भारतीय मानक

Indian Standard

IS 15533 : 2024
ISO 8098 : 2023

साइकिल — छोटे बच्चों की साइकिल के लिए सुरक्षा अपेक्षाएँ

(दूसरा पुनरीक्षण)

Cycles — Safety Requirements for Bicycles for Young Children

(Second Revision)

ICS 43.150; 97.190

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NATIONAL FOREWORD

This Indian Standard (Second Revision) which is identical to ISO 8098 : 2023 'Cycles — Safety requirements for bicycles for young children' issued by International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards, after the draft finalized by the Bicycles Sectional Committee had been approved by Transport Engineering Division Council.

This standard was first published in 2004 which was identical to ISO 8098 : 2002 'Cycles — Safety requirements for bicycles for young children (*first revision*)' and was subsequently revised in 2018 to align with revised ISO 8098 : 2014 'Cycles — Safety requirements for bicycles for young children'. This revision has been brought out to align it with the latest version of ISO 8098 : 2023.

The text of ISO standard is proposed for publication as an Indian Standard without deviations. Certain terminologies and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated. For undated references, the latest edition of the referenced document applies, including any corrigenda and amendment.

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 1101 Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out	IS 8000 (Part 1) : 2019/ISO 1101 : 2017 Geometrical product specifications (GPS) — Geometrical tolerancing: Part 1 Tolerances of form, orientation, location and run-out (*second revision*)	Identical
ISO 6742-2 Cycles — Lighting and retro-reflective devices — Part 2: Retro-reflective devices	IS/ISO 6742-2 : 2015 Cycles — Lighting and retro-reflective devices: Part 2 Retro-reflective devices (*first revision*)	Identical
ISO 8124-1 : 2018 Safety of toys — Part 1: Safety aspects related to mechanical and physical properties	IS 9873 (Part 1) : 2019/ISO 8124-1 : 2018 Safety of toys: Part 1 Safety aspects related to mechanical and physical properties (*fourth revision*)	Identical
ISO 11243 Cycles — Luggage carriers for bicycles — Requirements and test methods	IS 14363 : 2018/ISO 11243 : 2016 Cycles — Luggage carriers for bicycles — Requirements and test methods (*second revision*)	Identical

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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 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 standardization of components.

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

For safety requirements for toy bicycles intended for very young children see national regulations and standards.

Indian Standard

CYCLES — SAFETY REQUIREMENTS FOR BICYCLES FOR YOUNG CHILDREN

(Second Revision)

1 Scope

This document specifies safety and performance requirements and test methods for the design, assembly and testing of fully assembled bicycles and sub-assemblies for young children. It also provides guidelines for instructions on the use and care of the bicycles.

This document is applicable to bicycles with a maximum saddle height of more than 435 mm and less than 635 mm, propelled by a transmitted drive to the rear wheel.

It is not applicable to special bicycles intended for performing stunts (e.g. BMX bicycles).

NOTE For bicycles with a maximum saddle height of 435 mm or less, see national regulations for ride-on toys, and with a maximum saddle height of 635 mm or more, see ISO 4210-1 to ISO 4210-9[5]-[13].

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 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 6742-2, *Cycles — Lighting and retro-reflective devices — Part 2: Retro-reflective devices*

ISO 8124-1:2018, *Safety of toys — Part 1: Safety aspects related to mechanical and physical properties*

ISO 11243, *Cycles — Luggage carriers for bicycles — Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/

3.1
bicycle
two-wheeled vehicle that is propelled solely or mainly by the muscular energy of the person on that vehicle, in particular by means of pedals

[SOURCE: ISO 4210-1:2023, 3.1.1]

3.2
brake-lever
lever that operates a braking device

[SOURCE: ISO 4210-1:2023, 3.4.2]

3.3
conventional brake-lever
brake-lever (3.2) with a rotational axis perpendicular to the handlebar

3.4
parallel brake-lever
brake-lever (3.2) with rotational axis parallel to the handlebar

3.5
braking force
tangential rearward force between the tyre and the ground or the tyre and the drum or belt of the test machine

[SOURCE: ISO 4210-1:2023, 3.4.4]

3.6
crank assembly
assembly consisting of the drive side and the non-drive side crank arm the bottom-bracket spindle or crank spindle, and all component of the drive system that are affixed to the crankset

[SOURCE: ISO 4210-1:2023, 3.8.2, modified — EXAMPLE has been removed.]

3.7
exposed protrusion
protrusion which through its location and rigidity could present a hazard to the rider either through heavy contact with it in normal use or should the rider fall onto it in an accident

[SOURCE: ISO 4210-1:2023, 3.2.3]

3.8
fracture
unintentional separation into two or more parts

[SOURCE: ISO 4210-1:2023, 3.2.4]

3.9
highest gear
gear ratio which gives the greatest distance travelled for one rotation of the cranks

[SOURCE: ISO 4210-1:2023, 3.8.4]

3.10
lowest gear
gear ratio which gives the shortest distance travelled for one rotation of the cranks

[SOURCE: ISO 4210-1:2023, 3.8.5]

3.11
maximum inflation pressure
maximum tyre pressure recommended by the tyre or rim manufacturer for a safe and efficient performance, and if the maximum rim pressure was marked on both the tyre and rim, maximum tyre pressure according to the lower marked maximum inflation pressure on the rim or tyre

[SOURCE: ISO 4210-1:2023, 3.7.3, modified — Note 1 to entry has been removed.]

3.12
maximum saddle height
vertical distance from the ground to the point where the top of the seat surface is intersected by the seat-post axis, measured with the seat in a horizontal position and with the seat-post set to the minimum insertion-depth mark

[SOURCE: ISO 4210-1:2023, 3.2.6]

3.13
tread surface
surface of a pedal that is presented to the underside of the foot

[SOURCE: ISO 4210-1:2023, 3.8.6]

3.14
quick-release devices
lever actuated mechanism that connects, retains, or secures a wheel or any other component

[SOURCE: ISO 4210-1:2023, 3.2.8]

3.15
stabilizers
removable auxiliary wheels fitted to enable the rider to balance

3.16
toe-clip
device attached to the pedal to grip the toe end of the rider's shoe but permitting withdrawal of the shoe

[SOURCE: ISO 4210-1:2023, 3.8.8]

3.17
toe-strap
device to securely locate a rider's shoe on a pedal

3.18
visible crack
crack which results from a test where that crack is visible to the naked eye

[SOURCE: ISO 4210-1:2023, 3.2.11]

3.19
wheel and tyre assembly
assembled wheel fitted with tyre and wheel include all necessary parts for its intended use

[SOURCE: ISO 4210-1:2023, 3.7.7]

4 Requirements and test methods

4.1 Brake tests and strength tests — Special requirements

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 4.7.2.3 to 4.7.8.4 inclusive.

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 4.8 to 4.13 inclusive and 4.15.

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

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.

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.

It is permitted to carry out tests with dummy assemblies such as a fork or handlebar when carrying out frame or handlebar stem tests.

4.1.4 Tolerances

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

— Forces and torques: 0/+5 %

— Masses and weights: ±1 %

— Dimensions: ±1 mm

— Angles: ±1°

— Time duration: ±5 s

— Temperatures: ±2 °C

— Pressures: ±5 %

4.1.5 Fatigue test

The force for fatigue tests shall be applied and released progressively, and not exceed 10 Hz. The tightness of fasteners according to manufacturer's recommended torque can be re-checked not later than 1 000 test cycles to allow for the initial settling of the component assembly. (This is considered applicable to all components, where fasteners are present for clamping.) The test bench shall be qualified to meet dynamic requirements of 4.1.4.

NOTE Examples of suitable methods are listed in Reference [14].

4.1.6 Plastic material test ambient temperature

All strength tests involving any plastic materials shall be pre-conditioned for two hours and tested at an ambient temperature of 23 °C ± 5 °C.

4.1.7 Impact test

For all vertical impact test, the striker shall be guided in such a way that the efficiency will allow a value of at least 95 % of the free velocity.

NOTE See Annex B.

4.2 Toxicity

Any items which come into intimate contact with the rider (i.e. causing any hazard due to sucking or licking) shall comply with national regulations specific to children's products.

4.3 Sharp edges

Exposed edges that could come into contact with the rider's hands, legs etc., during normal riding or normal handling and normal maintenance shall not be sharp, e.g. deburred, broken, rolled or processed with comparable techniques.

4.4 Security and strength of safety-related fasteners

4.4.1 Security of screws

Any screws used in the assembly of suspension systems, bracket attached electric generators, brake-mechanisms and mud-guards to the frame or fork, shall be provided with suitable locking devices to prevent unintentional loosening, e.g. lock-washers, lock-nuts, thread locking compound or stiff nuts. Screws used to attach hub-generator are not included.

Fasteners used to assemble hub and disc brakes should have heat-resistant locking devices.

4.4.2 Minimum failure torque

The minimum failure torque of bolted joints for the fastening of handlebars, handlebar-stems, bar-ends, saddles and seat-posts shall be at least 20 % greater than the manufacturer's maximum recommended tightening torque.

4.4.3 Quick-release devices

Quick-release devices shall not be fitted. This requirement does not apply to the seat-tube clamp.

4.4.4 Foot location devices

Toe-straps and toe-clips shall not be fitted.

4.4.5 Folding bicycle mechanism

If folding bicycles mechanism is provided, it shall be designed so that the bicycle can be locked for use in a simple, stable, safe way and when folded no damage shall occur to any cables. No locking mechanism shall contact the wheels or tyres during riding, and it shall be impossible to unintentionally loosen or unlock the folding mechanisms during riding.

4.5 Crack detection methods

Standardised methods should be used to emphasize the presence of cracks where visible cracks are specified as criteria of failure in tests specified in this document.

NOTE For example, suitable dye-penetrant methods are specified in ISO 3452-1 to ISO 3452-4[1][2][3][4].

4.6 Exposed protrusions

These requirements are intended to address the hazards associated with the users of bicycles falling on projections or rigid components (e.g. handlebars, levers) on a bicycle possibly causing internal injury or skin puncture.

Tubes and rigid components in the form of projections which constitute a puncture hazard to the user should be protected. The size and shape of the end protection has not been stipulated, but an adequate shape shall be given to avoid puncturing of the body. Screw threads which constitute a puncture hazard shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.

4.7 Brakes

4.7.1 Braking-systems

Bicycles, whether or not fitted with a fixed transmitted drive, shall be equipped with at least two independently actuated braking systems, one system operating on the front wheel and one on the rear. The decision on whether the rear braking system is operated by the rider's hand or foot should be made in accordance with the legislation, custom or preference of the country to which the bicycle has to be supplied.

Brake-blocks containing asbestos shall not be permitted.

4.7.2 Hand-operated brakes

4.7.2.1 Brake-lever position

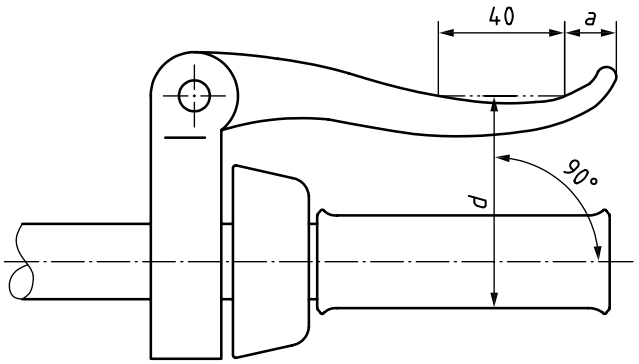
The brake-levers for front and rear brakes shall be positioned according to the legislation or custom and practice of the country in which the bicycle is to be sold, and the bicycle manufacturer shall state in the users instruction manual which lever operates the front brake and which operates the rear brake, see also Clause 5 b).

4.7.2.2 Brake-lever grip dimensions

4.7.2.2.1 Requirement

The maximum grip dimension, *d*, measured between the outer surfaces of the brake-lever and the handlebar, or the handlebar-grip or any other covering where present, shall not exceed 75 mm over a distance of 40 mm as shown in Figure 1. For dimension *a*, see 4.7.2.2.2.

The brake-lever may be adjusted to permit these dimensions to be obtained.



Key

a distance between the last part of the lever intended for contact with the rider's fingers and the end of the lever

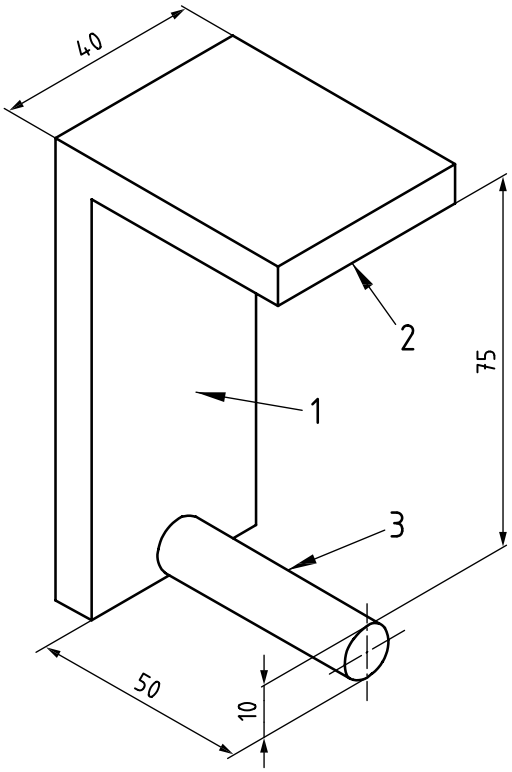
d brake-lever grip dimension - non activated

Figure 1 — Brake-lever grip dimensions

4.7.2.2.2 Test method

Fit the gauge illustrated in Figure 2 over the handlebar and handlebar-grip and the brake-lever as shown in Figure 3 so that the face A is in contact with the handlebar grip and the side of the brake-lever. Ensure that the face B is in uninterrupted contact with the part of the brake-lever which is intended for contact with the rider's fingers and that the gauge does not cause any movement of the brake-lever towards the handlebar or handlebar-grip. Measure the distance *a*, the distance between the last part of the lever intended for contact with the rider's fingers and the end of the lever (see 4.7.2.2.1 and 4.7.2.3).

Dimension in millimetres



Key

1 face A
2 face B
3 rod

Figure 2 — Brake-lever grip dimension gauge

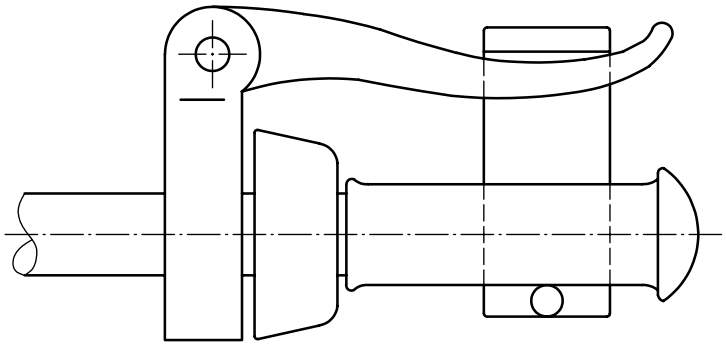
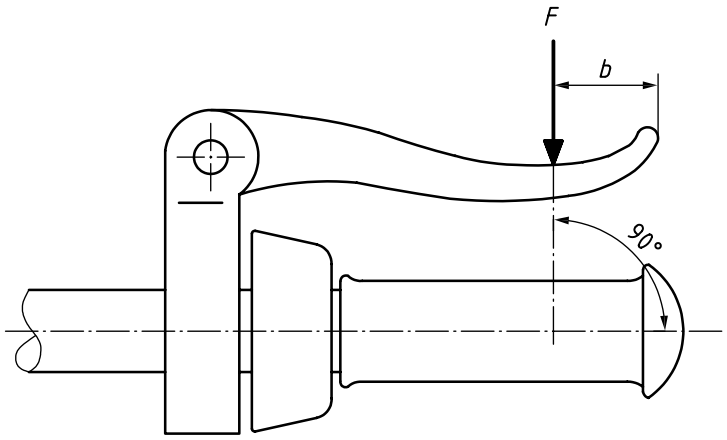


Figure 3 — Method of fitting the gauge to the brake-lever and handlebar

4.7.2.3 Brake-levers — Position of applied force

4.7.2.3.1 Conventional brake-lever

For the purposes of all braking tests in this document, the test force shall be applied at a distance, *b*, which is equal to either dimension *a* as determined in 4.7.2.2.2 or 25 mm from the free end of the brake-lever, whichever is the greater (see Figure 4).



Key

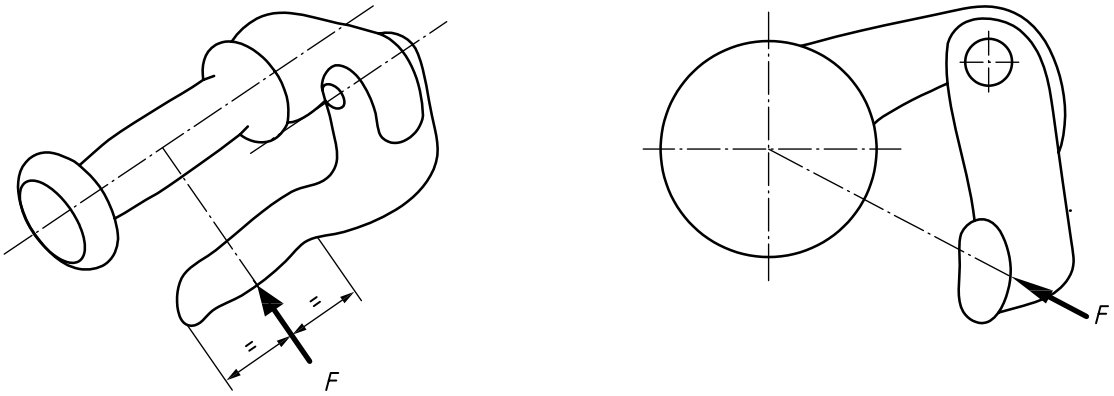
F applied force

b ≥25 mm

Figure 4 — Position of applied force on brake-lever

4.7.2.3.2 Parallel brake-lever

For the purposes of all braking tests in this document, the test force shall be applied at mid-distance of the lever grip length (see Figure 5).



a) Isometric view **b) Lateral view**

Key

F applied force

Figure 5 — Position of applied force on parallel brake-lever

4.7.3 Attachment of brake assembly and cable requirements

Cable pinch-bolts shall not sever any of the cable strands when assembled to the manufacturer's instructions. In the event of a cable failing, no part of the brake mechanism shall inadvertently inhibit the rotation of the wheel.

The cable end shall either be protected with a cap that shall withstand a removal force of 20 N or be otherwise treated to prevent unravelling.

NOTE See 4.4 in relation to fasteners.

4.7.4 Brake-block and brake-pad assemblies — Security test

4.7.4.1 Requirement

The friction material shall be securely attached to the holder, backing-plate, or shoe and there shall be no failure of the assembly when tested by the method specified in 4.7.4.2. The brake system shall be capable of meeting the strength test specified in 4.7.7 and the braking performance specified in 4.7.8.

4.7.4.2 Test method

Conduct the test on a fully assembled bicycle with the brakes adjusted to a correct position with a rider or equivalent mass on the saddle. The combined mass of the bicycle and rider (or equivalent mass) shall be 30 kg.

Actuate each brake-lever with a force of 130 N applied at the point as specified in 4.7.2.3 or a force sufficient to bring the brake-lever into contact with the handlebar grip, whichever is the lesser. Maintain this force while subjecting the bicycle to five forward and five rearward movements, each of which is not less than 75 mm distance.

4.7.5 Brake adjustment

Each brake shall be capable of adjustment with or without the use of a tool to an efficient operating position until the friction material has worn to the point of requiring replacement as recommended in the manufacturer's instructions.

Also, when correctly adjusted, the friction material shall not contact anything other than the intended braking surface.

If brake adjustment can be achieved without the use of a tool, the adjuster shall be designed to prevent for incorrect use or incorrect operation.

4.7.6 Back-pedal brake

Back-pedal brakes shall be actuated by the rider's foot pedalling in the opposite direction to the drive force. The brake mechanism shall function independently of any drive gear positions or adjustments. The differential between the drive and brake positions of the crank shall not exceed 60°.

The measurement shall be taken with the crank held against each position with a pedal force of at least 140 N. The force shall be maintained for 1 min in each position.

4.7.7 Braking-system — Strength tests

4.7.7.1 Hand-operated brake — Requirement

When tested by the method described in 4.7.7.2, there shall be no failure of the braking-system or of any component thereof.

4.7.7.2 Hand-operated brake — Test method

Conduct the test on a fully assembled bicycle. After it has been ensured that the braking system is adjusted according to the recommendations in the manufacturer's instructions, apply a force at the point specified in 4.7.2.3 and normal to the axis of handlebar in the grip area in the plane of travel of the lever, as shown in Figure 4 and Figure 5. The force shall be 300 N, or a lesser force required to bring:

a) a cable-brake lever into contact with the handlebar grip or the handlebar where the manufacturer does not fit a grip, or

b) a rod-operated brake lever level with the upper handlebar grip surface.

Repeat the test for a total of 10 times on each brake-lever.

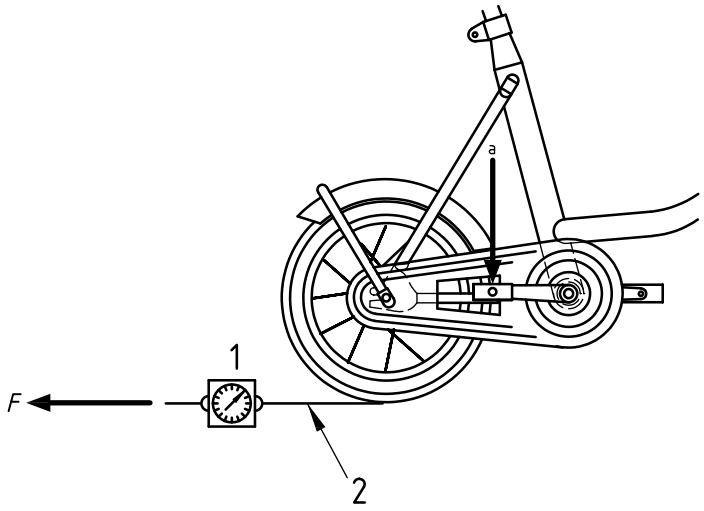
4.7.7.3 Back-pedal brake — Requirement

When tested by the method described in 4.7.7.4, there shall be no failure of the back pedal braking system or any component thereof.

4.7.7.4 Back-pedal brake — Test method

Conduct this test on a fully assembled bicycle. Ensure that the braking system is adjusted according to the recommendations in the manufacturer's instructions, and that a pedal crank is in a horizontal position (see Figure 6). Gradually apply a vertical force of 600 N to the centre of the pedal axe, and maintain for 1 min.

Repeat the test 5 times.



Key

1 force measuring device

2 suitable webbing wrapped around wheel and tyre assembly circumference

F applied force on wheel and tyre assembly (braking force)

a Direction of applied force on pedal (see 4.7.7.4 and 4.7.8.4).

Figure 6 — Measurement of braking force from back-pedal brake

4.7.8 Braking performance

4.7.8.1 Hand-operated brake performance test — Requirement

When tested in accordance with 4.7.8.2, the average braking force of hand operated braking systems shall increase progressively as the lever force is increased in steps of 10 N from 40 N to 80 N.

For front brakes, with the appropriate lever forces, the minimum and maximum braking forces shall conform to Table 1.

For rear brakes, with the appropriate lever forces, the minimum braking forces shall conform to Table 1.

Table 1 — Brake lever input forces and braking forces at the tyre

Brake lever input force N	Braking force at the tyre N	
	min.	max. (front brake only)
40	40	100
60	50	140
80	60	180

4.7.8.2 Hand-operated brake performance test — Test method

Conduct the hand-operated brake performance test on a bicycle fully assembled, and with the brake correctly adjusted (the saddle and seat-post may be removed).

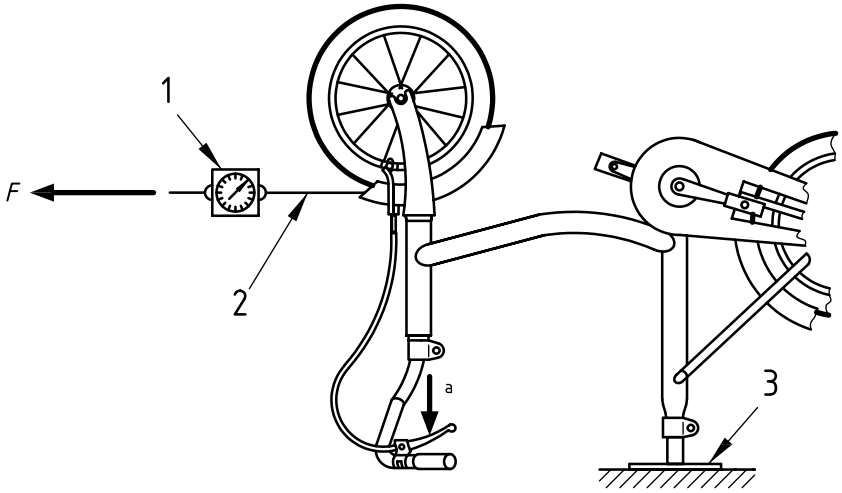
Secure the bicycle and attach a braking force measuring device to the appropriate wheel and tyre assembly, as shown in Figure 7.

Apply forces of 40 N, 50 N, 60 N, 70 N and 80 N progressively to the appropriate brake lever at a point specified in 4.7.2.3 and normal to the handlebar grip in the plane of travel of the lever (see Figure 4 and Figure 5).

For each brake lever input force, apply a steady pulling force to the wheel and tyre assembly through the force measuring device, tangentially to the circumference of the tyre and in the forward-travel direction of rotation.

After one half-revolution of the wheel, record the average braking force as the wheel rotates through a further revolution at a steady linear tyre surface speed of between 0,5 m/s and 2,0 m/s.

For each force on the lever, take the average of three readings.



Key

1 force measuring device
2 suitable webbing around wheel and tyre assembly circumference
3 fixture
F applied force
[a] Lever force.

Figure 7 — Measurement of braking force from hand-operated brake (typical arrangement)

4.7.8.3 Back-pedal brake performance test — Requirement

When tested in accordance with 4.7.8.4, the average braking force of back-pedal braking systems transmitted to the rear wheel shall increase progressively as the pedal force is increased in steps of 20 N from 20 N to 100 N. The ratio of pedal force to braking force shall not exceed 2.

4.7.8.4 Back-pedal brake performance test — Test method

Conduct the back-pedal brake performance test on a fully assembled bicycle with the brake correctly adjusted.

Secure the bicycle and attach a braking force measuring device to the rear wheel and tyre assembly as shown in Figure 6.

Apply forces of 20 N, 40 N, 60 N, 80 N and 100 N to the pedal at right angles to the crank and in the braking direction.

Apply a steady pulling force to the wheel through the force measuring device tangentially to the circumference of the tyre and in the forward-travel direction of rotation.

After one half-revolution of the wheel and tyre assembly, record the average braking force as the wheel rotates through a further revolution at a steady linear tyre surface speed of between 0,5 m/s and 2,0 m/s.

For each force on the pedal, take the average of three readings.

4.8 Steering

4.8.1 Handlebar — Dimensions and end fittings

The handlebar shall have an overall width between 350 mm and 550 mm unless national regulations dictate otherwise. The vertical distance between the top of the handlebar grips, when assembled to the highest riding position according to the manufacturer's instructions and the saddle surface of the saddle at its lowest position shall not exceed 400 mm. Handlebar end profiles shall be designed to have a flat end surface with no chamfer.

4.8.2 Handlebar grips and end plugs

4.8.2.1 Requirement

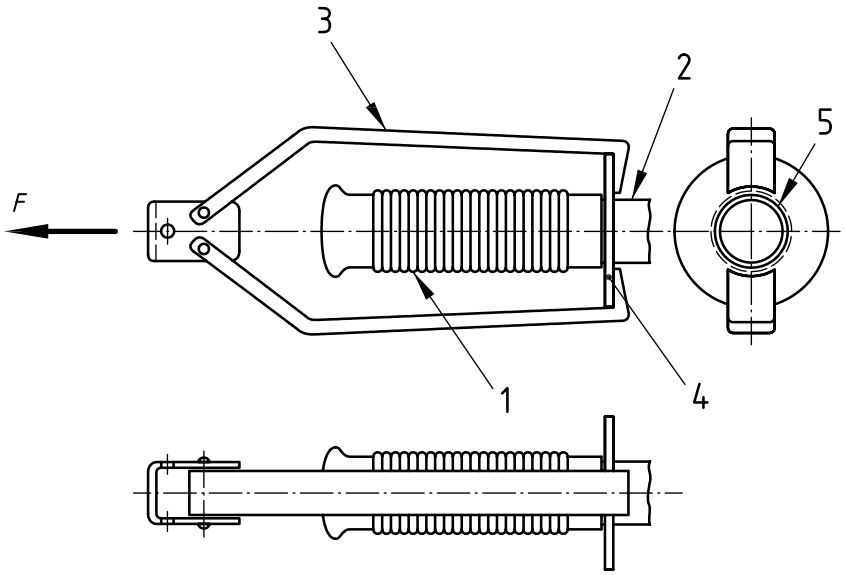
End plugs conforming with 4.8.2.4 shall be fitted to each handlebar end.

Handlebar grips which withstand removal when tested in accordance with 4.8.2.2 and 4.8.2.3 shall additionally be fitted to each handlebar end. Handlebar grips shall be of resilient material and shall have an enlarged and covered end not less than 40 mm in diameter. Handlebar grips shall not obstruct the operation of brake levers.

NOTE Regarding material see also 4.2.

4.8.2.2 Freezing test

Immerse the handlebar, with handlebar grips fitted, in water at room temperature for one hour and then place the handlebar in a freezing cabinet until the handlebar is at a temperature lower than –5 °C. Remove the handlebar from the freezing cabinet and allow the temperature of the handlebar to reach –5 °C, and then apply a force of 70 N in the loosening direction as shown in Figure 8. Maintain the force until the temperature of the handlebar has reached +5 °C.



Key

1 handlebar grip
2 handlebar
3 drawing attachment
4 hooking ring (can be divided)
5 clearance
F applied force

Figure 8 — Handlebar grip drawing attachment

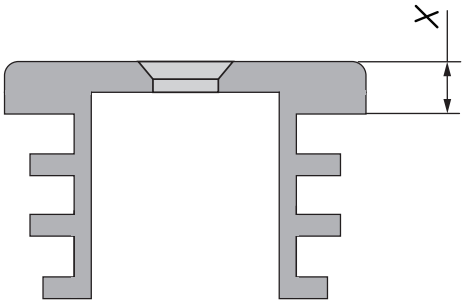
4.8.2.3 Hot water test

Immerse the handlebar, with handlebar grips fitted, in hot water of +60 °C ± 2 °C for one hour. Remove the handlebar from the hot water, allow the handlebar to stabilize at ambient temperature for 30 min, apply a force of 100 N to the grip in the loosening direction as shown in Figure 8. Maintain this force for 1 min.

4.8.2.4 Design of end plugs

Unless the handlebar has permanently closed ends (for example metal end plates, welded or otherwise permanently attached), each handlebar end shall be fitted with a handlebar end plug.

The outside diameter of the handlebar end plug shall match the outside diameter of the handlebar end. If made from plastic, the handlebar end plug shall have minimum 3 mm thickness for its end as shown in Figure 9, and have a minimum durometer of 65 Shore A. Alternatively, the handlebar end plug can be made from a durable material such as metal.



Key

X minimum 3 mm

Figure 9 — Handlebar end plug

4.8.3 Handlebar-stem — Insertion depth mark or positive stop

The handlebar-stem shall be provided with one of the two following alternative means of ensuring a safe insertion depth into the fork steerer:

a) it shall contain a permanent, transverse mark, of length not less than the external diameter of the cross section of the handlebar-stem that clearly indicates the minimum insertion-depth of the handlebar-stem into the fork steerer. The mark shall be located not less than 2,5 times the external diameter of the handle-bar stem from the bottom of the handlebar-stem, and there shall be at least one stem diameter's length of contiguous circumferential stem material below the mark;

b) it shall incorporate a permanent stop to prevent it from being drawn out of the fork steerer such as to leave the insertion less than the amount specified in a) above.

4.8.4 Steering stability

The steering shall be free to turn through at least 60° either side of the straight-ahead position and shall exhibit no tight spots, stiffness or slackness in the bearings when correctly adjusted.

A minimum of 25 % of the total mass of the bicycle and rider shall act on the front wheel when the rider is holding the handlebar grips and sitting on the saddle, with the saddle and rider in their most rearward positions.

NOTE Recommendations for steering geometry are given in Annex A.

4.8.5 Steering assembly — Static strength and security tests

4.8.5.1 Handlebar and stem assembly — Lateral bending test

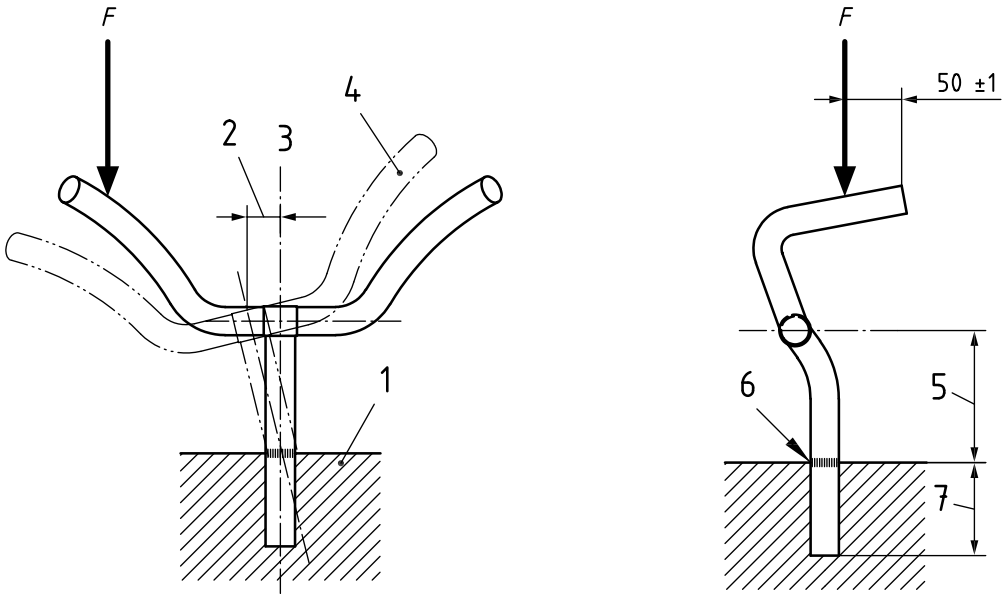
4.8.5.1.1 Requirement

When tested by the method described in 4.8.5.1.2, there shall be no cracking or fracture of the handlebar or stem and the permanent set measured at the point of application of the test force shall not exceed 20 mm per 100 mm of the free stem length.

4.8.5.1.2 Test method

Assemble the handlebar and stem in accordance with the manufacturer's instructions unless the stem and handlebar are permanently connected e.g. by welding or brazing, align the grips portion of the handlebar in a plane perpendicular to the stem axis. Clamp the stem securely at the minimum insertion depth and apply a vertical force of 450 N at a position 50 mm ± 1 mm from the free end of the handlebar as shown in Figure 10. Maintain this force for 1 min.

Dimension in millimetres



Key

1 clamping fixture
2 permanent set
3 stem centreline
4 deflected shape
5 free stem length
6 minimum insertion-depth mark
7 minimum insertion depth
F vertical force of 450 N

Figure 10 — Handlebar and stem assembly — Lateral bending test

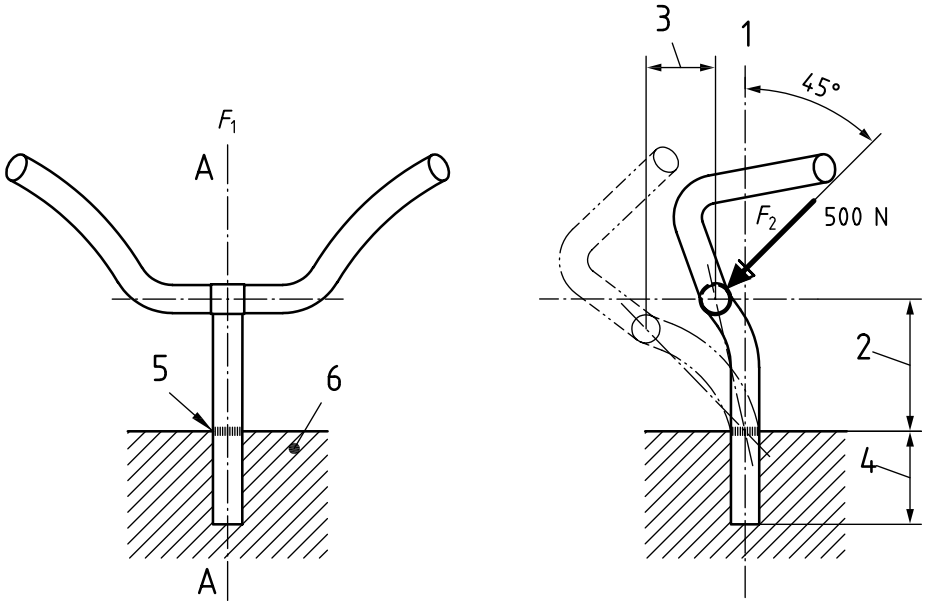
4.8.5.2 Handlebar and stem assembly — Forward bending test

4.8.5.2.1 Requirement

When tested by the method described in 4.8.5.2.2, there shall be no cracking or fracture of the handlebar or stem and the permanent set measurement at the point of application of the test force shall not exceed 20 mm per 100 mm of free stem length.

4.8.5.2.2 Test method

With the handlebar stem securely clamped to the minimum insertion depth, apply a force of 500 N through the handlebar attachment point in the forward and downward direction at 45° to the axis of the stem shank, in plane A-A (see Figure 11). Maintain this force for 1 min.



Key

1 axis of stem shank
2 free stem length
3 permanent set
4 minimum insertion depth
5 minimum insertion-depth mark
6 clamping fixture
F_1 force applied in plane A-A
F_2 applied force of 500 N

Figure 11 — Handlebar and stem assembly — Forward bending test

4.8.5.3 Handlebar to handlebar stem — Torsional security test

4.8.5.3.1 Requirement

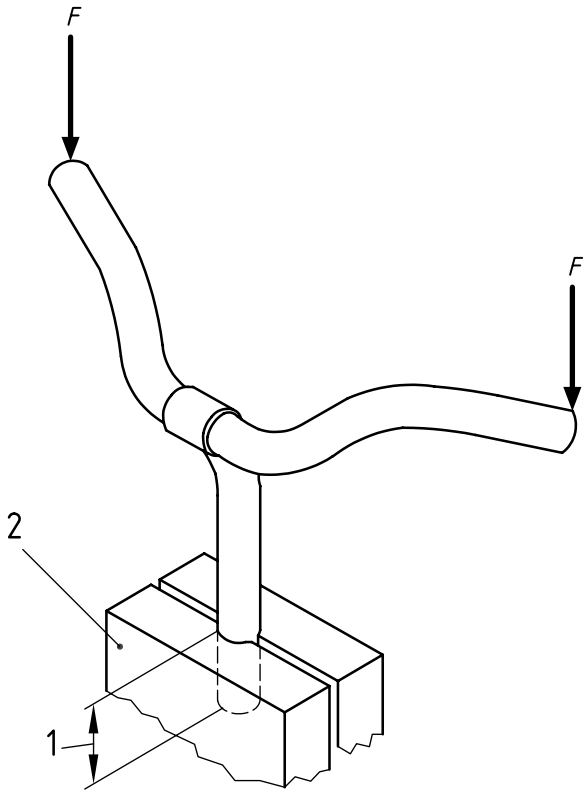
The handlebar shall not move in relation to the stem when tested in accordance with 4.8.5.3.2.

4.8.5.3.2 Test method

With the stem of the handlebar assembly securely clamped to the minimum insertion depth, apply a force of 130 N simultaneously to each side of the handlebar, in a direction and at a point giving maximum torque at the junction of the handlebar and stem. If the point of application is at the end of the handlebar, apply the force as near to the end as practicable, but no more than 15 mm from the end (see Figure 12). Maintain this force for 1 min.

Depending on the shape of the handlebar, the forces may be applied in a different direction from those illustrated in Figure 12.

If the handlebar/stem assembly uses a clamp, the torque applied to the fastener shall not exceed the manufacturer's recommended minimum torque.



Key

1 minimum insertion depth
2 clamping block
F applied force of 130 N

Figure 12 — Handlebar to handlebar stem — Torsional security test

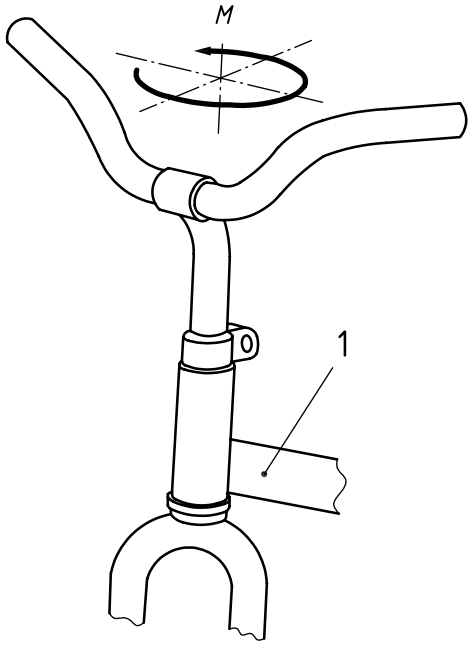
4.8.5.4 Handlebar stem to fork steerer — Torsional security test

4.8.5.4.1 Requirement

The handlebar shall not move in relation to the fork steerer when tested in accordance with 4.8.5.4.2.

4.8.5.4.2 Test method

With the handlebar stem correctly assembled in the frame and fork steerer, and the clamping device tightened to the manufacturer's recommended minimum torque, apply a torque of 15 Nm to the handlebar/fork clamping device, as shown in Figure 13. Maintain this torque for 1 min.



Key

1 frame and fork assembly

M applied torque of 15 Nm

Figure 13 — Handlebar stem to fork steerer — Torsional security test

4.8.6 Handlebar and stem assembly — Fatigue test

4.8.6.1 General

Handlebar-stems can influence test failure of handlebars and for this reason, a handlebar and stem is always to be tested as an assembly.

Conduct the test in two stages on the same assembly as follows.

4.8.6.2 Requirement for stage 1

When tested by the method described in 4.8.6.3, there shall be no visible cracks or fractures in any part of the handlebar and stem assembly.

4.8.6.3 Test method for stage 1

Unless the handlebar and stem are permanently connected, e.g. by welding or brazing, align the grip of portions of the handlebar in a plane perpendicular to the stem axis (see Figure 14), secure the handlebar to the stem according to the manufacturer's recommendations.

Clamp the handlebar stem securely in a fixture to the minimum insertion depth.

Apply fully-reversed forces of 115 N at a position 50 mm from the free end each side of the handlebar and in a plane parallel to the stem axis for 100 000 cycles, with the forces at each end of the handlebar being out of phase with each other and parallel to the axis of the handlebar stem as shown in Figure 15. The maximum test frequency shall be 10 Hz.

Any resonant condition should be avoided.

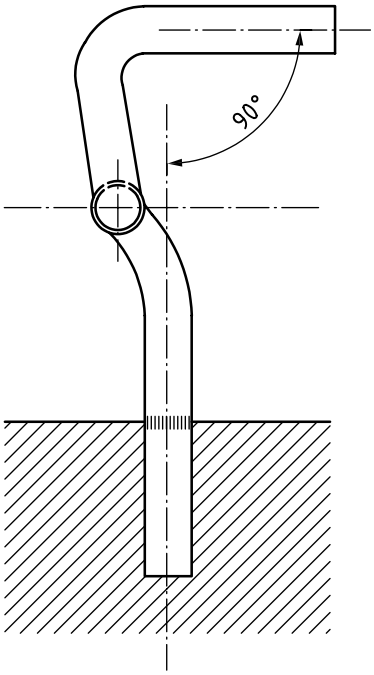
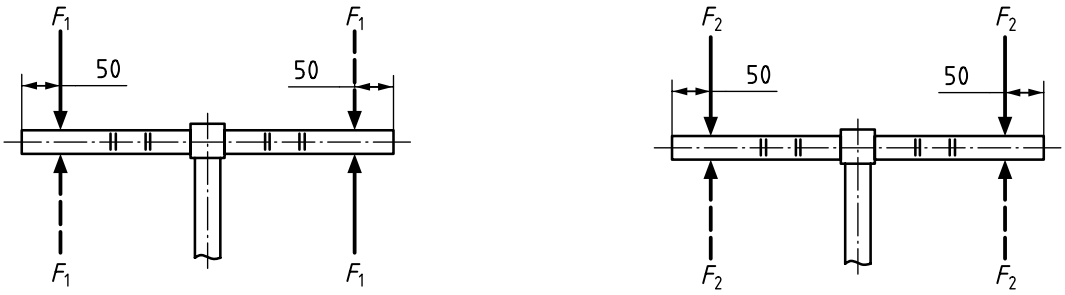


Figure 14 — Adjustable handlebars — Orientation for test

Dimension in millimetres



a) Stage 1 — out-of-phase loading **b) Stage 2 — in-phase loading**

Key

F_1 fully reversed forces of 115 N

F_2 fully reversed forces of 190 N

Figure 15 — Handlebar and stem — Fatigue tests

4.8.6.4 Requirement for stage 2

When tested by the method described in 4.8.6.5, there shall be no visible cracks or fractures in any part of the handlebar and stem assembly.

4.8.6.5 Test method for stage 2

Apply fully-reversed forces of 190 N at a position 50 mm from the free end each side of the handlebar and in a plane parallel to the stem axis for 100 000 cycles, with the forces at each end of the handlebar being in phase with each other and parallel to the axis of the handlebar stem as shown in Figure 15. The maximum test frequency shall be 10 Hz.

4.9 Frames

4.9.1 Frame and front fork assembly — Impact test (falling mass)

4.9.1.1 Requirement

When tested by the method described in 4.9.1.2, there shall be no visible cracks or fractures in any part of the frame/fork assembly.

The permanent set measured between the axes of the wheel axles (measured as the wheelbase, see Figure 16) shall not exceed 20 mm.

4.9.1.2 Test method

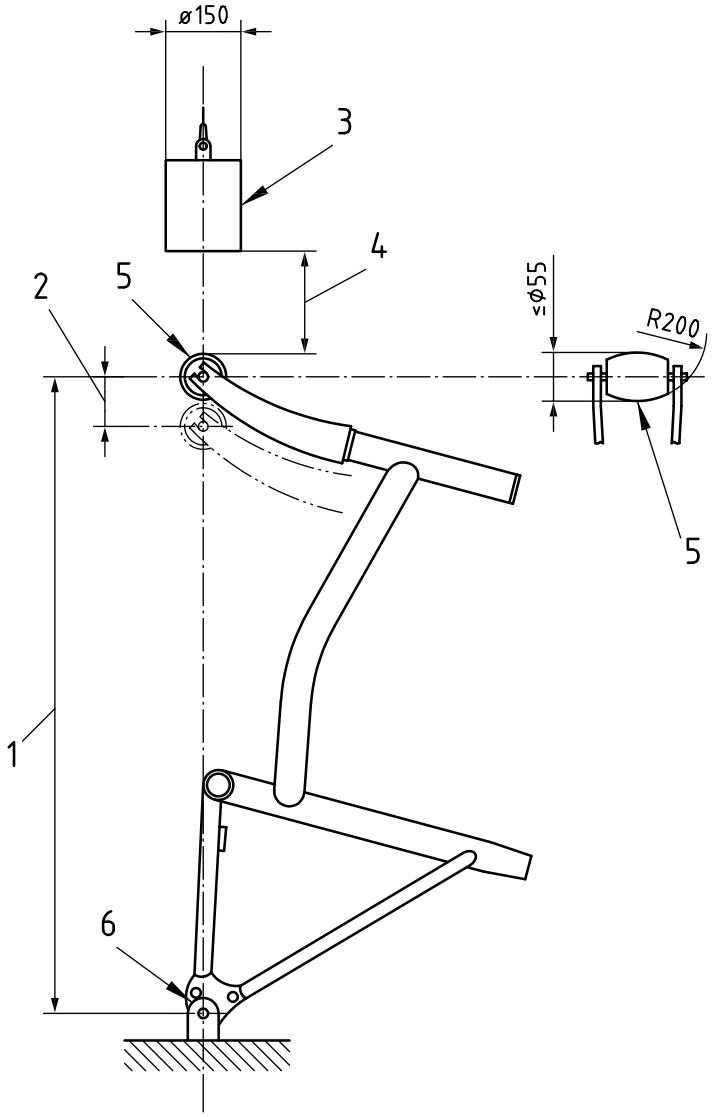
If the bicycle frame is convertible for male and female riders by removal of a bar, test the frame with the bar removed.

Measure the distance between the axle centrelines. Assemble a roller of mass less than or equal to 1 kg and with the dimensions conforming to those shown in Figure 16 in the front fork, and hold the frame/fork assembly vertically, clamped to a rigid fixture by the rear axle attachment points, as shown in Figure 16. The hardness of roller shall be not less than 50 HRC at impact surface.

Drop a striker of mass 22,5 kg from a height of 120 mm onto the low mass roller at a point in line with the wheel centres and against the direction of the fork rake.

NOTE See Annex B which is identical to ISO 4210-3:2023, Annex B.

Dimension in millimetres



Key

1 wheelbase
2 permanent set
3 22,5 kg striker
4 drop height 120 mm
5 low-mass roller (1 kg max)
6 rigid mounting for rear axle attachment point

Figure 16 — Frame and front fork assembly — Impact test (falling mass)

4.9.2 Frame and front fork assembly — impact test (falling frame)

4.9.2.1 Requirement

When tested by the method described in 4.9.2.2, there shall be no visible cracks or fractures in any part of the frame/fork assembly.

The permanent set measured between the axes of the wheel axles (the wheelbase – see Figure 17) shall not exceed 20 mm.

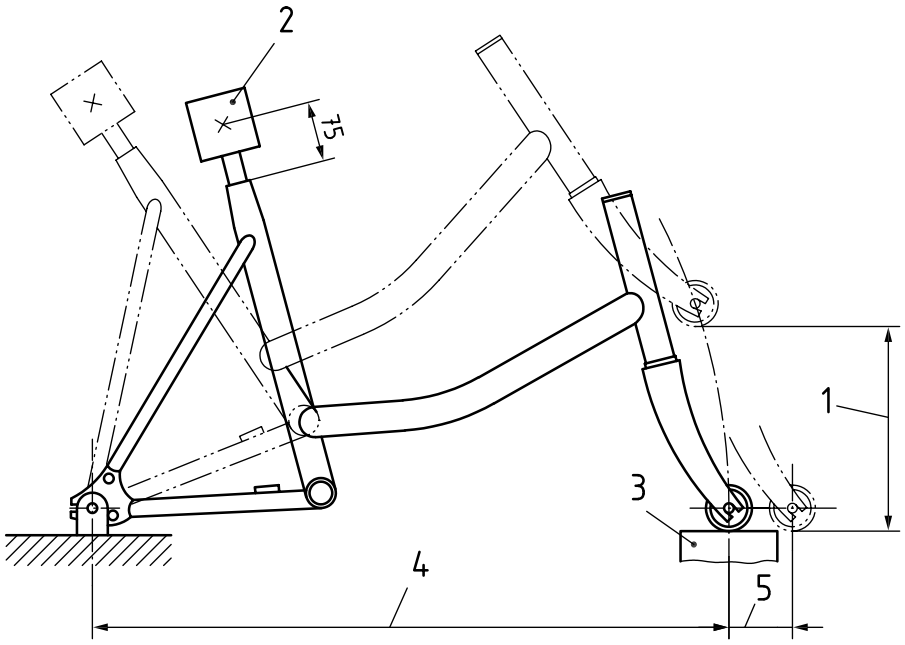
4.9.2.2 Test method

Conduct the falling frame/fork assembly test on the frame/fork/roller assembly used in 4.9.1.

Mount the assembly at the rear axle attachment points so that it is free to rotate about the rear axle in the vertical plane. Support the front fork with a flat steel anvil so that the frame is in the normal position of use. Fix a weight with a mass of 30 kg to the seat-post, with the centre of gravity on the axis of the seat tube and 75 mm from the top of the seat tube along the axis. Rotate the assembly around the rear axle until the distance between the low-mass roller and the anvil is 200 mm, then allow the assembly to fall freely onto the anvil (see Figure 17).

Perform the test twice.

Dimension in millimetres



Key

1 drop height
2 weight with a mass of 30 kg
3 steel anvil
4 wheelbase
5 permanent set

Figure 17 — Frame and front fork assembly — Impact test (falling frame)

4.10 Front fork

4.10.1 General

The slots or other receptors for the front axle in the front fork shall be aligned so that when the axle or cones firmly abut the top face, the front wheel is central within the fork.

4.10.2 Front fork — Bending fatigue test

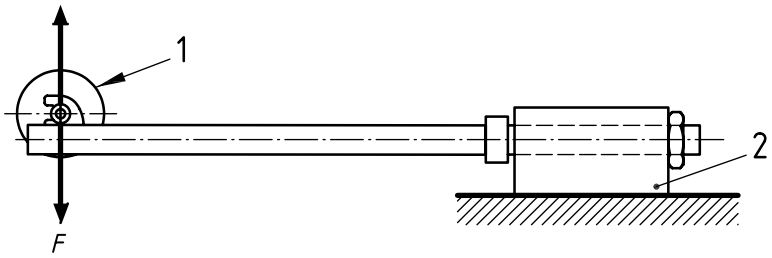
4.10.2.1 Requirement

When tested by the method described in 4.10.2.2, there shall be no fractures or visible cracks in any part of the fork.

4.10.2.2 Test method

Mount the fork in a fixture representative of the head-tube and gripped in the normal bearings as shown in Figure 18.

Apply cycles of fully reversed, dynamic forces of ±400 N in the plane of the wheel and perpendicular to the steerer-tube to a loading attachment and swivel on an axle located in the axle-slots of the blades for 100 000 test cycles with a test frequency not exceeding 10 Hz.



Key

1 pivoted force-application device

2 rigid mount incorporating head bearings

F dynamic force of ±400 N

Figure 18 — Front fork — Bending fatigue test

4.11 Wheel and tyre assembly

4.11.1 Wheel and tyre assembly — Rotational accuracy

4.11.1.1 General

Rotational accuracy shall be as defined in ISO 1101 in terms of circular run-out tolerance (lateral). The run-out tolerances given in 4.11.1.2 and 4.11.1.3 represent the maximum variation of position of the rim (i.e. full indicator reading) of a fully assembled and adjusted wheel during one complete revolution about the axle without axial movement.

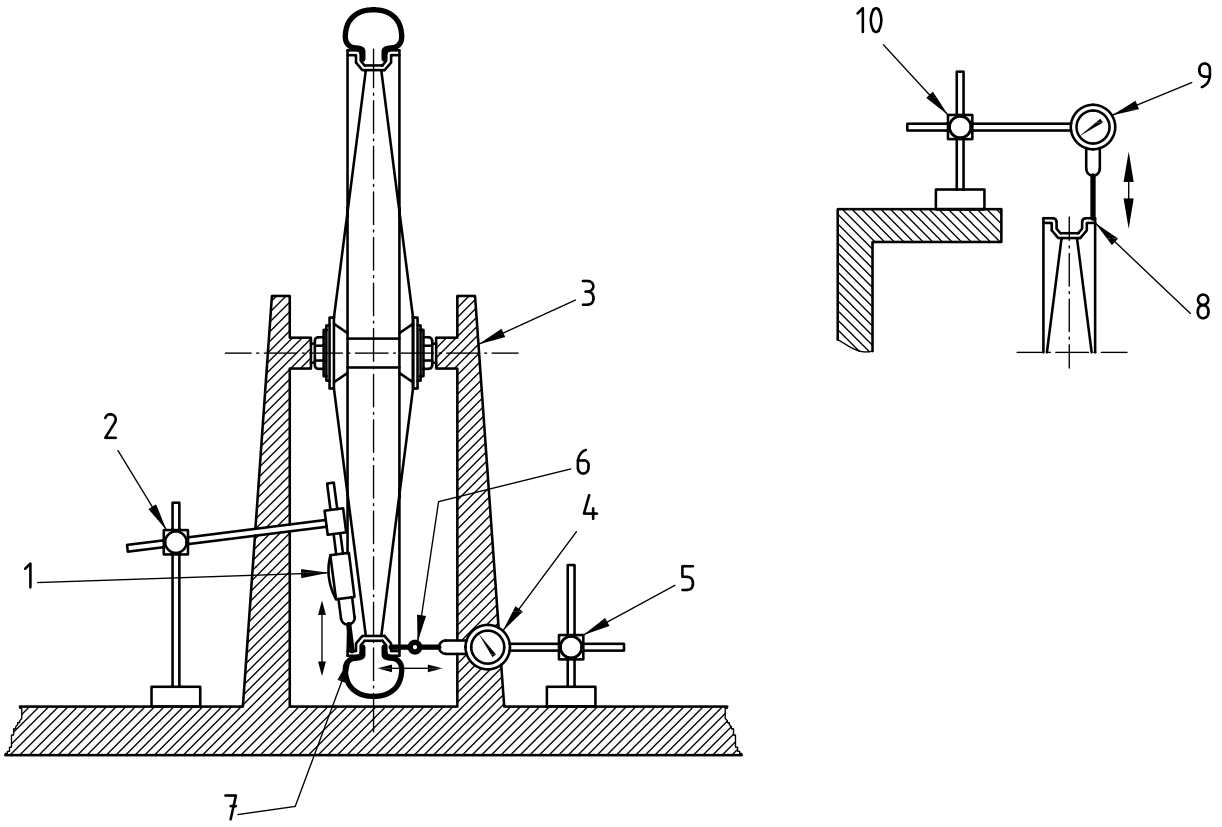
4.11.1.2 Wheel and tyre assembly — Rotational accuracy — Concentricity tolerance

For measurement of both axial run-out and radial run-out (concentricity) the wheel shall be fitted with a tyre inflated to the maximum pressure as marked on the tyre but, for rims where the concentricity cannot be measured with the tyre fitted, it is permissible to make measurements with the tyre removed.

The run-out shall not exceed 2 mm when measured perpendicular to the axle at a suitable point along the rim, see Figure 19.

4.11.1.3 Wheel and tyre assembly — Lateral tolerance

The run-out shall not exceed 2 mm when measured parallel to the axle at a suitable point along the rim, see Figure 19.



a) Rim with tyre **b) Rim without tyre**

Key

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

Figure 19 — Wheel and tyre assembly — Rotational accuracy

4.11.2 Wheel and tyre assembly — Clearance

Alignment of the wheel and tyre assembly in a bicycle shall allow not less than 6 mm clearance between the tyre and the frame or fork or a front mudguard and its attachment bolts.

This does not apply to the clearance between the tyre and a frame lock placed on the rear wheel.

The fully assembled wheel shall be fitted with the appropriate size tyre and inflated to the lower value of maximum inflation pressure recommended on the rim or on the tyre. This shall be checked before the test. Where a bicycle has a frame or a fork with a suspension system, the requirement applies to the suspension system in its uncompressed state.

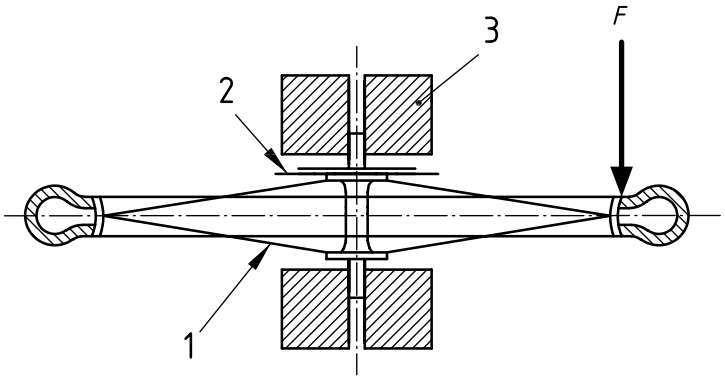
4.11.3 Wheel and tyre assembly — Static strength test

4.11.3.1 Requirement

When a fully-assembled wheel fitted with a tyre inflated to the manufacturer's recommended pressure is tested by the method described in 4.11.3.2, there shall be no failure of any of the components of the wheel, and the permanent set, measured at the point of application of the force on the rim, shall not exceed 1,5 mm.

4.11.3.2 Test method

Clamp and support the wheel suitably as shown in Figure 20 and apply a static force of 200 N at one point on the rim, perpendicular to the plane of the wheel. Apply the force once only for a duration of 1 min.



Key

1 wheel and tyre assembly
2 drive sprockets
3 clamping fixture
F static force of 200 N

Figure 20 — Wheel and tyre assembly — Static strength test

4.11.4 Wheels — Wheel retention

4.11.4.1 General

Wheels shall be secured to the bicycle frame and fork such that when adjusted to the manufacturer's recommendations they comply with 4.11.4.2 and 4.11.4.3.

Wheel nuts shall have a minimum removal torque of 70 % of the manufacturer's recommended tightening torque.

4.11.4.2 Front wheel retention — Retention devices secured

4.11.4.2.1 Requirement

When tested by the method described in 4.11.4.2.2, there shall be no relative motion between the axle and the front fork.

4.11.4.2.2 Test method

Apply a force of 1 000 N distributed symmetrically to both ends of the axle for a period of 1 min in the direction of the removal of the wheel.

4.11.4.3 Rear wheel retention — Retention devices secured

4.11.4.3.1 Requirement

When tested by the method described in 4.11.4.3.2, there shall be no relative motion between the axle and the frame.

4.11.4.3.2 Test method

Apply a force of 1 000 N distributed symmetrically to both sides of the axle for a period of 1 min in the direction of the removal of the wheel.

4.11.4.4 Front wheel retention — Retention devices unsecured

4.11.4.4.1 Requirement

When tested by the method described in 4.11.4.4.2, the wheel shall not detach from the fork.

4.11.4.4.2 Test method

Unscrew the axle nuts by one complete turn from the finger-tight condition and apply a force of 100 N to the wheel for a period of 1 min in direction of removal of the wheel.

4.11.5 Tyre inflation pressure

The maximum inflation pressure recommended by the manufacturer shall be moulded on the sidewall of the tyre so as to be readily visible when the latter is assembled on the wheel.

Non-pneumatic tyres are excluded from the requirements of 4.11.5.

It is recommended that the minimum inflation pressure specified by the manufacturer also be moulded on the sidewall of the tyre.

4.11.6 Wheel and tyre assembly —Overpressure test

Non-pneumatic tyres are excluded from the requirements of 4.11.6.

When inflated to 110 % of the maximum inflation pressure for a period of not less than 5 min, the tyre shall remain intact on the rim.

4.12 Pedals and pedal/crank drive system

4.12.1 Pedal tread

4.12.1.1 The tread surface of a pedal shall be secured against movement within the pedal assembly.

The pedal shall turn freely on its axle.

4.12.1.2 Pedals shall have

a) tread surfaces on the top and bottom surfaces of the pedal, or

b) a definite preferred position that automatically presents the tread surface to the rider's foot.

4.12.2 Pedal clearance

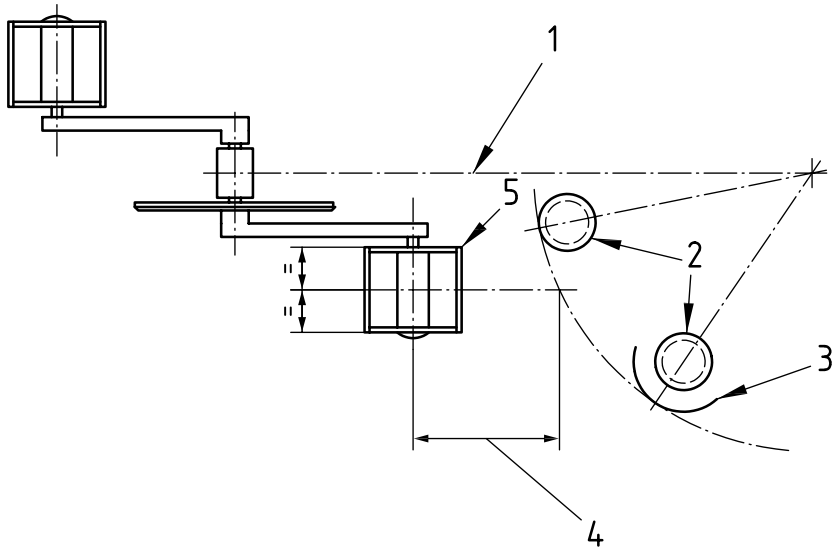
4.12.2.1 Ground clearance

With the bicycle unladen, with any stabilizers removed, the pedal at its lowest point and the tread surface of the pedal parallel to the ground (and uppermost where it has only one tread surface), the bicycle shall be capable of being leaned over at an angle of 23° from the vertical before any part of the pedal touches the ground.

Suspension devices (if applicable) shall be depressed by application of a weight with a mass of 30 kg to the saddle while the bicycle is held vertical. With the suspension clamped in this position, the bicycle shall be capable of being leaned over at an angle of 23° from the vertical before any part of the pedal touches the ground.

4.12.2.2 Toe clearance

Bicycles shall have at least 89 mm clearance between the pedal and front tyre or mudguard (when turned to any position). The clearance shall be measured forward and parallel to the longitudinal axis of the bicycle from the centre of either pedal to the arc swept by the tyre or mudguard, whichever is the lesser (see Figure 21).



Key

1 longitudinal axis
2 front tyre
3 mudguard
4 clearance
5 pedal

Figure 21 — Toe clearance

4.12.3 Pedal — Impact test

4.12.3.1 Requirement

When tested by the method described in 4.12.3.2, there shall be no fractures of any part of the pedal body, the pedal-spindle or any failure of the bearing system.

4.12.3.2 Test method

Screw the pedal-spindle securely into a suitable rigid fixture with its axis horizontal as shown in Figure 23 and release a striker of the design shown in Figure 22 and weighing 15 kg from a height of 200 mm to strike the pedal at the centre of the tread surface. The width of the striker shall be wider than the width of the tread surface.

Dimension in millimetres

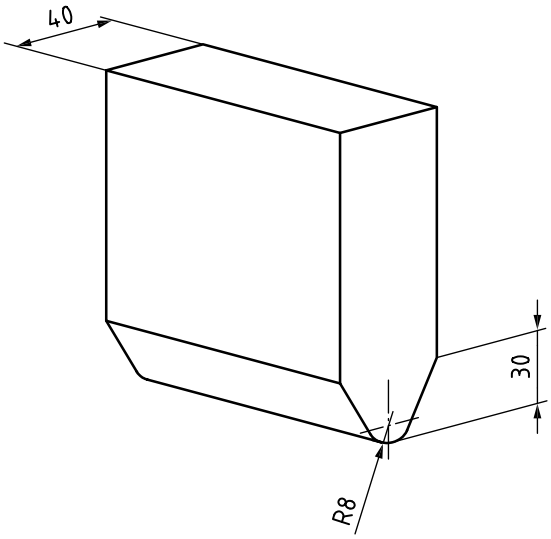


Figure 22 — Striker dimensions

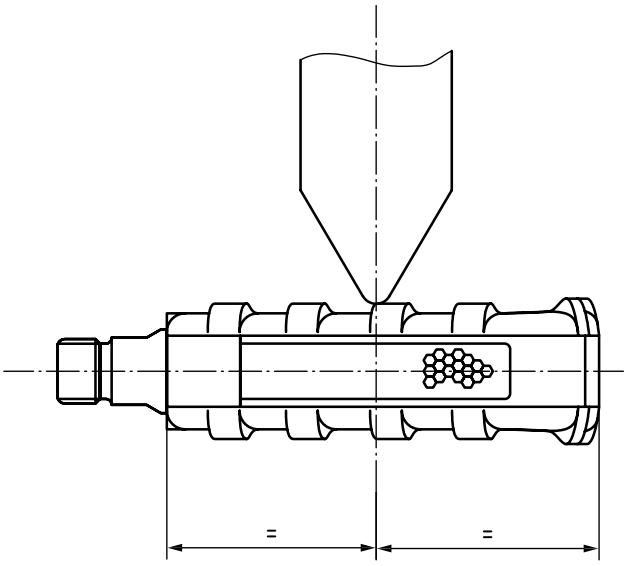


Figure 23 — Position of impact

4.12.4 Pedal/pedal-spindle — Dynamic durability test

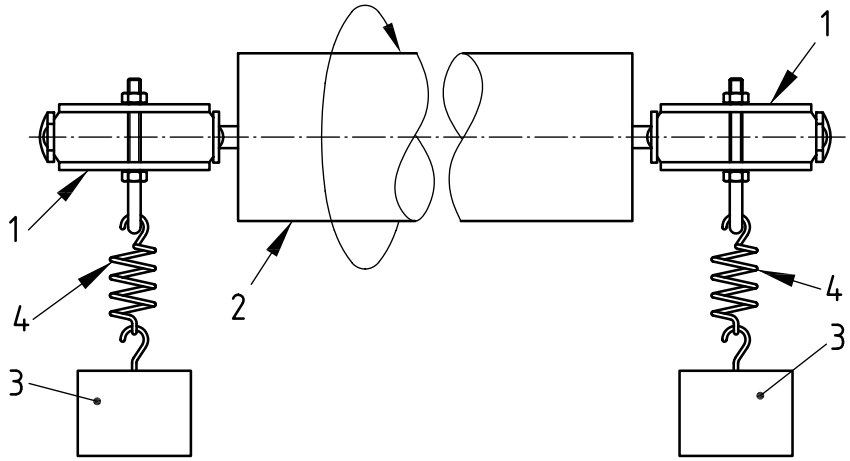
4.12.4.1 Requirement

When tested by the method described in 4.12.4.2, there shall be no fractures or visible cracking of any part of the pedal or the pedal-spindle.

4.12.4.2 Test method

Screw each pedal securely into a threaded hole in a rotatable test-shaft and suspend a weight with a mass of 30 kg by means of a tension-spring to each pedal, the object of the springs being to minimize oscillations of the load (as shown in Figure 24).

Drive the shaft at a speed not exceeding 100 min^{-1} for a total of 100 000 revolutions. If the pedals are provided with two tread surfaces, rotate them through 180° after 50 000 revolutions.



Key

1 pedal
2 test-shaft
3 weight with a mass of 30 kg
4 tension spring

Figure 24 — Pedal/pedal-spindle — Dynamic durability test

4.12.5 Drive system static strength test

4.12.5.1 Requirement

No component of the drive system shall fracture when tested in accordance with 4.12.5.2. Drive capability shall not be lost.

4.12.5.2 Test method

4.12.5.2.1 General

Conduct the drive system static load test on an assembly comprising the frame, pedals, transmission system, rear wheel assembly, and, if appropriate, the gear-change mechanism. Support the frame with the central plane vertical and with the rear wheel held at the rim to prevent the wheel rotating.

4.12.5.2.2 Single speed system

Carry out the following:

a) With the left-hand crank in the forward horizontal position, gradually apply a vertical downward force, increasing to 700 N, to the centre of the left-hand pedal, and maintain the full force for 1 min.

   If the drive sprockets tighten so that the crank rotates under the load, return the crank to the horizontal position, after fully tightening, and repeat the test.

b) On completion of a), repeat the test with the right-hand crank in the forward horizontal position and the load.

4.12.5.2.3 Multi-speed system

Carry out the following:

a) Conduct test 4.12.5.2.2 a) with the transmission in the highest gear;

b) Conduct test 4.12.5.2.2 b) with the transmission in the lowest gear.

4.12.6 Crank assembly — Fatigue tests

4.12.6.1 Requirement

When tested by the method described in 4.12.6.2, there shall be no fractures of or visible cracks, on any crank assembly component or loosening or detachment of the chain wheel from the crank. Pedal-spindles may be replaced by suitable adaptors.

4.12.6.2 Test method

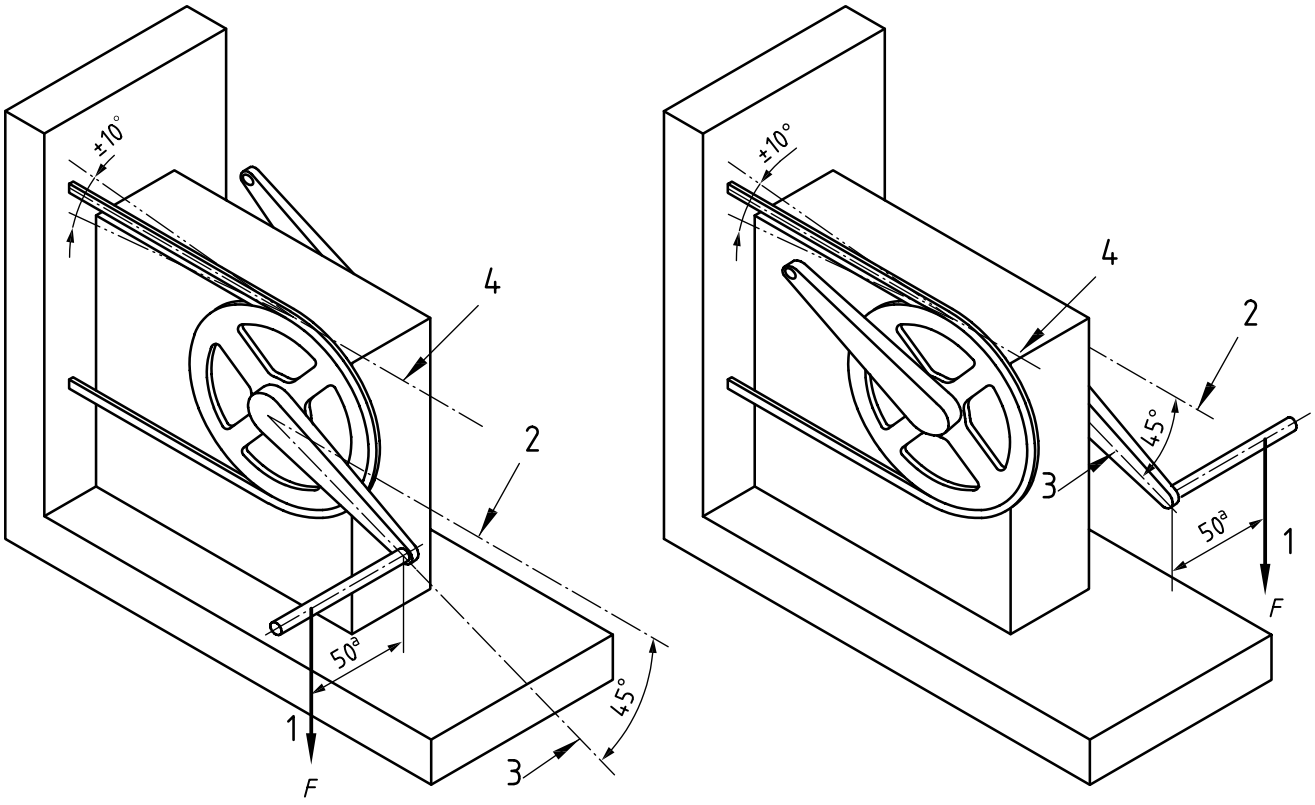
Mount the crank assembly located on its production bearings in a fixture with bearing housings representative of the bottom-bracket as shown in Figure 25 a). The drive side crank arm shall be 180° from the non-drive side crank arm. Position the crankset so that the drive side crank arm is at 45° below the horizontal as shown in Figure 25 a). Attach a pedal-spindle adaptor to drive side crank arm. The non-drive side crank is not attached to any pedal-spindle adaptor.

Prevent rotation by locating a suitable length of drive chain around the largest or only chain wheel and securing it firmly to a suitable rear support, or, for any other type of transmission (e.g. belt- or shaft-drive) by securing the first stage of the transmission. Attach the chain so that it is horizontal (±10°) to represent a real drivetrain as shown in Figure 25 a).

Stage 1: Apply repeated, vertical downward, dynamic force of 700 N to the pedal-spindle adaptors of the drive side crank at a distance of 50 mm from the outboard face of the crank for 100 000 cycles where one test cycle consists of loading and unloading the drive side crank once.

The assembly shall not be disassembled between test phases.

Stage 2: After stage 1, rotate the crank assembly 180° so that the non-drive side crank arm is in the 45° forward downward position. The crankset assembly shall not be disassembled to perform transition from stage 1 to stage 2. The drive side crank is not attached to any pedal-spindle adaptor. Resume the test by applying a repeated, vertical downward, dynamic force of 700 N to the pedal-spindle adaptor of the non-drive side crank at a distance 50 mm from the outboard face of the crank for 100 000 cycles, see Figure 25 b).



a) Stage 1 — Drive side **b) Stage 2 — Non-drive side**

Key

1 repeated test force
2 horizontal axis
3 axis of crank
4 horizontal axis
[a] From outboard face of crank.

Figure 25 — Crank assembly — Fatigue test with cranks at 45° (typical test arrangement)

4.13 Saddles and seat-posts

4.13.1 Limiting dimensions

No part of the saddle, saddle supports, or accessories to the saddle shall be more than 125 mm above the top saddle surface at the point where the saddle surface is intersected by the seat-post axis.

4.13.2 Seat-post — Insertion-depth mark or positive stop

The seat-post shall be provided with one of the two following alternative means of ensuring a safe insertion-depth into the frame:

a) it shall contain a permanent, transverse mark of length not less than the external diameter or the major dimension of the cross-section of the seat-post that clearly indicates the minimum insertion-depth of the post into the frame. For a circular cross-section, the mark shall be located not less than two diameters of the post from the bottom of the post (i.e. where the diameter is the external diameter). For a non-circular cross-section, the insertion-depth mark shall be located not less than 65 mm from the bottom of the post (i.e. where the seat-post has its full cross-section);

b) it shall incorporate a permanent stop to prevent it from being drawn out of the frame such as to leave the insertion less than the amount specified in a) above.

4.13.3 Saddle and seat-post security test

4.13.3.1 Requirement

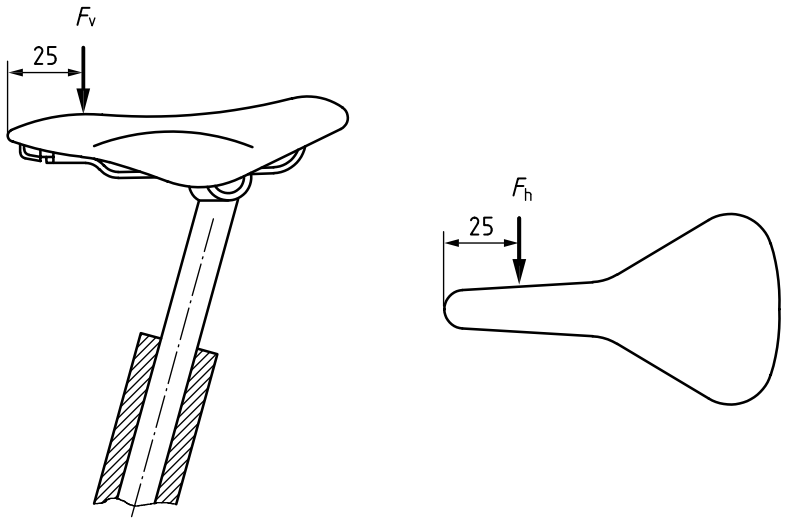
When tested by the method described in 4.13.3.2, there shall be no movement of the saddle adjustment clamp in any direction with respect to the post, or of the post with respect to the frame.

4.13.3.2 Test method

With the seat-post correctly assembled to the bicycle frame at minimum insertion depth of the seat-post, and clamps tightened to the torque recommended by the bicycle manufacturer, apply a force of 300 N vertically downwards at a point of 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 100 N 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 26).

The fixture shall be such that it does not damage the surface of the saddle.

Dimension in millimetres



Key

F_v vertical force of 300 N

F_h horizontal force of 100 N

Figure 26 — Saddle/seat-post security test

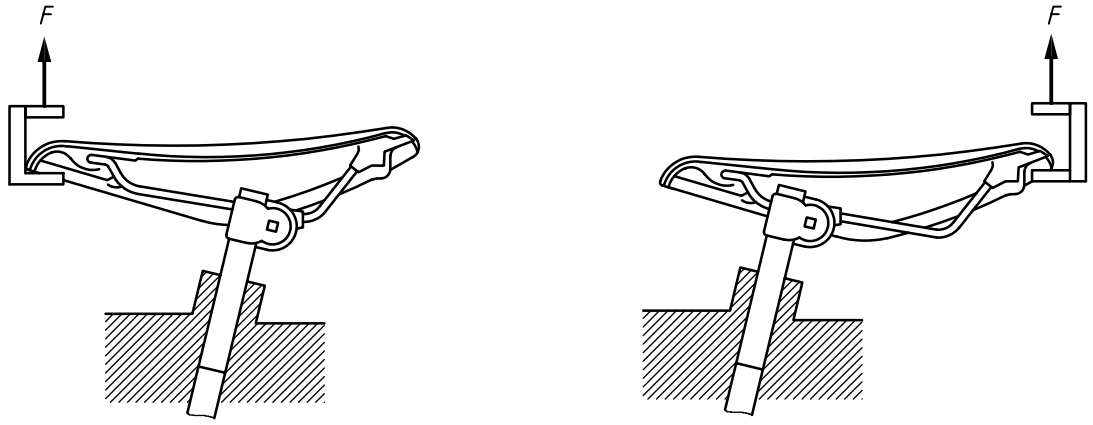
4.13.4 Saddle — Static strength test

4.13.4.1 Requirement

When tested by the method described in 4.13.4.2, the wire chassis shall not disengage from the saddle cover and/or plastic moulding shall not disengage from the wire chassis and there shall be no cracking or permanent distortion of the saddle assembly.

4.13.4.2 Test method

Position the saddle in its maximum forward position [Figure 27 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 27 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 27, ensuring that the force is not applied to any part of the chassis of the saddle. The forces shall be maintained for 1 min in each position.



a) Force under nose **b) Force under rear**

Key

F force of 400 N

Figure 27 — Saddle — Static strength test

4.13.5 Saddle and seat-post assembly fatigue test

4.13.5.1 General

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

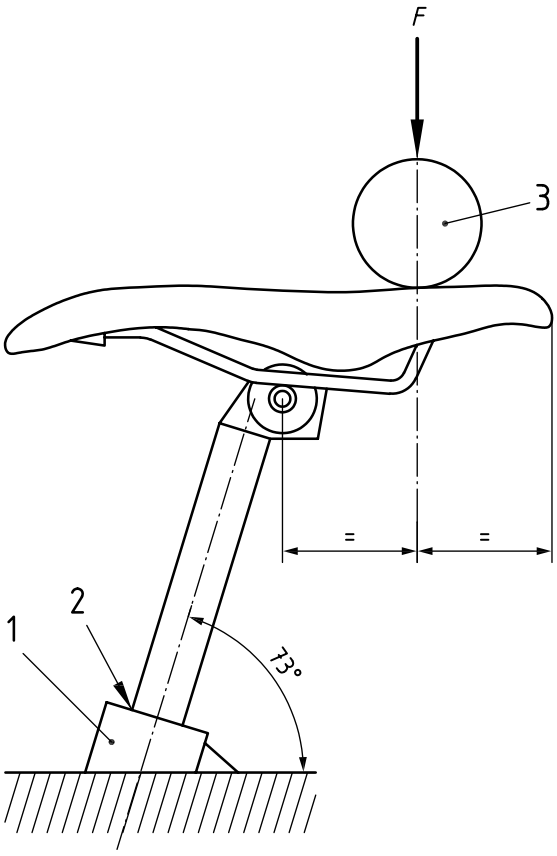
4.13.5.2 Requirement

When tested by the method described in 4.13.5.3 there shall be no fractures or visible cracks in the seat-post assembly or in the saddle, and no loosening of the clamp.

4.13.5.3 Test method

Insert the seat-post to its minimum insertion depth in a rigid mount representative of that on the bicycle and with its axis at 73° 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 700 N for 100 000 cycles, in the position shown in Figure 28 by means of a pad 300 mm long × 80 mm diameter to prevent localized damage of the saddle cover. The maximum test frequency shall be maintained as specified in 4.1.5.

In case of saddles in which the saddle and the post are one part, the angle in Figure 28 shall be chosen in such a way that the saddle surface is horizontal.



Key

1 rigid mount

2 minimum insertion depth

3 pad (length = 300 mm, diameter = 80 mm)

F force of 700 N

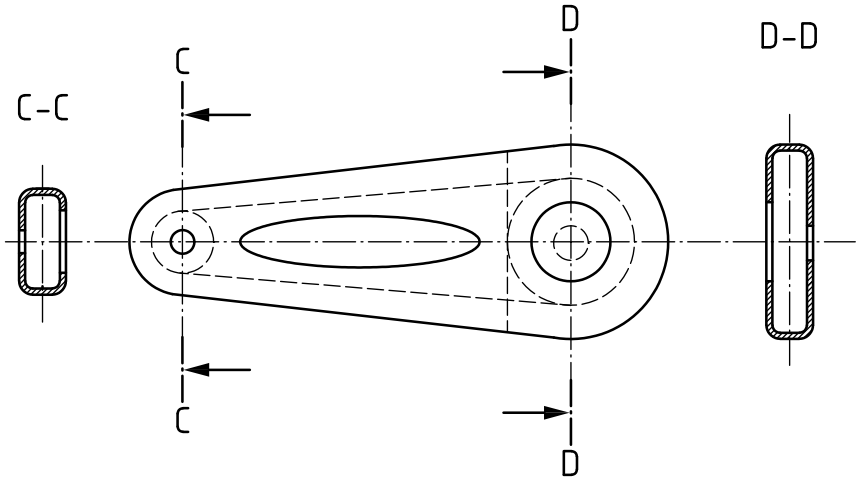
Figure 28 — Seat-post — Fatigue test

4.14 Chain-wheel and belt-drive protective device

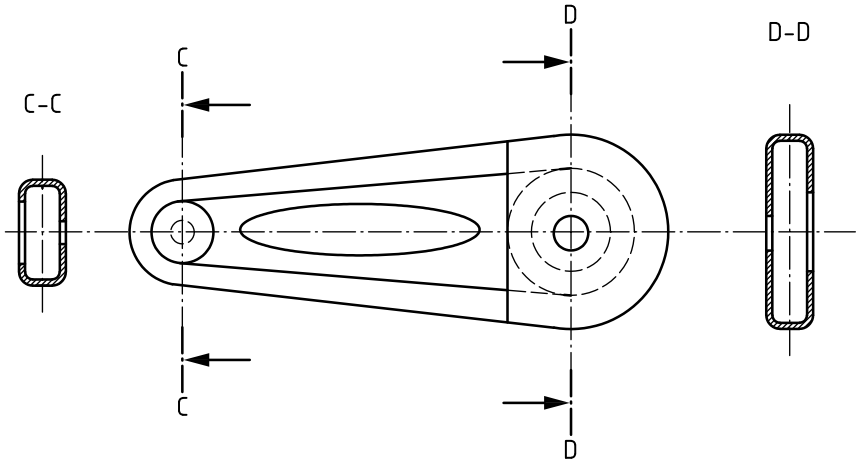
Power transmission shall have a shield from, and including, the driving chain- or belt-wheel to, and including, the driven chain- or belt-wheel at the side(s) where the limb of a child is nearest the chain or belt. If the structure of the bicycle requires a space for the chain stay to pass through, that space may be provided (see Figure 29, side A). There shall also be a shield around the driving chain- or belt-wheel on any side (see Figure 29, side B) where the chain or belt is separated from the limb of the child (e.g. by a frame on a bicycle).

NOTE A bicycle could have two sides “A”.

The shield shall be such that the chain or belt and any chain- or belt-wheels are not accessible from side A and that the junction between the chain or belt and the chain- or belt-wheel is not accessible from side B (if any) when tested in accordance with ISO 8124-1:2018, 5.7 Probe B (accessibility of a part or component).



a) Side A



b) Side B

Figure 29 — Chain-guard and belt guard

4.15 Stabilizers

4.15.1 Mounting and dismounting

It shall be possible to fit or remove the stabilizers without releasing the fixing of the rear wheel axle.

4.15.2 Dimensions

When attached to the bicycle in accordance with the manufacturer's instructions:

a) the horizontal distance between the vertical plane through each stabilizer wheel and the vertical plane through the centreline of the bicycle frame shall be at least 175 mm (see Figure 30);

b) the clearance between each stabilizer wheel and the ground shall not exceed 25 mm with the bicycle supported upright on a flat horizontal surface.

4.15.3 Vertical load test

4.15.3.1 Requirement

The deflection under load and permanent set shall not exceed 25 mm and 15 mm, respectively, when tested in accordance with 4.15.3.2.

4.15.3.2 Test method

With the bicycle frame inverted and rigidly secured in the upright position via the seat-post, apply a vertically downward force of 300 N to one of the stabilizer wheels, as shown in Figure 30, for 1 min.

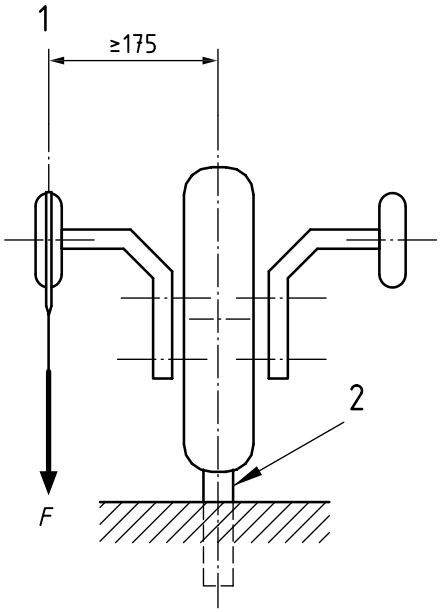
Measure the deflection under load at a point on the circumference of the stabilizer wheel.

Repeat the test on the other stabilizer wheel.

Repeat the alternate loading a further four times without checking the deflection (a total of five loadings on each stabilizer, each for a period of 1 min).

1 min after removal of the fifth loading on each stabilizer, measure the permanent set at the same measuring point.

Dimensions in millimetres



Key

1 stabilizer wheel
2 seat-post secured in rigid fixture
F force of 300 N acting through centreline of stabilizer wheel

Figure 30 — Vertical load test

4.15.4 Longitudinal load test

4.15.4.1 Requirement

The permanent set shall not exceed 15 mm when tested in accordance with 4.15.4.2.

No component of the stabilizer assembly shall fracture in the test.

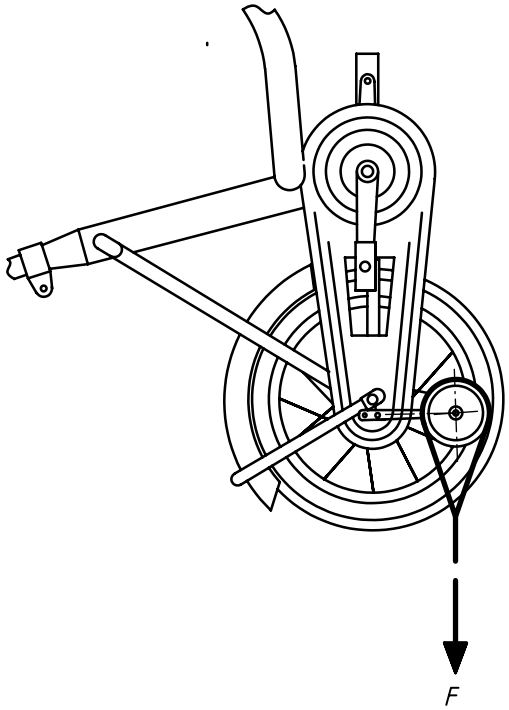
4.15.4.2 Test method

With the bicycle frame rigidly supported into the front axle vertically above the rear wheel axle, apply a vertically downward force of 300 N to one of the stabilizer wheels, as shown in Figure 31, for 1 min.

Repeat the test on the other stabilizer wheel.

Repeat the alternate loading a further four times (a total of five loadings on each stabilizer, each for a period of 1 min).

1 min after removal of the fifth loading on each stabilizer, measure the permanent set at a point on the circumference of the stabilizer wheel.



Key

F force of 300 N acting through centreline of stabilizer wheel

Figure 31 — Longitudinal load test

4.16 Luggage carriers

If luggage carriers are provided, they shall comply with ISO 11243. The bicycle shall be designed to be stable with a luggage carrier loaded with the max permissible load.

4.17 Lighting systems and reflectors

If the bicycle is intended for the use on public road space, national regulations apply.

4.17.1 Front and rear light

Manufacturer's instruction shall advise the user to take note of national regulations for front and rear light of the country in which the bicycle is to be used [see Clause 5 i)].

4.17.2 Reflectors

Bicycles for young children shall be fitted with front, rear, side and pedal reflectors.

These devices shall comply with the provisions in force in the country in which the products is marketed. If there are no forced provisions of these devices, the retro-reflective devices shall comply with the requirements of ISO 6742-2.

4.17.3 Wiring harness

When a wiring harness is fitted, it shall be positioned to avoid any damage by contact with moving parts or sharp edges. All connections shall withstand a tensile force in any direction of 10 N.

4.18 Warning device

Where a bell or other suitable device is fitted, it must comply with national regulations.

5 Instructions

These instructions can be provided in all types of format (paper, CD, website, etc.) according to national regulations and shall be written in the language of the country where the bicycle is to be marketed, or by visual tools, such as pictograms and illustrations, which shall feature prominently in the product safety information. When an electronic format is provided, a paper version shall be available upon request. The customer shall be made aware of this information either by the manufacturer or the retailer.

Instructions for use shall contain the following information:

a) the type of use for which the bicycle has been designed (i.e. the type of terrain for which it is suitable) with a warning about the hazards of incorrect use;

b) preparation for riding – how to measure and adjust the saddle height to suit the rider with an explanation of the insertion-depth warning marks on the seat-post and handlebar stem. Clear information on which lever operates the rear brake, the presence of any brake-power modulators with an explanation of their function and adjustment, and the correct method of using a back-pedal brake, if fitted;

c) the importance of parents or carers ensuring that children are properly instructed in the use of a child's bicycle, particularly in the safe use of the braking systems (especially a back-pedal brake);

d) indication of minimum saddle height and the way to measure it;

e) the recommended method for adjusting any adjustable suspension system fitted;

f) recommendations for safe riding – use of a bicycle helmet, regular checks on brakes, tyres, steering, rims, and caution concerning possible increased braking distances in wet weather;

g) the permissible total mass of the rider plus luggage and the maximum total mass (bicycle + rider + luggage);

h) indication whether or not a bicycle is suitable for the fitting of a luggage carrier and (or) a child seat;

i) an advisory note to drawn attention to the parents or carer concerning possible national legal requirements when the bicycle is to be ridden on public roads (e.g. lighting and reflectors);

j) an advisory note on specific risk of entrapment during normal use and maintenance;

k) recommended tightening of fasteners related to the handlebar, handlebar-stem, saddle, seat-post, and wheels, with torque values for threaded fasteners;

l) fitting, adjustment and removal of stabilizers, and a warning regarding risks when using stabilizers;

m) the correct method of assembling any parts supplied unassembled;

n) lubrication – where and how often to lubricate, and the recommended lubricants;

o) the correct chain tension and how to adjust it or other drive mechanism;

p) adjustment of gears and their operation;

q) adjustment of brakes and recommendations for the replacement of the friction components;

r) recommendations on general maintenance;

s) the importance of using only genuine replacement parts for safety-critical components;

t) appropriate spares, i.e. tyres, tubes, and brake friction-components;

u) accessories – where these are offered as fitted, details shall be included such as operation, maintenance required (if any) and any relevant spares (e.g. light bulbs).

Any other relevant information may be included at the discretion of the manufacturer.

6 Marking

6.1 Requirement

The frame shall be:

— visibly and permanently marked with a successive serial number for the bicycle at a readily visible location to facilitate traceability;

— visibly and durably marked with the name of the manufacturer or manufacturer's representative, and the number of this document, i.e. ISO 8098:2023. The methods of testing for durability is specified in 6.2.

NOTE In some countries there is a legal requirement concerning marking of bicycles.

For components, currently there are no specific requirements, but it is recommended that the following safety-critical components be clearly and permanently marked with traceable identification, such as a manufacturer's name and a part number:

a) front fork;

b) handlebar and handlebar stem;

c) seat-post;

d) brake blocks and/or brake-block holders and brake-pads;

e) brake outer-cable casing;

f) hydraulic-brake tubing;

g) brake-levers;

h) chain and belt;

i) pedals and cranks;

j) bottom-bracket spindle;

k) wheel rims.

6.2 Durability test

6.2.1 Requirement

When tested by the method described in 6.2.2, marking shall remain easily legible. It shall not be easily possible to remove any label nor shall any label show any sign of curling.

6.2.2 Test method

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.

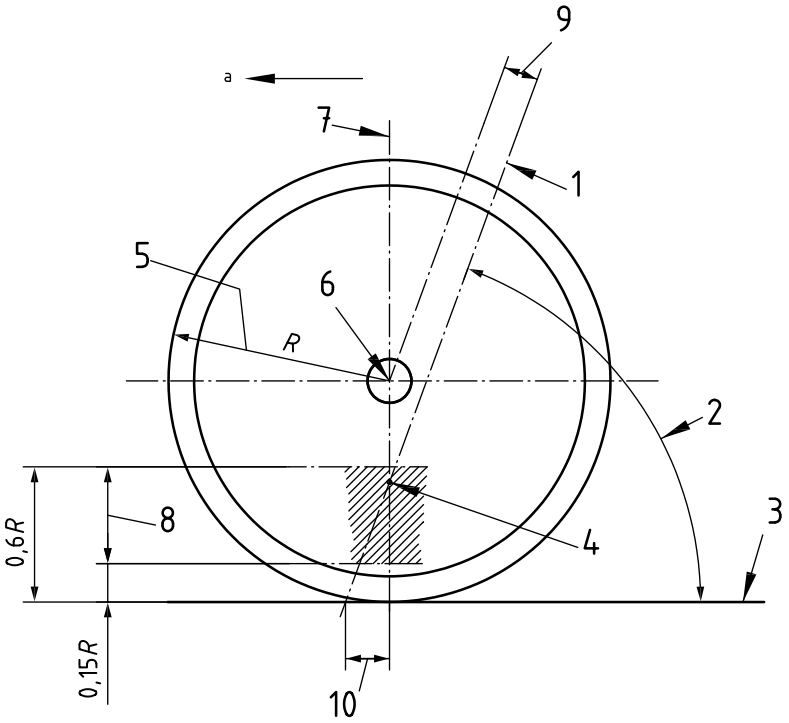
Annex A
(informative)

Steering geometry

The steering geometry employed, as shown in Figure A.1, will generally be dictated by the use for which the bicycle is intended but it is nevertheless recommended that

a) the steering head angle be not more than 75° and not less than 65° in relation to the ground line, and

b) the steering axis intersects a line perpendicular to the ground line, drawn through the wheel centre, at a point not lower than 15 % and not higher than 60 % of the wheel and tyre assembly radius when measured from the ground line.



Key

1 steering axis
2 steering head angle
3 ground line
4 intersection point
5 wheel and tyre assembly radius
6 wheel centre
7 perpendicular to ground line
8 tolerance
9 offset
10 trail
[a] Direction of travel.

Figure A.1 — Steering geometry

Annex B
(informative)

Verification of free fall velocity

For all vertical impact tests, the striker shall be guided in such a way that the efficiency will allow a value of at least 95 % of the free fall velocity.

The free fall velocity is calculated as given by Formula (B.1):

$$v = \sqrt{2gh} \tag{B.1}$$

where

v is the free fall velocity (m/s);

g is the gravitation acceleration (m/s^2) (i.e. = 9,806 65 m/s^2);

h is the falling height (m).

The efficiency is equal to Formula (B.2):

$$\mu = \frac{v_i}{v} \times 100 \tag{B.2}$$

where

μ is the efficiency (%);

v_i is the measured speed at impact (m/s).

Bibliography

[1] ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

[2] ISO 3452-2, *Non-destructive testing — Penetrant testing — Part 2: Testing of penetrant materials*

[3] ISO 3452-3, *Non-destructive testing — Penetrant testing — Part 3: Reference test blocks*

[4] ISO 3452-4, *Non-destructive testing — Penetrant testing — Part 4: Equipment*

[5] ISO 4210-1, *Cycles — Safety requirements for bicycles — Part 1: Terms and definitions*

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

[7] ISO 4210-3, *Cycles — Safety requirements for bicycles — Part 3: Common test methods*

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

[9] ISO 4210-5, *Cycles — Safety requirements for bicycles — Part 5: Steering test methods*

[10] ISO 4210-6, *Cycles — Safety requirements for bicycles — Part 6: Frame and fork test methods*

[11] ISO 4210-7, *Cycles — Safety requirements for bicycles — Part 7: Wheel and rim test methods*

[12] ISO 4210-8, *Cycles — Safety requirements for bicycles — Part 8: Pedal and drive system test methods*

[13] ISO 4210-9, *Cycles — Safety requirements for bicycles — Part 9: Saddle and seat-post test methods*

[14] ASTM E467, *Standard Practice for Verification of Constant Amplitude Dynamic Forces in an Axial Fatigue Testing System*

NATIONAL ANNEX C

(*National Foreword*)

TOXICITY TEST

C-1 PLASTIC COMPONENTS

Plastic components such as brake cable, grips, brake levers, pedals etc should be tested for total polycyclic aromatic hydrocarbons (PAH) content and total phthalate content.

C-1.1 Total Polycyclic Aromatic Hydrocarbons (PAH) Content

Total polycyclic aromatic hydrocarbons (PAH) content should be determined as per AFPS GS 2014 : 01 PAK- analysis by GC-MSD for following 18 compounds:

Naphthalene (91-20-3), acenaphthylene (208-96-8), acenaphthene (83-32-9), fluorine (86-73-7), phenanthrene (85-1-8), anthracene (120-12-7), fluoranthene (206-44-0), pyrene (129-00-0), chrysene (218-01-9), benzo (a) anthracene (56-55-3), benzo (b) fluoranthene (205-99-2), benzo (k) fluoranthene (207-08-9), benzo (j) fluoranthene (205-82-3), benzo (e) pyrene (192-97-2), benzo (a) pyrene (50-32-8), dibenzo (a, h) anthrancene (53-70-3), indeno (1,2,3-cd) pyrene (193-39-5), benzo (g, h, i) perylene (191-24-2).

Samples tested should meet the following requirements:

Total of 18 PAH's: ≤ 10 mg/kg and benzo (a) pyrene: ≤ 1 mg/kg

NOTE — CAS number of compounds are given in brackets.

C-1.2 Total Phthalate Content

Total phthalate content should be determined by solvent extraction followed by GC-MS analysis. The amount of following 19 compounds should be determined:

a) DEHP bis(2-ethylhexyl) phthalate (117-81-7);
b) DBP dibutylphthalate (84-74-2);
c) BBP benzylbutylphthalate (85-68-7);
d) DINP diisononylphthalate (28553-12-0, 68515-48-0);
e) DIDP diisodecylphthalate (26761-40-0);
f) DNOP dioctylphthalate (117-84-0);
g) DIBP diisobutylphthalate (84-69-5);
h) DHNUP 1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (68515-42-4);
j) DIHP 1,2-benzoldicarbonsäure, Di-C6-8-verzweigte alkyl ester, C7-reich (71888-89-6);
k) DMEP dimethoxyethylphthalat (117-82-8);
m) 1,2-benzoldicarbonsäure, dipentylester, verzweigt undlinear (84777-06-0);
n) DIPP diisopentylphthalat (605-50-5);
p) nPIPP N-pentyl-isopentylphthalat (776297-69-9);
q) DPP dipentylphthalat (131-18-0);
r) DnHP dihexylphthalate (84-75-3);
s) DHxP 1,2-benzenedicarboxylic acid, dihexylester, branched and linear, (68515-50-4);
t) 1,2-benzenedicarboxylic acid di-C6-10-alkyl esters;

u) 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyldiesters with 0.3 percent of dihexyl phthalate, (68515-51-5, 68648-93-1);

v) DCP dicylohexyl phthalate (84-61-7); and

w) Di-n-pentyl phthalate (DNPP).

The presence of none of the above compounds should exceed 0.1 percent.

NOTE — CAS number of compounds are given in brackets.

C-2 COATED METAL COMPONENTS

Metal components with coating such as metal tubes should be subjected to determination of 19 elements for migration of heavy metal as per EN 71-3***.** The list of 19 elements along with their maximum migration allowed is given in Table C-1. Samples should meet the migration content requirement of all the elements individually.

Table C-1 Migration Limits of Heavy Metals

(*Clause* C-2)

Sl No. (1)	**Element** (2)	**Limit *Max* (mg/Kg)** (3)
i)	Aluminum (Al)	70 000
ii)	Antimony (Sb)	560
iii)	Arsenic (As)	47
iv)	Barium (Ba)	18 750
v)	Boron (B)	15 000
vi)	Cadmium (Cd)	17
vii)	Chromium (III) (Cr III)	460
viii)	Chromium-Vi (Cr-vi)	0.2
ix)	Cobalt (Co)	130
x)	Copper (Cu)	7 700
xi)	Lead (Pb)	160
xii)	Manganese (Mn)	15 000
xiii)	Mercury (Hg)	94
xiv)	Nickel (Ni)	930
xv)	Selenium (Se)	460
xvi)	Strontium (Sr)	56 000
xvii)	Tin (Sn)	180 000
xviii) 1	Organotin	12
xix)	Zinc (Zn)	46 000

* EN 71-3 :2019 Safety of toys — Part 3: Migration of certain elements.

NATIONAL ANNEX D

(*National Foreword*)

PROTRUSIONS

D-1 Exposed Protrusions

Any rigid, exposed protrusion longer than 8 mm (*see* L in Fig. D-1) after assembly, with the exception of:

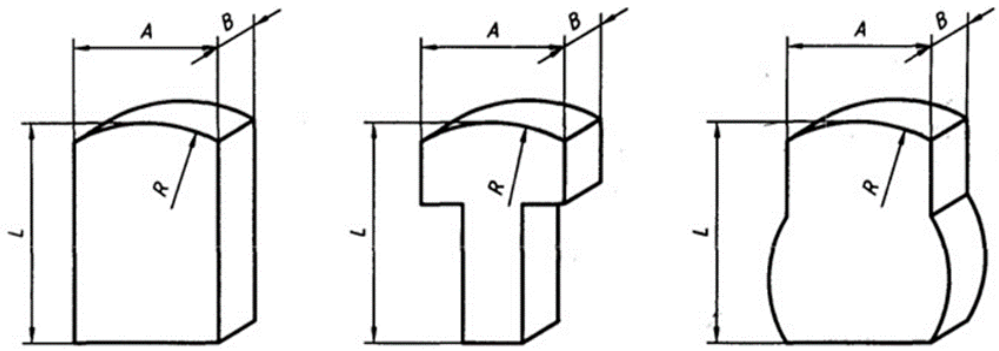
a) the front gear-change mechanism at the chainwheel;
b) the rear gear-change mechanism below the chain-stay;
c) the rim-brake mechanism at the front and rear wheels;
d) a lamp-bracket fitted on the head-tube;
e) reflectors; and
f) toe-clips and toe straps.

should terminate in a radius, R of not less than 6.3 mm. Such protrusions shall have a major end dimension, A of not less than 12.7 mm and a minor dimension B, of not less than 3.2 mm (*see* Fig D-1).

D-2 Exclusion Zone, Protective Devices and Screw Threads

D-2.1 There should be no protrusions on the top tube of a bicycle frame between the saddle and a point 300 mm forward of the saddle, with the exception that control cables no greater than 6.4 mm in diameter and cable clamps made from material no thicker than 4.8 mm may be attached to the top tube.

D-2.2 Foam pads attached to the bicycle frame to act as protective cushions are permitted, provided that the bicycle meets the requirements for protrusions when the pads are removed. A screw thread that is an exposed protrusions should be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.



These shall apply when L is greater than 8 mm.

FIG. D-1 EXAMPLES OF DIMENSIONS OF EXPOSED PROTRUSIONS

D-3 Location of Exposed Protrusions

D-3.1 The location of exposed protrusions should be established using a test-cylinder (simulating a limb) conforming to the dimensions shown in Fig. D-2.

D-3.2 Manoeuvre the cylinder in any convenient attitude toward any rigid protrusion on the bicycle. If the central 75 mm long section of the test cylinder comes into contact with any protrusion, that protrusion shall be considered an exposed protrusion and shall comply with the requirements of exposed protrusions.

Dimensions in millimetres

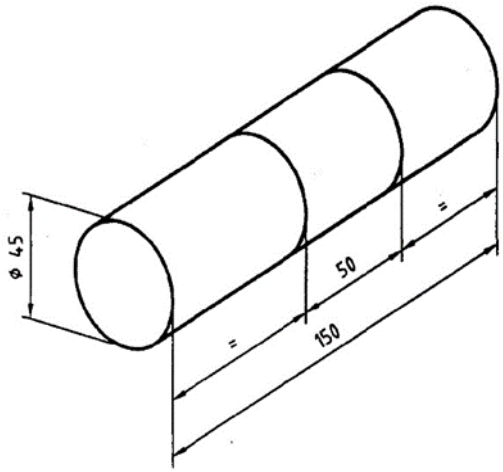
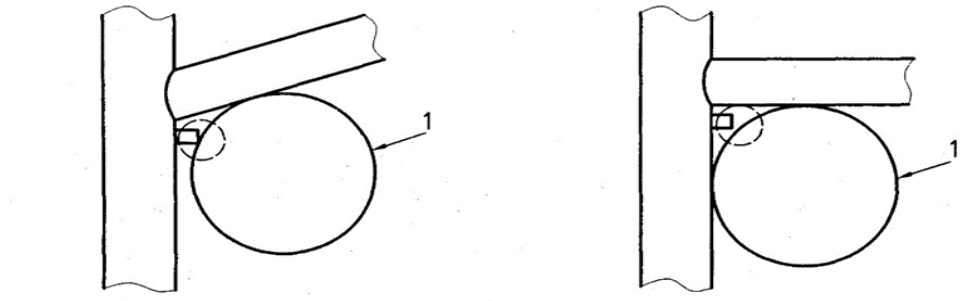


FIG. D-2 EXPOSED PROTRUSIONS TEST CYLINDER

D-3.3 Examples of exposed protrusions which do, and do not, need to comply with the requirements of clause exposed protrusions are shown in Fig. D-3.



Key
1 Test cylinder

FIG. D-3 EXAMPLES OF EXPOSED PROTRUSIONS

NATIONAL ANNEX E

(*National Foreword*)

VIBRATION TEST METHOD FOR STRENGTH TEST OF FRAME-FORK ASSEMBLY

E-1 TEST METHOD

E-1.1 With a frame-fork assembly mounted on the stand so as the ground contact points of both intended wheels are horizontal as shown in Fig. E-1, test shall be made by application of vertical up- and downward vibrations under the conditions given in Table E-1. The front wheel attachment shall be freely movable in the lengthwise orientation.

E-1.2 Using a Seat pillar to be combined with the frame-fork assembly, fix the seat pillar at the position of the minimum insertion mark. Secure the saddle-shape support as shown in 4 onto the seat area and suspend the circular weights dividedly on both sides through the hanger metals so that the total mass of the weight support, hanger metals, and weights is applied to the seat assembly. The weight support shall be secured to the seat pillar on the axis at 20 mm below the upper extreme of the by a fastening metal. For a frame-fork assembly a combined seat pillar, the test may be performed by replacing the combined seat pillar with a unit pillar having the same If the bar connecting the right-hand and left-hand weights contacts with the battery or other parts, test shall be performed with connecting bar removed. For applying load to the bottom bracket assembly, fix circular weight to the bottom bracket area dividedly on both sides. The weight support to which the weight is fixed shall not be heavier than 2 kg.

E-1.3 For applying load to the head assembly, fix the weight at the position where there is no clearance between the under surface of weight support (of mass not more than 0.5 kg) and the upper surface of the head lock nut by using a metal fitting as shown in Fig. E-1. For a frame-fork assembly using a handlebar stem consisting of a stem only, in which the Fork stem is clamped from outside, the test shall be performed with the weight fixed to the upper end of the fork stem by means of a jig which clamps the Fork stem from outside or by means of handlebar stem.

E-1.4 The frequency of vibration shall be selected arbitrarily in the range of 5 Hz to 12 Hz avoiding a resonance.

E-1.5 For testing a frame-fork assembly motor assist cycles, fix the battery, the drive unit, control unit or other that are to be mounted under the test conditions in Table E-1, or weights of equivalent masses thereof, on positions where they are actually mounted so that the test assembly simulates the actual application of load on the frame-fork. In this case, the battery, drive unit and control unit themselves are not the subjects of evaluation for the vibration proof performance. When the drive unit housing or other of the frame fork assembly for motor assist cycles constitute a of the frame-fork assembly, the test shall be with all such attached.

E-2 TEST CONFORMITY REQUIREMENT

There should be no visible cracks or fractures in any part of the frame /fork assembly besides no loosening of parts. The permanent set measured between the axes (the wheelbase, *see* Fig. E-1) should not exceed 20 mm.

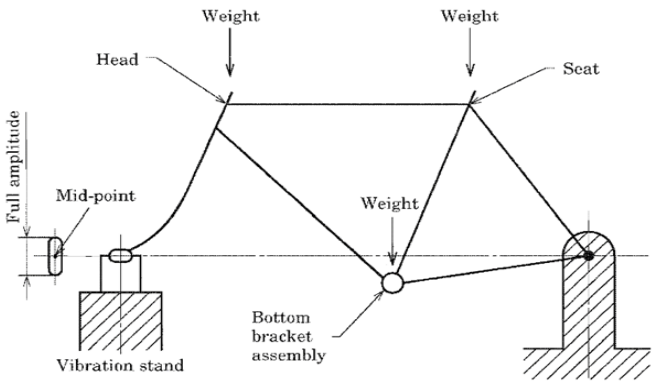


FIG. E-1 VIBRATION TEST OF FRAME AND FORK ASSEMBLY

Table E-1 Test Conditions for Vibration Test of Frame – Fork Assembly

(*Clauses* E-1.1 *and* E-1.5)

Weight (Mass) kg				Frequency of Vibration Hz	Acceleration of Vibrating Part m/s^2	Number of Vibrations
Head Assembly	Seat Assembly	Bottom Bracket Assembly	Total			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	40	10	55	5 to 12	17.6	70 000

NATIONAL ANNEX F

(*National Foreword*)

BIS CERTIFICATION MARKING

F-1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

NATIONAL ANNEX G

(*National Foreword*)

COMMITTEE COMPOSITION

Bicycles Sectional Committee, TED 16

Organization	*Representative(s)*
Research and Development Centre for Bicycle and Sewing Machine, Ludhiana	SHRI RAKESH PATHAK **(*Chairperson*)**
All India cycle Manufacturers Association, New Delhi	DR K. B. THAKUR SHRI SHRI ZOHEB KHAN (*Alternate*)
Amar Wheels Private Limited, Ludhiana	SHRI KARAN AGGARWAL
Avon Cycles Limited, New Delhi	SHRI ONKAR SINGH PAHWA SHRI RAJWINDER SINGH (*Alternate*)
Central Tool Room, Ludhiana	SHRI ONKAR SINGH PAHWA
Citizen Press Components, Ludhiana	SHRI MANJINDER SINGH AMIT PRAKASH SHARMA (*Alternate*)
Controllerate of Quality Assurance, New Delhi	SHRI SUBIR ROYCHOWDHURI SHRI ASOKA KUMAR MN (*Alternate*)
Department of Industries of Commerce, Chandigarh	SHRI SHASHI KANT SHRI AJAY KUMAR (*Alternate*)
G-13 Bicycle Forum, New Delhi	UMESH KUMAR NARANG SHRI RAJINDER JINDAL (*Alternate*)
Hero Cycles, Ludhiana	SHRI S. K. RAI SHRI K. C. SHARVA (*Alternate*)
Hero Ecotech Limited, Ludhiana	GURDEEP SINGH SHRI SURINDER PAL (*Alternate*)
Institute for Auto Parts and Hand tools Technology, Ludhiana	DR SANJEEV KATOCH
Lucky Exports, Ludhiana	SHRI SOHRAB CHHABRA SHRI HARSIMER JIT SINGH (*Alternate*)
Metro Tyres Limited, Ludhiana	SHRI JAGDEEP KUMAR SABLOK SHRI SAMIR MAYRA (*Alternate*)
National Institute of Technology, Jalandhar	DR RAMAN BEDI
Research & Development Centre for Bicycle and Sewing Machines, Ludhiana	SHRI VISHWAS MEHTA
Research and Development Centre for Bicycle and Sewing Machine, Ludhiana	SHRI RAJEEV SHARMA
S.K. Bikes Private Limited, Ludhiana	SHRI MUKESH KUMAR SHRI SACHIN LAKRA (*Alternate*)

Organization	*Representative(s)*
Sebco Enterprises, Ludhiana	SHRI RAJEEV JAIN SHRI LALIT SHARMA (*Alternate*)
Spark Engineering Private Limited, Ghaziabad	SHRI ANOOP AGGARWAL SHRI PRADEEP KUMAR AGGARWAL (*Alternate*)
Tube Investments of India Limited, Chennai	SHRI PRAKASH V. SHRI VENKATESWARAN B. (*Alternate*)
United Cycle and Parts Manufacturers Association,	PRESIDENT GENERAL SECRETARY (*Alternate*)
Vishal Cycles Private Limited, Ludhiana	SHRI SANJEEV MAHINDRU SHRI BHIM SAIN (*Alternate*)
BIS Directorate General	SHRI DEEPAK AGGARWAL, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (TRANSPORT ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI RAVINDRA BENIWAL
SCIENTIST 'C'/ DEPUTY DIRECTOR
(TRANSPORT ENGINEERING)

(*Continued from second cover*)

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. The Bureau of Indian Standards shall not be held responsible for identifying any or all such patent rights.

This standard contains Annex A and Annex B which are for information only.

This Standard also makes reference to following National Annexes C, D, E and F:

National Annex C Toxicity test

National Annex D Protrusions

National Annex E Vibration test method for strength test of frame-fork assembly

National Annex F Details of BIS certification marking of product

Out of these, National Annexes C, D and E are for information only and compliance to these requirements may be as per agreement between manufacturer and purchaser. National Annex F provides guidance on BIS certification marking of the product to the manufacturer seeking BIS certification marking.

The composition of the Committee responsible for the formulation of this standard is given in Annex G.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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