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Cycles — Safety requirements for bicycles for young children

Cycles — Conditions de sécurité des bicyclettes pour jeunes enfants

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8098 was prepared by Technical Committee ISO/TC 149, *Cycles*.

Introduction

Safety requirements for bicycles intended to be ridden on the public roads, and thus intended for adults, and for children aged about 8 years and older, are given in ISO 4210 : 1982, *Cycles — Safety requirements of bicycles.*

This International Standard follows the concept and format of ISO 4210, and covers requirements for bicycles that are suitable for younger children, aged from about 4 years to 8 years. Such bicycles are not intended to be ridden on the public roads and may not be adequately equipped to do so.

Bicycles complying with the requirements of this International Standard are not toy bicycles, and therefore do not fall within the scope of ISO/TC 181, *Safety of toys*.

Cycles — Safety requirements for bicycles for young children

Section 1 : General

1.1 Scope

This International Standard specifies safety and performance requirements, and the appropriate test methods, for bicycles for young children in respect of the design, assembly and testing of bicycles and sub-assemblies; it also lays down guidelines for instructions on the use and care of bicycles.

It applies to bicycles on which the maximum saddle height is less than 635 mm and more than 435 mm, and which are propelled by means of a transmitted drive to the rear wheel.

It applies to these bicycles whether fitted with stabilizers or not.

1.2 Definitions

For the purposes of this International Standard, the following definitions apply.

1.2.1 cycle: Any vehicle that has at least two wheels and is propelled solely by the muscular energy of the person on that vehicle, in particular by means of pedals.[1)]

1.2.2 bicycle: Two-wheeled cycle.[1)]

1.2.3 saddle height: Dimension from the ground plane to the top of the saddle, measured in the centre of the seating area normal to the ground plane when the bicycle is in the upright position.[1)]

1.2.4 braking distance: Distance travelled in bringing a bicycle to rest from the moment of application of the brakes.[1)]

1.2.5 exposed protrusion: Protrusion that can be contacted by the central 50 mm of the lateral surface of a cylinder 150 mm long and 45 mm in diameter (simulating a limb). (See figure 1.)

1.2.6 (pedal) tread surface: Surface of a pedal that is presented to the underside of the foot, the design of which incorporates a slip-resistant characteristic.[1)]

1.2.7 stabilizers: Removable auxiliary wheels fitted to enable the rider to maintain balance.

1.2.8 inflation pressure: Pressure recommended by the tyre manufacturer to which a tyre is inflated to provide safe and efficient performance.

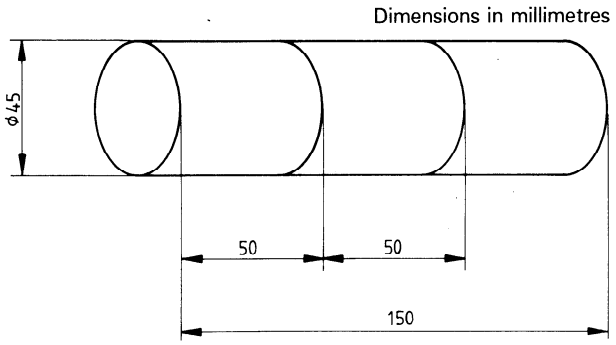

Figure 1 — Exposed protrusion test cylinder

1) These definitions are repeated, for convenience, from ISO 4210 : 1982.

Section 2: Requirements of sub-assemblies

2.1 General

2.1.1 Sharp edges

Exposed edges that could come into contact with parts of the rider's body, e.g. hands and legs, during normal riding or normal handling and normal maintenance shall not be sharp.

2.1.2 Protrusions

Any exposed protrusion longer than 8 mm after assembly shall terminate in a radius of not less than 6,3 mm. The end of such protrusions shall have a major dimension greater than 12,7 mm and a minor dimension greater than 3,2 mm.

There shall be no protrusions on the top tube.

A screw thread that is an exposed protrusion, as defined in 1.2.5, shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.

2.2 Brakes

2.2.1 Braking system

2.2.1.1 A bicycle having a maximum saddle height of 560 mm or more shall be equipped with a braking system, or systems, complying with the relevant requirements of 2.2.2 to 2.2.5.

2.2.1.2 A bicycle having a maximum saddle height of less than 560 mm need not be equipped with a braking system, but in this case the bicycle shall have a fixed transmitted drive.

Where a bicycle having a maximum saddle height of less than 560 mm is equipped with a braking system, it shall comply with the relevant requirements of 2.2.2 to 2.2.5.

2.2.2 Hand-operated brake

2.2.2.1 Brake lever position

The brake levers for front and rear brakes shall be positioned on that side of the handlebar appropriate to the country in which the bicycle is to be used.

2.2.2.2 Brake lever dimensions

The maximum grip dimension, *d*, shown in figure 2 and measured between the outer surfaces of the brake lever and the handlebar grip shall not exceed 65 mm at any point between points A and B, and 80 mm at any point between points B and C.

NOTE — The range of adjustment on an adjustable brake lever should permit these dimensions to be obtained.

2.2.2.3 Cable-brake assembly

When a bicycle is equipped with cable brakes of whatever type, the screws for attaching the brake assembly to the frame, fork or handlebar shall be provided with a suitable locking device, for example lockwasher, locknut or stiffnut.

The brake system shall operate without binding.

The cable pinch-bolt shall not cut any of the cable strands, when assembled to the manufacturer's instructions.

The cable end shall be protected with a cap that shall withstand a removal force of 20 N.

2.2.2.4 Brake block and holder assembly

The brake block shall be securely attached to the brake block holder and there shall be no failure of the brake block and holder assembly when tested by the method specified in 3.2. After completion of the test, the brake system shall be capable of meeting the braking performance requirements of 2.2.5.

Dimensions in millimetres

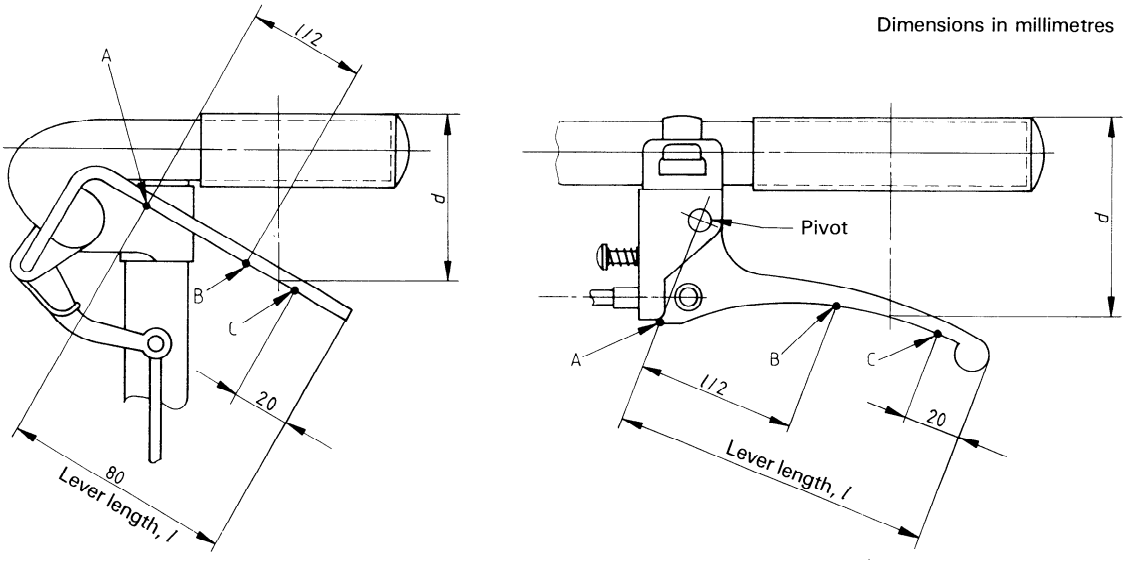

Figure 2 — Hand-brake lever dimensions

2.2.2.5 Brake adjustment

The brakes shall be capable of adjustment to an efficient operating position until the brake blocks have worn to the point of requiring replacement as recommended in the literature provided by the manufacturer.

When correctly adjusted, the brake block shall not contact anything other than the intended braking surface.

2.2.3 Back-pedal brake

The back-pedal brake shall be actuated by the operator's foot applying force to the pedal in a direction opposite to that of 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 torque of 14 N·m.

2.2.4 Strength of brake system

2.2.4.1 Hand-operated brake

When tested by the method described in 3.3.1, there shall be no failure of the brake system or of any component thereof.

2.2.4.2 Back-pedal brake

When tested by the method described in 3.3.2, there shall be no failure of the brake system or any component thereof.

2.2.5 Braking performance

2.2.5.1 Hand-brake performance test

When a hand-operated brake system is tested by the method described in 3.4, the braking force shall increase progressively as the lever force is increased from 45 N to 90 N, and shall be not less than 50 N for a lever force of 90 N.

NOTE — A braking force of 46,3 N equates to a theoretical braking distance of less than 2,5 m from a speed of 10 km/h with a total mass of rider and bicycle of 30 kg.

2.2.5.2 Back-pedal brake performance test

When a back-pedal brake system is tested by the method described in 3.5, the braking force transmitted to the rear wheel shall increase progressively as the pedal force is increased from 20 N to 100 N. The ratio of pedal force to braking force shall not be greater than 2 : 1.

NOTE — A braking force of 46,3 N equates to a theoretical braking distance of less than 2,5 m from a speed of 10 km/h with a total mass of rider and bicycle of 30 kg.

2.3 Steering

2.3.1 Handlebars

The handlebars shall have an overall width between 350 mm and 550 mm. The vertical distance between the top of the handlebar grips in their highest position and the saddle height when the saddle is in its lowest position shall not exceed 250 mm.

The ends of the handlebars shall be fitted with handlebar grips or handlebar plugs that will withstand a removal force of 70 N.

2.3.2 Handlebar stem

The handlebar stem shall contain a permanent mark that clearly indicates the minimum insertion depth of the handlebar stem into the fork stem, or alternatively a positive and permanent means of ensuring that the minimum insertion depth is always achieved. The insertion mark, or insertion depth, shall be not less than 65 mm from the lower end of the stem, and there shall be at least one shaft diameter's length of contiguous circumferential shaft material below the mark. An insertion mark shall not detract from the strength of the handlebar stem.

2.3.3 Clamping device for handlebar stem

The clamping device shall withstand a tightening torque of at least 150 % of the manufacturer's maximum tightening torque without failure of any part of the threaded assembly. After this test, the handlebar stem/fork assembly shall comply with the requirements of 2.3.5.3.

2.3.4 Steering stability

The steering shall be free to turn through at least 60° but not more than 75° 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.

2.3.5 Strength of steering assembly

2.3.5.1 When tested by the method described in 3.6.1.1 and 3.6.1.2, there shall be no fracture of the handlebar stem, nor shall it suffer permanent deformation in excess of 20 mm per 100 mm length.

2.3.5.2 When tested by the method described in 3.6.2, there shall be no movement of the handlebar relative to the stem.

2.3.5.3 When tested by the method described in 3.6.3, there shall be no movement of the handlebar stem relative to the fork stem.

2.4 Frame/fork assembly

2.4.1 Impact test (falling mass)

When tested by the method described in 3.7.1, there shall be no visible evidence of fracture, and the permanent deformation of the assembly, measured between the centrelines of the axles, shall not exceed 20 mm.

2.4.2 Impact test (falling frame/fork assembly)

When tested by the method described in 3.7.2, there shall be no visible evidence of fracture.

2.5 Front fork

The slots or other means of location for the front axle within the front fork shall be such that when the axle or cones are firmly abutting the top face of the slots, the front wheel remains central within the front fork.

2.6 Wheels

2.6.1 Rotational trueness

NOTE — This is defined in ISO 1101 : 1983, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings* in terms of the measurement of run-out under rotation. The run-out tolerances given below represent the maximum permissible variation of position of the rim (i.e. full indicator reading) of a fully assembled wheel during one complete revolution about the axle without axial movement.

2.6.1.1 Radial run-out tolerance

For a wheel used in conjunction with a rim brake, the run-out shall not exceed 2 mm when measured perpendicular to the axle at a suitable point along the rim. For a wheel not used with a rim brake, the run-out shall not exceed 4 mm.

2.6.1.2 Axial run-out tolerance

For a wheel used in conjunction with a rim brake, the run-out shall not exceed 2 mm when measured parallel to the axle at a suitable point along the rim. For a wheel not used with a rim brake, the run-out shall not exceed 4 mm.

2.6.2 Clearance

Alignment of the wheel assembly in a bicycle shall allow not less than 2 mm clearance between the tyre and any frame or fork element.

2.6.3 Static load test

When a fully assembled wheel is tested by the method described in 3.8, there shall be no failure of any of the components of the wheel, and the permanent deformation, measured at the point of application of the force on the rim, shall not exceed 1,5 mm.

2.7 Tyres and tubes

2.7.1 Inflation pressure

The inflation pressure (see 1.2.8) shall be moulded on the sidewall of the tyre so as to be readily visible when the tyre is assembled on the wheel.

Non-pneumatic tyres are excluded from this requirement.

2.7.2 Compatibility of inflatable tyres and rims

The tyre and tube shall be compatible with the rim design such that, when inflated to the inflation pressure as moulded on the sidewall of the tyre plus 100 kPa for a period of 5 min, the tyre shall remain intact on the rim.

2.8 Pedals and pedal/crank assembly

2.8.1 Pedal tread

2.8.1.1 The tread surface of a pedal shall be secured against movement within the pedal assembly. The pedal shall be able to turn freely on its axle.

2.8.1.2 A pedal 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.

2.8.2 Pedal clearance

2.8.2.1 Ground clearance

2.8.2.1.1 With the bicycle unladen, 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 an angle of 20° from the vertical before any part of the pedal touches the ground.

2.8.2.1.2 When a bicycle is equipped with a sprung suspension, the suspension shall be depressed by the application of a mass of 30 kg to the saddle whilst the bicycle is in a vertical position. With the suspension clamped in this position, the ground clearance shall be as specified in 2.8.2.1.1.

2.8.2.2 Toe clearance

A bicycle shall have at least 89 mm clearance between the pedal and the 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 results in the least clearance (see figure 3).

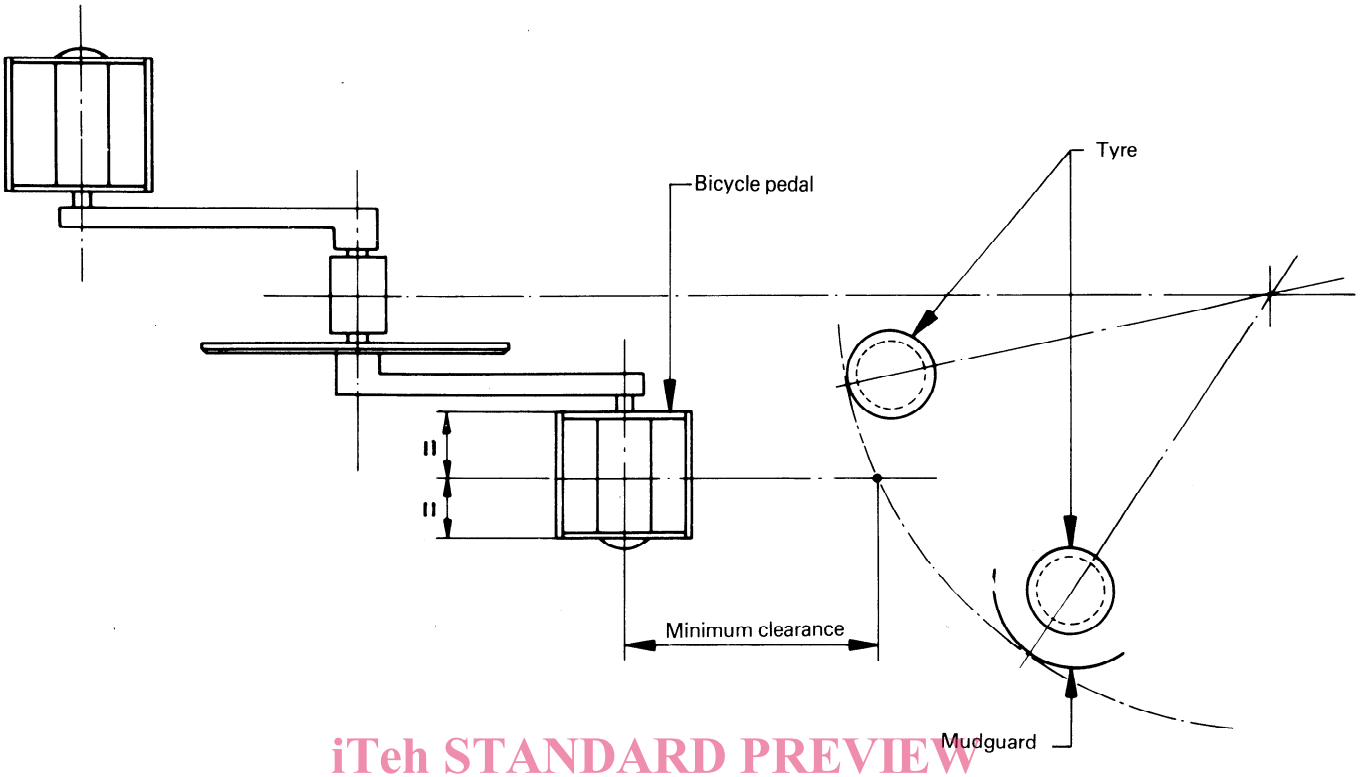

Figure 3 — Toe clearance

Where a bicycle front fork has features that are designed to permit the fitting of a front mudguard, the toe clearance shall be measured with a suitable mudguard so fitted.

2.8.3 Pedal/crank assembly kinetic test

When tested by the method described in 3.9, there shall be no visible fracture of any part of the pedal or of the crank threads.

2.9 Saddle

2.9.1 Limiting dimensions

No part of the saddle, saddle supports, or accessories attached 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 pillar axis.

2.9.2 Seat pillar

The seat pillar shall contain a permanent mark that clearly indicates the minimum insertion depth of the pillar into the frame. The insertion mark shall be positioned at a distance equivalent to not less than two diameters of the pillar from the bottom of the full diameter of the pillar, and it shall not detract from the strength of the pillar.

2.9.3 Saddle adjustment clamp

When tested by the method described in 3.10, there shall be no visible permanent movement of the saddle assembly in any direction with respect to the pillar, or of the pillar with respect to the frame.

A saddle assembly that is not clamped, but is designed to pivot in a vertical plane with respect to the pillar, shall be allowed to move within the parameters of the design and shall withstand the test described in 3.10 without additional visible permanent movement.

2.10 Drive system static load test

When tested by the method described in 3.11, there shall be no visible fracture or visible permanent deformation of any component of the drive system, and drive capability shall not be lost.

2.11 Chainguard

A bicycle having a maximum saddle height of 560 mm or more shall be equipped with a chainwheel disc or other protective device to shield the outside face of the upper junction of the chain and chainwheel. A chainwheel disc shall exceed in diameter the outside surface of the chain when the chain is fully positioned on the chainwheel. A protective device other than a chainwheel disc shall shield the chain for a distance of at least 25 mm measured along the chain prior to the point where the chainwheel teeth first pass between the side plates of the chain.

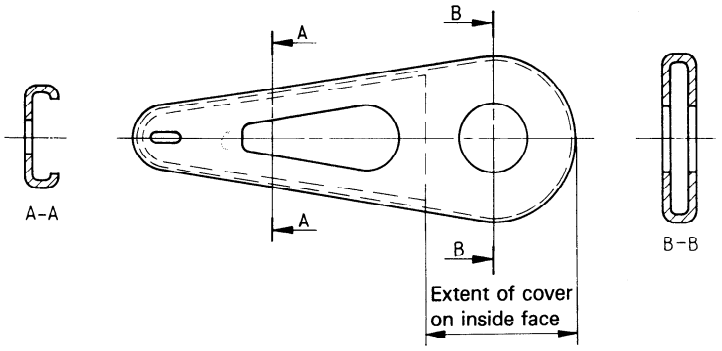

Figure 4 — Chainguard

A bicycle having a maximum saddle height of less than 560 mm shall be equipped with a chainguard that fully shields the outside face and edge of the chain, chainwheel and rear sprocket, and the inside face of the chainwheel and junctions of the chain and chainwheel (see figure 4).

2.12 Stabilizers

2.12.1 Dimensions

When assembled to the bicycle in accordance with the manufacturer's instructions,

a) the horizontal distance between a vertical plane through each stabilizer wheel and a vertical plane through the centreline of the bicycle frame shall be not less than 175 mm;

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

2.12.2 Vertical load test

When tested by the method described in 3.12, the deflection under load and the permanent deformation shall not exceed 25 mm and 15 mm respectively.

2.12.3 Longitudinal load test

When tested by the method described in 3.13, the permanent deformation shall not exceed 15 mm.

There shall be no visible fracture of any component of the stabilizer assembly.

2.13 Instructions

Each bicycle shall be provided with a set of instructions containing information on

a) preparation for riding — how to adjust the saddle height and handlebar to suit the rider with an explanation of the warning marks on the seat pillar and handlebar stem;

b) recommended tightening of fasteners relating to handlebar, handlebar stem, saddle and pillar, and wheels;

c) lubrication — where and how often to lubricate, and recommended lubricant;

d) how to adjust the chain or other drive mechanism;

e) adjustment of brakes and recommendations for replacement of brake blocks;

f) adjustment of gears;

g) fitting, adjustment and removal of stabilizers;

h) normal spares, i.e. tyres, tubes, brake-block holder assembly;

i) recommendations on safe riding — regular checks on brakes, tyres and steering.

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

2.14 Marking

Where compliance with this International Standard is claimed, each bicycle shall be visibly and durably marked with

a) the number of this International Standard, i.e. ISO 8098;

b) the name of the manufacturer, importer or distributor, as appropriate.

Section 3: Test methods

3.1 General

Unless otherwise stated, all tests shall be carried out without stabilizers fitted.

3.2 Brake block test

Conduct this test on a fully assembled bicycle with the brakes adjusted to a correct position, and with a mass of 30 kg on the saddle. Actuate each brake lever with a force of 130 N, and maintain this force during the test.

Subject the bicycle to five forward and five rearward movements, each of not less than 75 mm distance.

3.3 Brake system load test

3.3.1 Hand-operated brake

Conduct this test on a fully assembled bicycle, and ensure that the braking system is correctly adjusted. Apply a force to the brake lever at a point 25 mm from the end of the lever and in a direction normal to the handlebar grip surface in the plane of travel of the lever, as shown in figure 5. This force shall be 300 N, or such lesser force as is required to bring

a) a cable-brake lever into contact with the handlebar grip surface;

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

Repeat the test for a total of ten times on each handbrake lever.

3.3.2 Back-pedal brake

Conduct this test on a fully assembled bicycle. Ensure that the braking system is correctly adjusted, and that the right-hand pedal crank is in a horizontal position, as shown in figure 7. Apply a force of 600 N, gradually and in a vertical direction, to the centre of the right-hand pedal axle, and maintain this force fully for 15 s.

Repeat the test for a total of ten times.

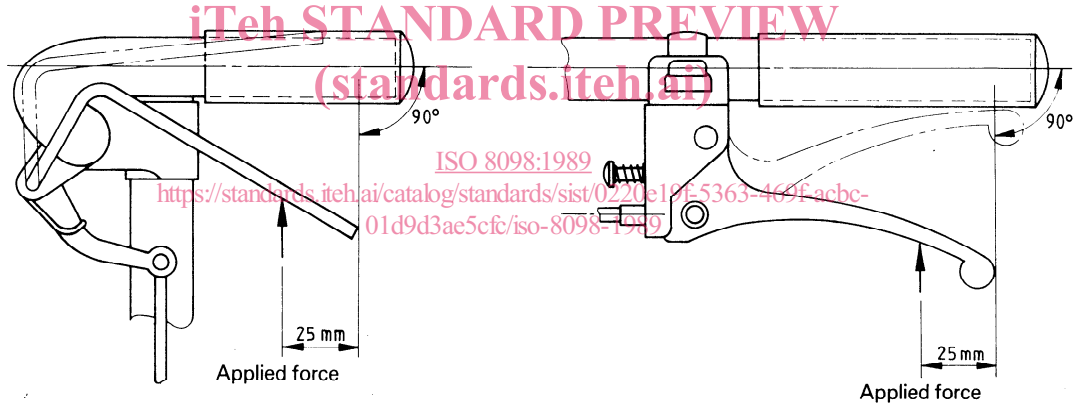

Figure 5 — Applied force on hand-brake levers

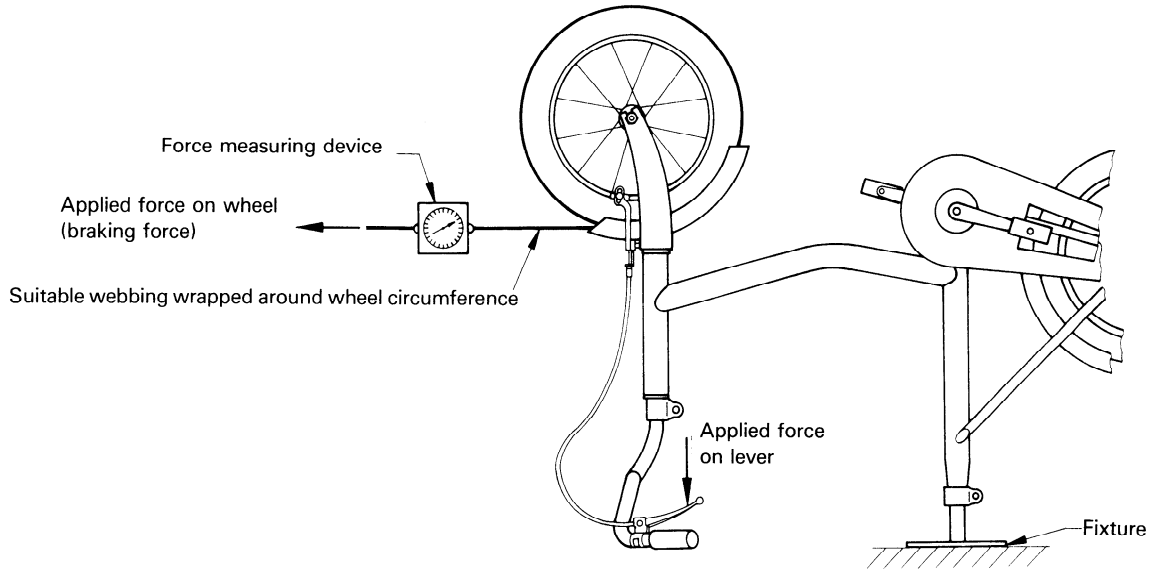

Figure 6 — Measurement of braking force from hand-brake