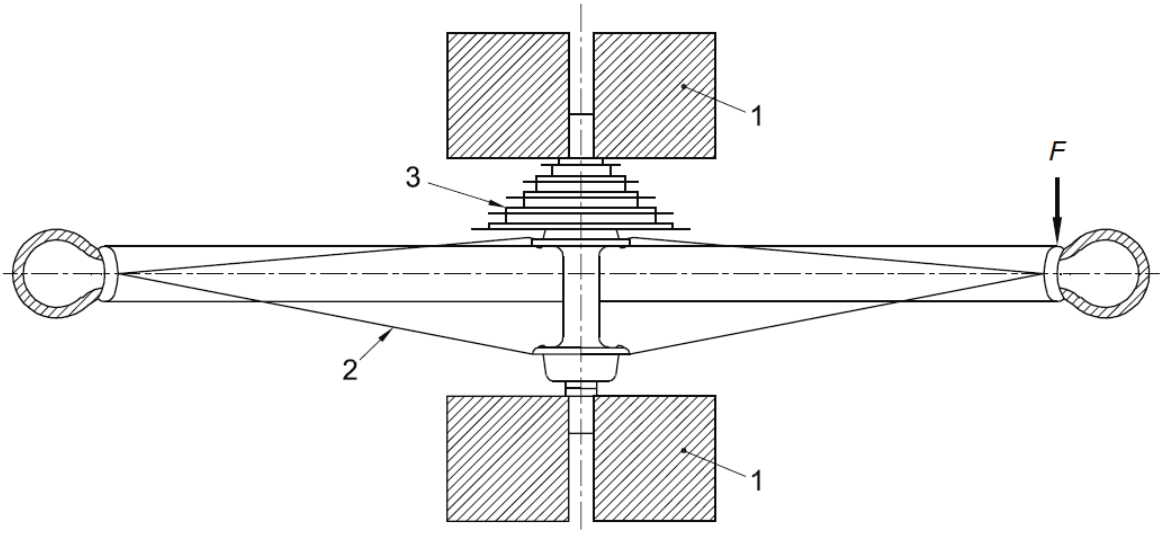
Repeat the above measurement once between two spokes.

See Annex A for fatigue testing.

**Table 1 — Forces on rim**

Forces in newtons

| Bicycle type | City and trekking bicycles | Young adult bicycles | Mountain bicycles | Racing bicycles |
|---|---|---|---|---|
| Force *F* | 250 | 250 | 370 | 250 |




**Key**

1 clamping fixture
2 wheel/tyre assembly
3 drive sprockets

**Figure 3 — Wheel/tyre assembly— Static strength test**

## 4.3 Wheels — Front/rear wheel retention devices secured — Test method

Apply a force of 2 300 N distributed symmetrically to both ends of the axle for a period of 1 min in the direction of the removal of the front and rear wheel independently.

## 4.4 Greenhouse effect test for composite wheels — Test method

A fully assembled wheel, fitted with the appropriate size tyre and inflated according to the lower value between maximum inflation pressure recommended on the rim or the tyre, shall be controlled before the test; lateral run-out has to be controlled according to ISO 4210-2:2014, 4.10.1 and maximum widths of the rim have to be reported.

A specific bench as shown in Figure 5 could be used to measure the maximum width all around the rim with tyre and pressure (continuous measuring).

The wheel is laid down on the ground of a climate chamber, which has been pre-heated at 80 °C, leant on axle and tyre support points, sprocket side of the wheel, as shown in Figure 4, during 4 h. At the end of 4 h, the wheel should be taken out of the climate chamber and allowed to cool down at room temperature during 4 h to re-measuring the rim width and its conformance to ISO 4210-2:2014, 4.11.6.1 and 4.11.6.2.

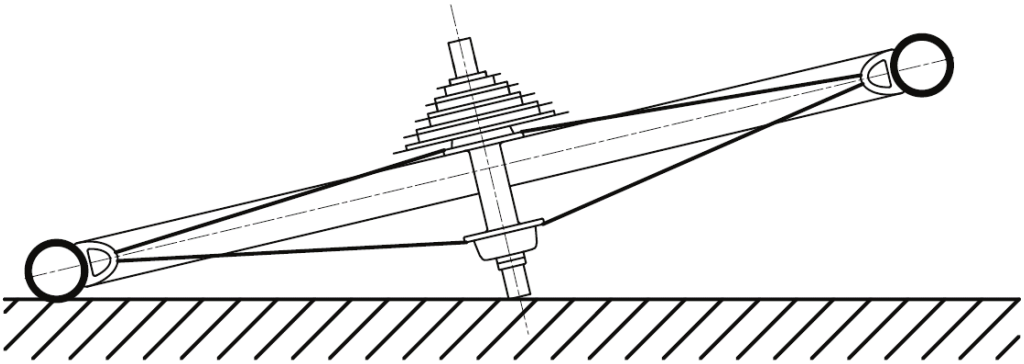


**Figure 4 — Wheel laid down on tire and axle**

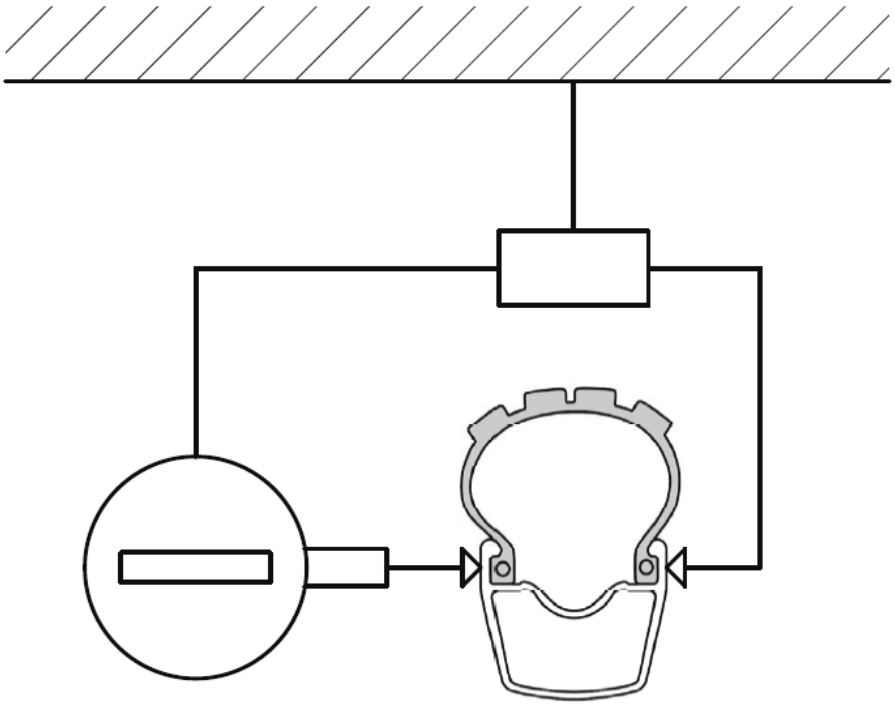


**Figure 5 — Maximum rim's width measuring**

# Annex A
(informative)

# Wheel/tyre assembly — Fatigue test

## A.1 Wheel/tyre assembly — Fatigue test for city and trekking bicycles

### A.1.1 Requirements

When tested by the method described in A.1.2, there should be no fractures, detachments, or visible cracks in any part of the wheel, no loss of air pressure in the tyre due to damage from the wheel to the tyre or the inner tube (when fitted), and the undamaged tyre should remain on the rim.

### A.1.2 Test method

Assemble the wheel, tyre, and inner tube (when fitted) and inflate the tyre to 90 % of the maximum inflation pressure.

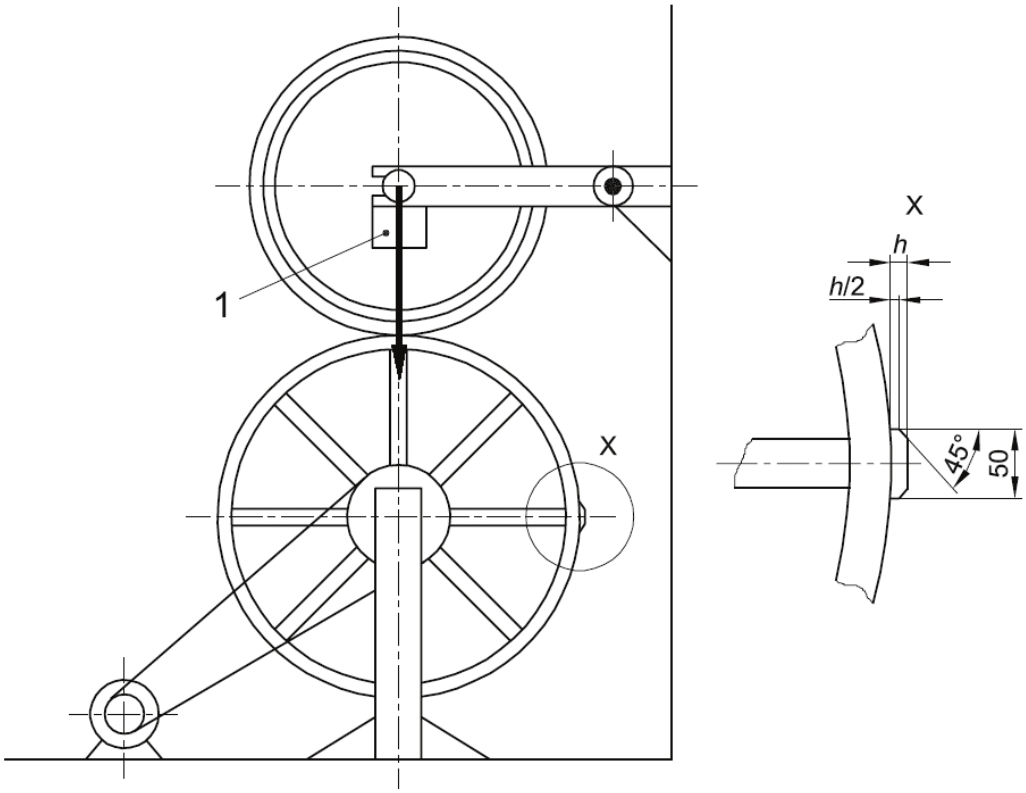
Mount the wheel/tyre assembly free to rotate on its axle, and free to move in a vertical direction. Load the wheel assembly by means of dead weights against a drum equipped with equally spaced, transverse, metallic slats such that the radial force applied to the wheel/tyre assembly is 640 N. The wheel and drum axes shall be vertically aligned.

An example of a test arrangement is shown in Figure A.1, in which the wheel axle is fixed between the free ends of a pair of pivoted arms that extend horizontally with the tyre contacting the drum between the slats.

The diameter of the drum shall be in the range of 500 mm to 1 000 mm, and the slats shall have a width of 50 mm ± 2,5 mm, a thickness of 10 mm ± 0,25 mm, and 45° chamfered edges of half their thickness. The circumferential spacing between the centrelines of two consecutive slats shall be not less than 400 mm.

Rotate the drum to give a linear surface speed of 25 km/h (±10 %) for a period to provide 750 000 impacts between the tyre and the slats.

Dimensions in millimetres




**Key**

1 total force on the axle, 640 N

*h* height of slats

**Figure A.1 — Wheel/tyre assembly— Fatigue test**

**ICS 43.150**

Price based on 7 pages