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Bicycles for general use

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Bicycle Promotion Institute (JBPI)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS D 9301:2008** is replaced with this Standard.

However, **JIS D 9301:2008** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until November 19th, 2010.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Bicycles for general use

Introduction

This Japanese Industrial Standard has been prepared based on the fourth edition of **ISO 4210** published in 1996, with some modifications of its technical contents mainly for the purpose of reinforcing the safety requirements.

The portions given sidelines or dotted underlines are the matters not stated in the original International Standard. A list of modifications with explanations is given in Annex JB. Annex JA is not part of the said corresponding International Standard.

1 Scope

This Standard specifies requirements for bicycles for general use (hereafter referred to as “bicycles”) defined in **JIS D 9111**.

Bicycles for general use refer to sports bicycles, city cycles, utility bicycles, children bicycles, and the folding or separable type bicycles.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 4210:1996 *Cycles—Safety requirements for bicycles* (MOD)

The symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS A 1481 *Determination of asbestos in building material products*

JIS B 0205-1 *ISO general purpose metric screw threads—Part 1: Basic profile*

JIS B 0205-2 *ISO general purpose metric screw threads—Part 2: General plan*

JIS B 0205-3 *ISO general purpose metric screw threads—Part 3: Selected sizes for screws, bolts and nuts*

JIS B 0205-4 *ISO general purpose metric screw threads—Part 4: Basic dimensions*

JIS B 0209-1 *ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data*

JIS B 0209-2 *ISO general purpose metric screw threads—Tolerances—Part 2: Limits of sizes for general purpose external and internal screw threads—Medium quality*

JIS B 0209-3 *ISO general purpose metric screw threads—Tolerances—Part 3: Deviations for constructional screw threads*

JIS B 0225 *Cycle threads*

JIS B 4652 *Hand torque tools—Requirements and test methods*

JIS C 9502 *Lighting equipment for bicycles*

NOTE : Corresponding International Standard: ISO 6742-1:1987 *Cycles—Lighting and retro-reflective devices—Photometric and physical requirements—Part 1: Lighting equipment (MOD)*

JIS D 9101 *Cycles—Terminology*

JIS D 9111 *Cycles—Classification and essential characteristics*

JIS D 9112 *Cycles—Tyres—Dimensions*

JIS D 9401 *Frame—Assembly for bicycles*

JIS D 9411 *Bicycles—Mudguards*

JIS D 9412 *Bicycles—Handlebars and stems*

JIS D 9413 *Bicycles—Handle grips*

JIS D 9414 *Bicycles—Brakes*

JIS D 9415 *Bicycles—Chainwheels and cranks*

JIS D 9416 *Bicycles—Pedals*

JIS D 9417 *Bicycles—Chains*

NOTE : Corresponding International Standard: ISO 9633:2001 *Cycle chains—Characteristics and test methods (MOD)*

JIS D 9418 *Bicycles—Free wheels and hub cogs*

JIS D 9419 *Bicycles—Hubs*

JIS D 9420 *Bicycles—Spokes and nipples*

JIS D 9421 *Bicycles—Rims*

NOTE : Corresponding International Standard: ISO 5775-2:1996 *Bicycle tyres and rims—Part 2: Rims and Amendment 1 (2001) (MOD)*

JIS D 9422 *Tire valves for bicycles*

JIS D 9428 *Derailleur for bicycles*

JIS D 9431 *Bicycles—Saddles*

JIS D 9432 *Bicycles—Chain adjusters and crank cotter pins*

JIS D 9451 *Bicycles—Bells*

JIS D 9452 *Bicycles—Reflex reflectors*

NOTE : Corresponding International Standard: ISO 6742-2:1985 *Cycles—Lighting and retro-reflective devices—Photometric and physical requirements—Part 2: Retro-reflective devices (MOD)*

JIS D 9453 *Bicycles—Luggage carriers and stands*

JIS D 9454 *Bicycles—Chain cases*

JIS D 9455 *Air pumps for bicycles*

JIS D 9456 *Cycles—Locks*

JIS G 4303 *Stainless steel bars*

JIS K 6258 *Rubber, vulcanized or thermoplastic—Determination of the effect of liquids*

JIS K 6302 *Pneumatic tyres for bicycles*

NOTE : Corresponding International Standard: ISO 5775-1:1994 *Bicycle tyres and rims—Part 1: Tyre designations and dimensions (MOD)*

JIS K 6304 *Inner tubes for bicycle tyres*

JIS K 6550 *Testing methods for leathers*

JIS L 1096 *Testing methods for woven fabrics*

JIS R 6252 *Abrasive papers*

JIS R 6253 *Waterproof abrasive papers*

JIS T 8134 *Protective helmets for bicycle users*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS D 9101** and the following apply.

3.1 safety hook

a protective device of cantilever caliper brake, provided to prevent any occurrence of failure such as breaking of the brake cable; it catches the straddle cable to prevent it from being entangled in the wheel

3.2 control cable

cable for controlling the devices, including brake cable, derailleur control cable or cable for actuating the locks attached to the front and rear wheels simultaneously

3.3 shoulder pad

a pad fixed on the internal corner between the top and seat tubes providing for an event of shouldering the bicycle

3.4 coaster brake hub

a type of rear hub with a built-in mechanism of braking the bicycle by means of pedaling backwards

In ISO standards, these are called “back-pedal brakes”.

3.5 quick release hub

a type of hub equipped with a mechanism to allow quick attachment and detachment of the wheel to/from a frame without using any tool such as spanners

3.6 chainwheel disc

a disk-shaped chainguard mainly employed in a sports bicycle, which is designed to be installed between the right crank and chainwheel to protect rider's clothes from being caught in the chain and chainwheel junction

3.7 toe clip

a metal attachment to support the toe area of the rider's shoe so as not to be removed from the pedal

3.8 toe strap

a fastening device of belt for fixing the rider's shoe on the pedal to prevent his foot from removal

3.9 binding type pedal

a pedal with a foot-retaining device structured as capable of fixing by coupling the fixing member (cleat) to be attached on the shoe sole and the exclusive pedal body designed as engaging with the cleat

It is also called "clipless pedal".

3.10 spoke protector

a disc shaped device to be fitted between the greatest of the multiple free wheels or hub cogs and the rear wheel spokes to prevent the chain from falling down to spoke side

3.11 reflective tyre

a bicycle tyre provided with a circular refractive element on the sidewall in order to improve visibility of the bicycle by irradiation from automobile's headlight and the like in night-time

3.12 minimum insertion mark

a permanent mark to indicate the minimum insertion depth of the handlebar stem to fork stem or of the seat post to frame seat tube

3.13 gear development (GD)

distance travelled by a bicycle during one revolution of the bottom bracket axle (gear-ratio distance)

It is expressed in the value of the wheel circumferential length multiplied by the gear ratio.

3.14 solid wheel

a wheel of which the rim, spokes and hub are integrated into one body

3.15 ferrous component

component composed of structural members made entirely from ferrous materials excluding any joining media such as brazing materials or adhesives

3.16 non-ferrous component

component composed of structural members made entirely from non-ferrous materials excluding any joining media such as adhesives

Any component made from a mixture of ferrous and non-ferrous materials shall be classified as non-ferrous.

4 Constitution and parts

4.1 Constitution

Bicycles shall be composed of the parts necessary for driving and safety as shown in table 1, which are selected and combined according to the type of bicycle such as sports bicycle, city cycle, utility bicycle, children bicycle and their folding or separable type.

4.2 Parts

The parts of bicycles used shall conform to the **JIS** standards given in table 1 or shall be at least equivalent thereto in qualities. Where no applicable **JIS** is found for the parts among those listed in table 1, such parts used shall have the quality necessary for driving and safety.

For a belt-drive type bicycle transmitting the drive force by using a toothed belt, the **JIS** standards in table 1 do not apply for chainwheels and cranks, chains, free-wheel or hub cogs and derailleurs. The toothed-belt is subjected to Annex JA of this Standard. The screw threads other than those specified in **JIS B 0225**, Annex A of **JIS D 9418**, or Annex of **JIS D 9422** shall be in accordance with **JIS B 0205-1** to **JIS B 0205-4**, and the tolerance class 6H/6g or finer as specified in **JIS B 0209-1** to **JIS B 0209-3**.

Table 1 Constitution

Division of sub-assemblies ^{a)}	Name of part	Applicable JIS
Body	Frame-fork assembly (frame, front fork, frame parts)	JIS D 9401 ^{b)}
Steering device	Handlebars and stems	JIS D 9412 ^{b)}
	Handle grips	JIS D 9413
Driving device	Chainwheels and cranks	JIS D 9415
	Pedals	JIS D 9416
	Toe clips and toe straps	—
	Chains	JIS D 9417
	Toothed belt	Annex JA
	Free wheels or hub cogs	JIS D 9418
	Unit hub ^{c)}	JIS D 9419
	Toothed pulley (front and rear)	—
Running device	Tyres	JIS K 6302
	Tubes	JIS K 6304
	Rims	JIS D 9421
	Spokes and nipples	JIS D 9420
	Hubs (ordinary hub, quick-release hub, unit hub, hub gear, coaster brake hub, brake hub, and hub dynamo)	JIS D 9419
	Solid wheels	—
Change gear device	Derailleur	JIS D 9428
	Hub gear ^{c)}	JIS D 9419

Table 1 (concluded)

Division of sub-assemblies ^{a)}	Name of part	Applicable JIS
Braking device	Brakes (rim brake, caliper brake, band brake, internal expanding brake, and disc brake)	JIS D 9414
	Coaster brake hub ^{c)} and brake hub ^{c)}	JIS D 9419
Seating device	Saddles	JIS D 9431
Loading device	Front carriers	—
	Rear carriers	JIS D 9453
	Baskets	—
	Bags	—
Standing device	Stands	JIS D 9453
Warning device	Bells	JIS D 9451
	Buzzer	—
	Reflex reflectors (front, rear, pedal and side)	JIS D 9452
	Reflective materials (reflective tyre, reflective tape, etc.)	—
	Rear lamp	JIS C 9502
Lighting device	Head lamp	JIS C 9502
	Dynamo	JIS C 9502
	Hub dynamo ^{c)}	JIS D 9419
	Hand lantern	—
Protective device	Mudguards	JIS D 9411
	Mud flap	—
	Chain cases	JIS D 9454
	Spoke protector	—
	Cotter pin cover	—
	Dress guard	—
	Safety hook	—
Accessories	Locks	JIS D 9456
	Frame pumps	JIS D 9455
	Bottle and bottle cage	—
	Shoulder pad	—
Fasteners	Crank cotterpins, chain adjusters	JIS D 9432
	Bolts, nuts, machine screws	—

Notes ^{a)} The division of sub-assemblies is in accordance with **JIS D 9111**.

^{b)} Including frame-fork assemblies of which the fitting part between the fork stem and head set has 1 1/8 tpi 26 in nominal thread size or $\phi 31.8$ mm in the fork stem outer diameter with the inner diameter of 25.4 mm or 28.6 mm respectively and handlebars with stem of which the outer diameter corresponds to the said sizes.

^{c)} The unit hub, hub gear, coaster brake hub and brake hub and hub dynamo are a complex part including the functions of driving, gear change, braking and lighting power generation, respectively, which are classified wholly in the division of running device.

5 Safety (including performance, constitution and shape and dimensions)

5.1 General

5.1.1 Principal dimensions

The length, width and maximum saddle height of bicycles (see figure 1) shall be as given in clause 4 of JIS D 9111.

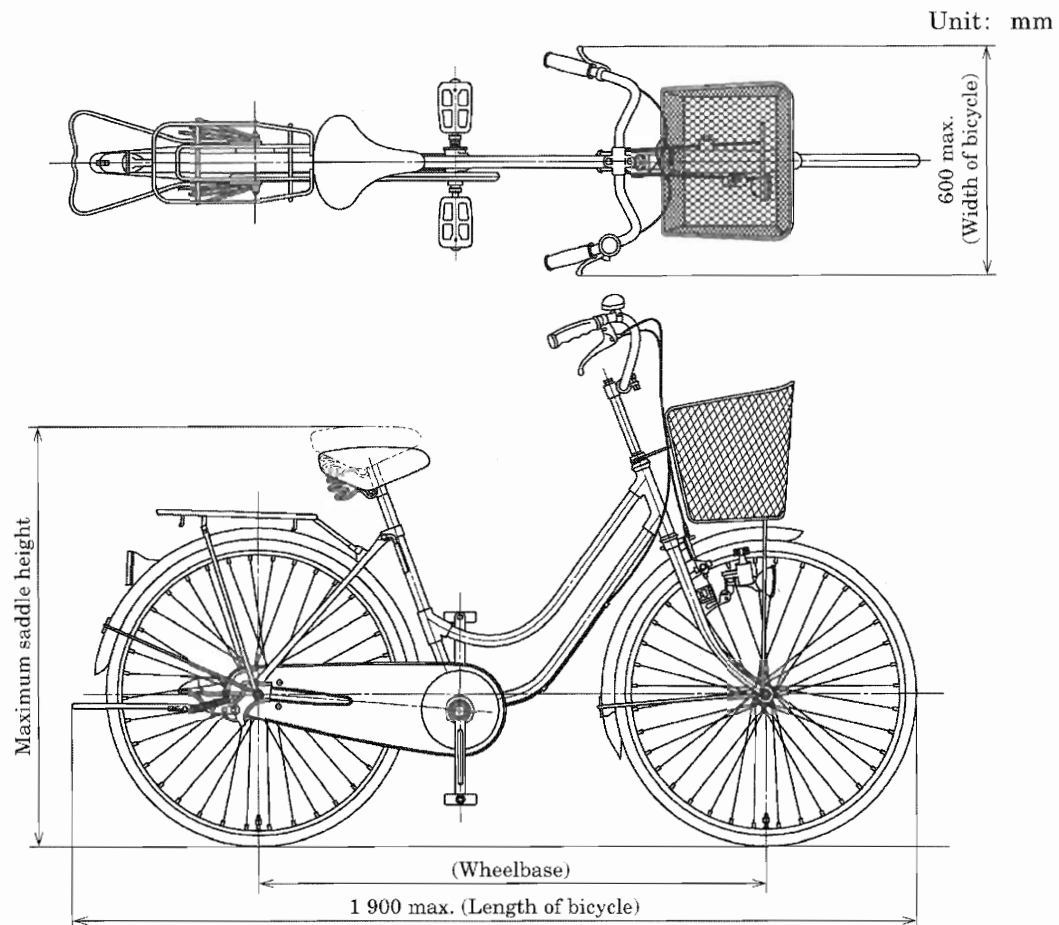


Figure 1 Principal dimensions (informative)

5.1.2 Sharpness

Bicycles shall be free from sharp edges, sharp points, flashes, burrs and so on liable to injure the human body during normal riding or other normal handlings. The tip end of the brake levers, stand, safety hooks, etc. shall be rounded or covered by caps or the like not easily disengaged.

5.1.3 Protrusions

Any rigid exposed protrusion (excluding soft rubber and plastics) 8 mm or longer after assembly shall terminate in a radius of not less than 6.3 mm, and also, if it has a rectangular end, have a major end dimension greater than 12.7 mm and a minor end dimension greater than 3.2 mm.

There shall be no protrusions on the top or main tube of a bicycle frame between the saddle end 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. Screw threads shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part (such as a nut surface).

This requirement does not apply to those requiring adjustment such as chain adjusters and those covered with cap and the like.

NOTE : The exposed protrusion test cylinder, which is a device to decide protrusion that can be contacted by the central 75 mm of the cylinder 250 mm long and 83 mm in diameter (simulating a limb) as an exposed protrusion, may be used as required (see figure 2).

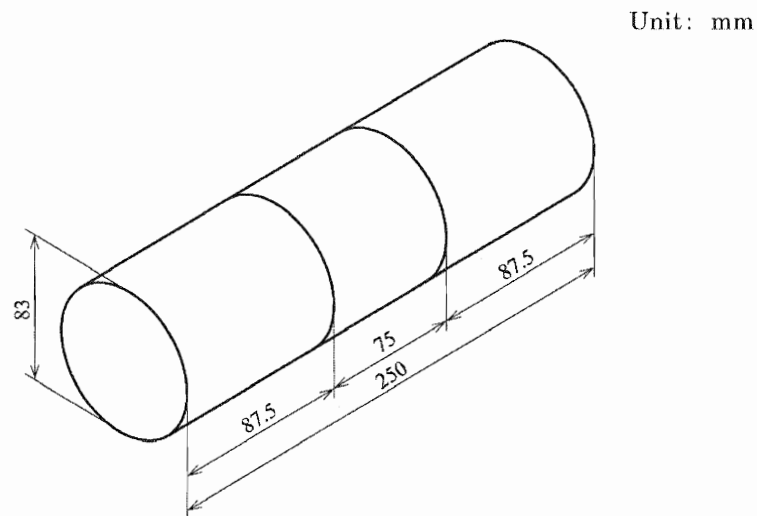


Figure 2 Exposed protrusion test cylinder (informative)

5.1.4 Cables

The brake cables, derailleur control cables and so forth shall have a necessary length for operation and there shall be no visible slackness.

The cable end shall be prevented from unravelling with a cap that shall withstand a removal force of 20 N when tensioned by a push-pull scale.

5.1.5 Fixing of each part

For fixing each part of a bicycle, the screw threads shall be engaged for a length capable of obtaining sufficient fixing force and tightened so that there is no easy loosening while the bicycle is being used.

5.2 Brakes

5.2.1 General

A bicycle shall be equipped with separate braking systems operating on the front and rear wheels respectively. Use of any asbestos-containing material for manufacturing the brake is not permitted.

The asbestos content shall be determined according to clause 7 of JIS A 1481.

5.2.2 Hand-operated brakes

The hand-operated brakes shall be as follows:

When a bicycle is fitted with extension levers, separate tests shall be conducted for the operation of the extension levers in addition to tests for the normal levers.

- a) **Brake lever position** The brake lever for the front brake shall generally be positioned on the right side of handlebars, and the lever for the rear brake, on the left side.
- b) **Brake lever dimensions** The distance measured between the outside surfaces of the brake lever and the handlebar grip (maximum brake lever grip dimension, d) shall not exceed 90 mm between points A and B, and 100 mm between points B and C (85 mm between points A and C for children bicycles) in the drawing of figure 3¹⁾.

The dimension L in figure 3 is the distance between the centre of lever pivot and the lever tip end.

Note ¹⁾ An adjustable brake lever may be used providing the range of adjustment permits obtaining the specified dimensions.

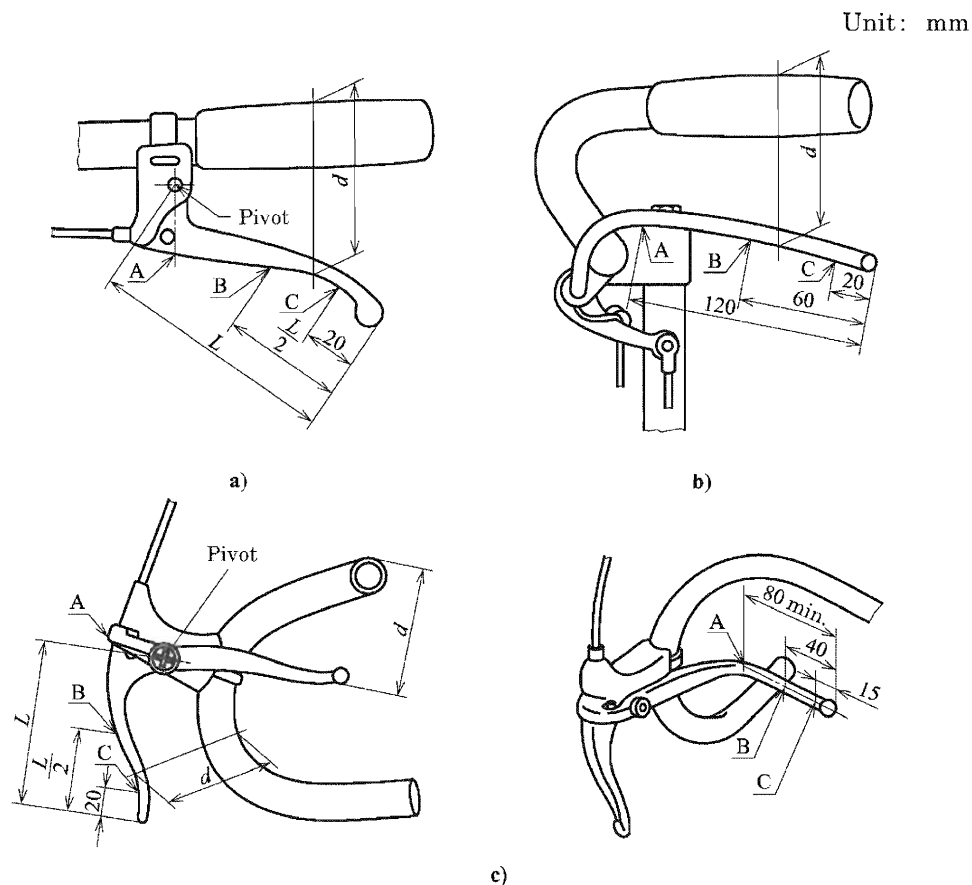


Figure 3 Brake lever grip dimensions

- c) **Attachment of brake assembly** To attach a caliper brake assembly to the frame or fork, the screws shall be provided with suitable locking devices, for example, spring washer or lock-nut.

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

- d) **Assembly of brake friction material** The brake block, brake lining, etc. shall be securely attached to the holder or backing plate, etc. and there shall be no failure of the assembly such as coming out from the holder or backing plate, etc., or cracking when subjected to the brake block test specified in 7.1. Further, the braking system shall meet the requirement of 5.2.4 after completion of the brake block test.
- e) **Brake adjustment** The brake adjustment shall be as follows.
- 1) The brakes shall be capable of adjustment to maintain the braking force against the occasion such as wearing of the brake blocks, brake linings, etc. and elongation of the cable.
 - 2) The brakes shall have adequate clearances between each brake block, brake lining, etc. and its intended braking surface without any significant partial contact with each other when the brake lever is grasped to operate.
 - 3) For a bicycle equipped with rod brakes, the brake block, brake lining, etc. shall not come in contact with the intended braking surface or cause visible bend, twist and the like on the rear brake tube or plunger rods when the steering angle of the handlebars is set at 60°.

5.2.3 Coaster brake hub

A coaster brake hub shall commence to function the braking within 60° in the crankreverse rotation of drive and release it immediately by the normal rotation of drive.

The crank reverse angle shall be measured at an optional position by applying a torque of 14 N·m or over.

5.2.4 Strength of brake system

The strength of brake systems shall be as follows.

- a) **Hand-operated brakes** A bicycle equipped with hand-operated brake, when tested by the system load method of 7.2.1, shall cause no failure of the brake system or any component thereof.
- b) **Coaster brake hub** A bicycle equipped with coaster brake hub, when tested by the system load method of 7.2.2, shall cause no failure of the brake system or any component thereof.

5.2.5 Braking performance

Using a bicycle as the test bicycle, that has been subjected to the test of 7.2 and whose brake has been re-adjusted as required, carry out the brake performance test of 7.3. The test bicycle shall be brought to a smooth safe stop within the relevant distances and from the relevant velocities given in table 2.

Table 2 Brake test velocities and braking distance

Condition		Velocity	Braking distance
Dry	GD $\geq$ 5 m ^{a)}	25 km/h	Within 5.5 m
	GD < 5 m ^{a)}	16 km/h	Within 5.5 m
Wet		16 km/h	Within 9 m
Note ^{a)} To take the highest gear ratio of GD.			

5.2.6 Linearity of coaster brake hub

When the test by the method described in 7.4 is performed, the test result plotted on the coordinate shall be within $\pm 20\%$ limit lines to the line of best fit for a pedal force from 90 N to 300 N. The braking force shall be not less than 150 N for a pedal force of 300 N.

5.3 Steering**5.3.1 Steering stability**

The steering stability shall be as follows.

- The rotating part of steering shall exhibit no tight spot, stiffness or noticeable slackness in the bearings.
- A minimum of 25 % of the total mass of the bicycle and rider shall act on the front wheel when the rider having a weight of suitable rider's weight ± 5 kg is holding the handlebar grips with both hands and sitting on the saddle, with the saddle and rider in their most rearward positions.
- When the right and left steering angles are measured by means of an angle gauge of the minimum scale not greater than 1° , with a rider sitting on the saddle fixed at the highest position, the steering angle shall be at least 60° in each direction.

5.3.2 Handlebar assembly**5.3.2.1 General**

A handlebar assembly, consisting of a pair of handlebars and handlebar stem (including a solid type), shall be as follows:

The handlebar stem is either constructed of a pillar (shaft) and a stem (extended part), as shown in figure 4, or of a stem only, and some are designed to clamp the fork stem from outside.

- The overall width of handlebars shall not exceed 600 mm.
- The handlebar stem or pillar 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 the minimum insertion depth shall be provided.

The insertion mark, or insertion depth, shall be not less than 2.5 times the shaft diameter 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 affect the strength of the handlebar stem.

- c) The handlebar stem or pillar shall be fixed in the fork stem so that its minimum insertion mark does not appear above the uppermost end of the head set.
- d) The vertical distance between the top of the handlebar grips, when the handlebar assembly is pulled up to the level of its minimum insertion mark, and the seat surface central area of the saddle in its lowest position shall not exceed 400 mm. This does not apply to a bicycle with folding or separable frame.
- e) The ends of the handlebars shall be fitted with handlebar grips, end caps and the like. The handlebar grip, when subjected to the test of **7.6.1**, shall withstand a removal force of at least 100 N. The end cap, when subjected to the test of **7.6.2**, shall withstand a removal force of at least 70 N.

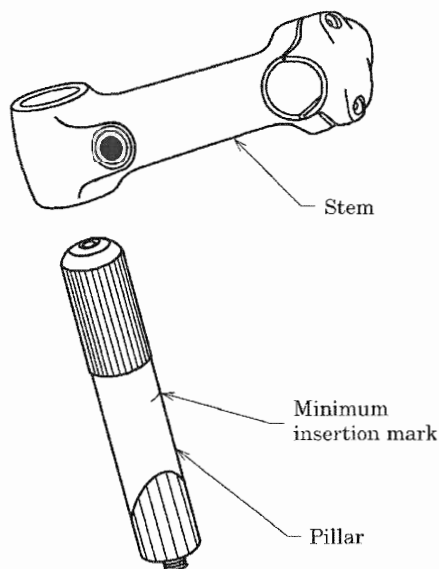


Figure 4 Handlebar stem

5.3.2.2 Offset load strength

When the offset load test of **7.5.1** is performed, there shall be no visible deformation or fracture.

5.3.2.3 Handlebar stem bending strength

The handlebar stem, when tested according to **7.5.2**, shall not be fractured.

5.3.2.4 Fixing between handlebar and stem

When the test by the method described in **7.5.3** is performed, there shall be no movement of the handlebars relative to the stem.

5.3.2.5 Fixing between handlebar stem and fork stem

When the test by the method described in **7.5.4** is performed, there shall be no movement of the handlebar stem relative to the fork stem.

5.3.2.6 Brake lever joining strength

The joining strength of brake levers in a brake lever combined handlebar assembly shall be such that, when it is tested by **7.5.5**, there is no movement in the joint between the brake lever and the brake lever arm.

5.3.2.7 Fatigue strength

When the fatigue strength test by the method described in **7.5.6** is performed, there shall be no abnormality on any part.

5.3.3 Strength of expander bolt

The expander bolt, when tightened with a torque at least 50 % greater than the manufacturers' recommendation by means of a torque wrench specified in **JIS B 4652** (maximum, if its range is provided) shall be free from any abnormalities.

5.4 Front fork

5.4.1 General

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

5.4.2 Energy absorption characteristics of front fork

When tested by the method described in **7.7.1**, the front fork shall be free from cracks or breaks on any of its parts. Further, permanent deformation of hub shaft fixing part shall not exceed 40 mm.

5.4.3 Fatigue characteristics of front fork

When tested by the method described in **7.7.2**, the front fork shall be free from fractures or any visible evidence of cracks.

For front forks made of carbon fibre, the maximum deflection of the front fork to any direction from the average position during the test shall not increase by more than 20 % from the initial value.

5.4.4 Tyre clearance of tyre suspension fork

When the suspension fork for MTB-type bicycles is tested by the method described in **7.7.3**, the tyre shall not touch the fork shoulder.

For the suspension forks for other than MTB-type bicycles, when the test by the method described in **7.7.3** is performed, it is desirable that the tyre not touch the fork shoulder.

5.4.5 Tensile strength of suspension fork

When the suspension fork for MTB-type bicycles is tested by the method described in **7.7.4**, no part of the suspension fork shall disengage or slacken, and no constituent parts of the fork leg shall come apart under the test load.

For the suspension forks for other than MTB-type bicycles, when the test by the method described in **7.7.4** is performed, it is desirable that no part of the suspension fork disengage or slacken, and no constituent parts of the fork leg come apart under the test load.

5.5 Frame-fork assembly

5.5.1 Endurance characteristics of frame-fork assembly

When tested by the method described in 7.8.1, the frame-fork assembly shall be free from any visible evidence of fracture, deformation or distortion.

For the frame-fork assemblies made of carbon fibre, when the test by the method described in 7.8.1 b) is performed, the maximum deflection under the test force F applied as specified in 7.8.1 b) 6) shall not increase by more than 20 % from the initial value.

5.5.2 Impact resistance or energy absorption property

When the frame-fork assembly is subjected to the falling mass impact test of 7.8.2.1 or the energy absorption test of 7.8.2.2, the permanent deformation of the wheelbase shall not exceed 40 mm and no part of the frame-fork assembly shall show visible fracture.

The maximum force to be absorbed at the energy absorption test shall not be less than 880 N.

5.5.3 Falling impact resistance

When the frame-fork assembly for adults' and children's bicycles is subjected to the falling impact resistance test of 7.8.3.1, no part of the frame-fork assembly shall show visible fracture. In the case of a falling impact resistance test on the frame-fork assembly for an MTB-type bicycle in accordance with 7.8.3.2, no part of the frame assembly shall show visible fracture. The permanent deformation of the wheelbase shall not exceed 60 mm.

5.6 Wheels (including solid wheels)

5.6.1 Rotational trueness

The concentric and square run-outs, represented by the maximum travel of the indicator of dial gauge put on the rim surface during one complete revolution about the axle fixed, shall be as follows. Figure 5 shows an example of the measuring methods.

- a) **Concentricity tolerance** The concentric run-out, measured at an appropriate position of the rim as shown in figure 5, shall not exceed 1.5 mm for bicycles equipped with rim brakes, and not exceed 3 mm for others.
- b) **Squareness tolerance** The squareness run-out, measured at an appropriate position of the rim and in parallel with the axle, shall not exceed 1.5 mm for bicycles equipped with rim brakes, and not exceed 3 mm for others.

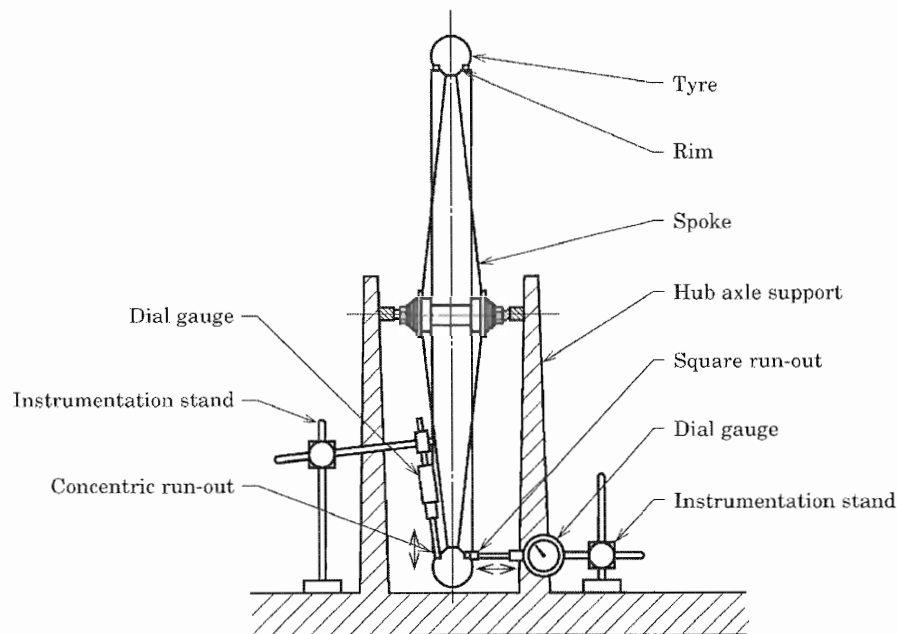


Figure 5 Example for measuring methods of wheel rotational trueness

5.6.2 Clearance

There shall be clearance of not less than 2 mm between the tyre and any frame or front fork element.

5.6.3 Spoke tension

The spoke tension of spoked front and rear wheels shall be not less than 400 N in average for a wheel of nominal diameter exceeding 22 and not less than 300 N in average for those not exceeding 22. In any case, there shall be no spoke of which the tension is 150 N or less. For an offset hub wheel, the spoke tension shall be at least 400 N in average for the free wheel side and at least 300 N for the opposite side.

These spoke tensions shall be obtained from the measurements on all the spokes in the front or rear wheel by using a spoke tension meter. This test may be substituted by the vertical static load test mentioned in 7.9.2. In this case, there shall be no abnormalities on any part and the additional run-out of the wheel shall not exceed 1.5 mm after the test.

5.6.4 Strength of wheel

When a wheel is subject to the lateral static load test described in 7.9.1, there shall be no abnormality on any part and the permanent deformation at the position of load shall not exceed 1.5 mm.

5.6.5 Wheel retention

The fixing of wheels relative to the frame and fork shall be as follows. The measurement of the fixed force may be substituted by that of the hub nuts tightening torque based on definite correlation data if agreed between the purchaser and the manufacturer.

- a) **Minimum removal (loosening) torque of hub nuts** Wheel hub nuts shall have a minimum removal torque of at least 70 % of the manufacturer's recommended tightening torque.
- b) **Front wheel retention** A front wheel shall be fixed to the front fork as follows.
- 1) There shall be no relative motion between the front hub axle and the front fork when a force of 2 300 N is applied symmetrically to either side of the axle for a period of 30 s in the direction of the removal of the wheel.
 - 2) Where the front wheel is fixed by means of hub nuts and the nuts are unscrewed by 360° from the finger tight condition, the wheel shall not detach from the fork when the bicycle is lifted to 500 mm above the ground and a weight of 12 kg is hung from the wheel for a period of 1 min.
 - 3) Where the front wheel is fixed with a quick-release hub and a secondary wheel retention device²⁾ (including any mechanism of retaining wheels) is present, the wheel shall not detach from the fork when the quick-release camlever is fully open and a force of 100 N is applied, with influence of brake system being removed, in line with the fork drop out slots.
- Note ²⁾ A secondary device keeping the wheel in the fork to prevent it from detachment by providing against any occurrences of loosening in the original wheel retaining device such as quick-release camlever.
- c) **Rear wheel retention** There shall be no relative motion between the rear axle and the frame when a force of 2 300 N is applied symmetrically to either side of the axle for a period of 30 s in the direction of removal of the wheel.

5.7 Quick-release mechanisms

5.7.1 Operating features

Any quick-release mechanism to be used for hub of bicycles, fixing the seat post to the frame and folding mechanism shall be of normal operating feature as shown in the following.

- a) The quick-release mechanism shall be adjustable to allow setting for tightness.
- b) The form and marking shall clearly indicate whether the mechanism is in the open or closed position.
- c) If adjustable by a camlever, the force required to a properly set camlever at 5 mm from its tip end shall not exceed 200 N and, at this closing force, there shall be no permanent deformation of the quick-release mechanism.
- d) The releasing force of the clamping mechanism when closed shall not be less than 50 N.
- e) If operated by a camlever, the quick-release mechanism shall withstand without fracture or permanent deformation a closing force of not less than 250 N applied with the adjustment set to prevent full closure under this force.
- f) The wheel retention with the quick-release hub mechanism in the clamped position shall be in accordance with 5.6.5 b) 1) and 5.6.5 c).

5.7.2 Constitution

The folding and separating mechanisms of the frame-fork assembly and the handle-bar stem utilizing quick-release mechanism shall be so designed as to prevent the clamping devices such as a lever from an abrupt unclamping by means of a multiple-action mechanism which allows unclamping only by two or more actions.

5.8 Tyres and tubes

5.8.1 Indicated inflation pressure

The standard or maximum inflation pressure shall be indicated permanently on the sidewall of the tyre so as to be readily visible when the latter is assembled on the wheel in the service condition.

5.8.2 Rim removal resistance

For a wheel of which the tyre is WO or HE type defined in **JIS D 9112**, when inflated to 150 % of the indicated inflation pressure (maximum value, if indicated with the range) or the inner pressure given in water pressure test of tyre rim detachment as specified in **JIS K 6302**, whichever the smaller pressure, to be allowed in the rest for a period of 8 h, the tyre shall remain intact on the rim without visible abnormalities on any part of the wheel body³⁾.

Note ³⁾ Refers to a wheel assembly excluding tyre, tube and rim tape.

5.8.3 Heat resistance

For a solid wheel, the tyre made of synthetic resin shall remain intact on the equivalent rim part without abnormalities on any part after completion of rest under a temperature of $60\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for a period of 1 h.

In this case, the tyre shall be inflated to the indicated inflation pressure (maximum, if indicated with the range).

5.9 Drive system

5.9.1 Strength of pedal

5.9.1.1 Static load resistance of pedal

When tested by the method described in **7.11.1**, the pedal spindle and pedal body shall be free from cracks, fracture and so on.

5.9.1.2 Static load resistance of pedal end

When tested by the method described in **7.11.2**, the maximum deflection at the loading point in figure 37 shall be 20 mm or less, and the pedal spindle and pedal body shall be free from cracks, fracture and so on, and for those of the type which can be folded (hereafter referred to as "folding pedal"), the pedal fixing shall not be released. However, pedals with shoe retention devices (such as binding pedals) are not included.

5.9.1.3 Dynamic durability of pedal

When tested by the method described in **7.11.3**, there shall be no visible fracture of any part of the pedal or of the crank threads.

5.9.1.4 Low temperature resistance of synthetic resin pedal

When tested by the method described in 7.11.4, the pedal body shall be free from visible cracking, fracture and the like.

5.9.2 Pedal tread

The pedal tread shall be as follows.

- a) Pedals intended to be used without toe clips and the like shall have tread surfaces on their top and bottom faces, or a definite preferred position that automatically presents the tread surface to the rider's foot (referred to as "single tread pedals").
- b) The tread surface shall either be integrated with the pedal or secured within the pedal body.
- c) Pedals with shoe retention devices such as binding pedals need not provide tread surfaces.
- d) The revolution shall be smooth, and the square run-out, measured at a position 15 mm apart from the centre of the gauge plate fitted on the threaded part of the pedal spindle with the pedal body fixed as shown in figure 6, shall not exceed 0.5 mm.

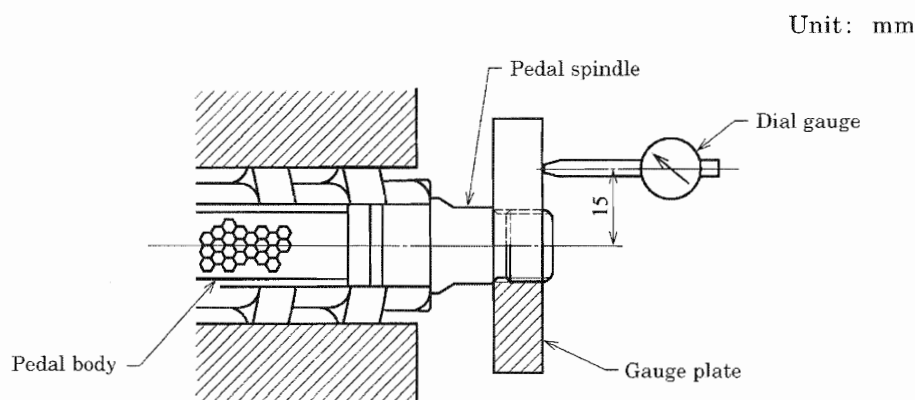


Figure 6 Inspection for pedal revolution accuracy

5.9.3 Pedal clearance

Pedal clearances, as the ground clearance and toe clearance, shall be as follows:

In any case, the tyres are inflated to the indicated inflation pressure (maximum, if indicated with the range).

- a) **Ground clearance** The ground clearance shall be a lean of not less than 25° (20° for children bicycles). If the bicycle has suspension systems, the measurement shall be made under the condition loaded with equivalent mass of an appropriate rider.
- b) **Toe clearance** The toe clearance shall be at least 89 mm except that this does not apply to those equipped with positive foot retention devices such as toe clips.

5.9.4 Strength of drive system

When tested by the static load method described in 7.10, there shall be no visible deformation nor fracture on any component of the drive system, and the drive capability shall not be lost.

5.9.5 Gear changeability

Those equipped with gear change device shall be secure in shifting the gear ratios and smooth in operation.

5.9.6 Strength of chainwheel and cranks

5.9.6.1 Static strength of pedal fitting part

When tested by the method described in 7.15.1, the displacement of the loading point after removal of the load shall not exceed 2 mm.

5.9.6.2 Fixation of chainwheel to crank

When tested by the method described in 7.15.2, there shall be no loosening in the joint of chainwheel to right crank.

5.9.6.3 Falling mass impact strength of crank in horizontal

When tested by the method described in 7.15.3, the crank shall not be fractured. Further, the permanent deformation at the measuring point indicated in figure 49 shall not exceed 5 mm.

5.9.6.4 Falling mass impact strength of crank in vertical

When tested according to 7.15.4, the crank shall not be fractured. Cranks of steel may be omitted from this requirement.

5.9.6.5 Crank assembly fatigue strength

When tested according to 7.15.5, there shall be no cracks or fractures on either of the cranks, nor loosening in the joints between the crank and B.B. axle.

5.9.7 Chain or toothed belt

The chain or toothed belt used for the transmission shall be as follows.

- a) The chain or toothed belt shall be mounted without visible slackening or excessive stretching to operate smoothly.

A chain adjuster shall be fitted, as required, on the rear wheel axle.

- b) Annex JA gives the performance of toothed belt.

5.10 Saddle

5.10.1 General

The general requirements of saddle shall be as follows.

- a) No part of the saddle shall be more than 125 mm above the central area of the saddle seating face.
- b) Saddles shall not exceed 350 mm in full length.

- c) The seat pillar, including the stem of pillar combined saddle, shall contain a permanent mark that clearly indicates the minimum insertion depth of the pillar into the frame. The insertion mark shall be located not less than two diameters of the pillar from the bottom of the pillar full diameter part, and it shall not affect the strength of the pillar.

5.10.2 Performance

5.10.2.1 Clamping fixity

When tested by the method described in **7.12.1**, there shall be no fracture or visible deformation on any part, and shall be no movement between the saddle clamp and seat pillar.

5.10.2.2 Durability

When tested by the method described in **7.12.2**, there shall be no abnormalities such as visible deformation on the saddle top or any other part.

5.10.2.3 Low temperature resistance

When tested by the method described in **7.12.3**, no part shall be fractured.

5.10.2.4 Spring strength

When tested by the method described in **7.12.4**, the permanent set shall not exceed 0.5 mm.

5.10.2.5 Fit-in retention

When tested by the method described in **7.12.5**, no base wires or coil springs shall come off from its fit-in. Further, there shall be no cracks or deformation on the saddle.

5.10.2.6 Bursting strength of vinyl leather or synthetic resin top

When tested by the method described in **7.12.6**, the bursting strength shall be at least 600 kPa.

5.10.2.7 Tensile strength and elongation of leather top

When tested by the method described in **7.12.7**, requirements in table 3 shall be met.

Table 3 Tensile strength and elongation of leather top

Division	Tensile strength MPa	Elongation %
Tannin leather	22 min.	30 max.
Chrome leather or mixed chrome and tannin leather	15 min.	50 max.
Upper shoe leather or thin imitation leather	6 min.	25 min.

5.10.2.8 Breaking torque

The breaking torque of clip bolts, when tightened with indicating torque tool (Type I) specified in **JIS B 4652**, shall be 25 N·m or more.

5.11 Seat pillar

5.11.1 Fatigue test

When tested by the methods described in **7.13** or **7.14**, the seat pillar shall be free from fracture or visible cracks.

The combination pillars shall be tested in accordance with **7.14**.

5.11.2 Mating length

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 located not less than twice the diameter of the pillar from the bottom of the pillar full diameter part, and it shall not affect the strength of the pillar.

5.12 Protective devices

5.12.1 Chainguard

A chain driven bicycle shall be equipped with a chainguard for preventing rider's clothes, hands and feet from entrapment.

The chainguard equipped, when it is other than a full gear case, shall be as described in the following. This requirement, however, does not apply to the case where a combined chain guide of front derailleur shields the outside face of the upper junction of the chain and chainwheel for a distance of at least 25 mm rearwards along the chain from the point where the chainwheel commences engaging with the chain, and also when the pedals are fitted with positive foot retention devices (toe clips, toe straps, binding pedals, etc.).

- a) A single side chainguard or half chainguard shall, as a minimum, shield the outer side faces and top surface of the chain and chainwheel for a distance of at least 25 mm rearwards along the chain from the point of commencement engaging the chainwheel teeth with the chain and forwards round the outer chainwheel to a horizontal line passing through the bottom bracket axle centre.
- b) A chainwheel disc shall exceed the diameter of the outer chainwheel, when measured across the teeth tips, by not less than 10 mm.

5.12.2 Protection for rotating wheel

For preventing rotating wheel from sudden stopping, the bicycle shall be constructed as follows.

- a) When a brake cable is broken, no part of the braking system shall suddenly interfere with rotation of the wheel.
- b) A bicycle equipped with a derailleur shall be fitted with a spoke protector or the like to prevent interference of rotation of the wheel in cases of damage or improper adjustment of the derailleur which causes derailing of the chain.

5.13 Lighting and reflectors

5.13.1 Lighting system

The lighting system shall be as follows.

- a) A bicycle shall be provided with a head-lamp specified in **JIS C 9502**.
- b) It is desirable for a bicycle to be provided with a rear lamp. The rear lamp shall be recognizable from 100 m rearwards in the nighttime.
- c) When a wiring harness is fitted, it shall be positioned to avoid damage by contact with moving parts or sharp edges. All connections shall withstand a tensile force in any direction of 10 N.

5.13.2 Reflex reflectors

A bicycle shall be equipped with a front reflector, rear reflector, pedal reflectors, side reflectors, etc. The performance of these reflex reflectors shall comply with **JIS D 9452**. Further, the provision and attachment shall be as follows.

a) Front reflectors

- 1) Front reflectors shall be clear in colour.
- 2) Front reflector shall be located above the front wheel axle where the whole lens surface can be recognized from the front.
- 3) For an alternative to the front reflector, such other reflective material may be equipped as that reflects an irradiation of automobile's head-lights and the like to be easily recognizable from a distance of 100 m forward in the nighttime.

b) Rear reflectors

- 1) Rear reflectors shall be red in colour.
- 2) The rear reflector shall be mounted with the top of its lens above the rear wheel axle and at least 75 mm below the centre area of saddle seating surface. This requirement does not apply to the case where there is no possibility of it being hidden by the rider's clothes or a laden baggage.
- 3) The optical axis or main optical axis of the rear reflector shall be parallel to running direction of the bicycle without the horizontal and vertical inclinations exceeding 5°.

For a bicycle with suspension systems, the measurement shall be made with the bicycle loaded with a mass equivalent to that of an appropriate rider.

- 4) When a force of 90 N (or 50 N for that mounted on the mudguard) is applied to the rear reflector of the same condition as use, for a period of 30 s, in the direction selected as having the most effect, the variation in the alignment of the reflective surface shall be less than 15°, and after removal of the force applied, shall be less than 5°. Further, there shall be no fracture or visible defects on any part.

c) Pedal reflectors

- 1) Pedal reflectors shall be amber in colour.
- 2) Pedal reflectors shall be located on the front and rear surfaces of the pedal.
- 3) The surface of pedal reflector lens shall be sufficiently recessed from the edge of the pedal or its housing.

- d) **Side reflectors, etc.** A bicycle shall be equipped with two side reflectors each visible from both sides or reflective devices having equivalent performance thereto (a reflective material, e.g. reflective tyres, reflective tapes), as follows.
- 1) All the reflective elements of side reflector, etc. shall be the same colour of clear or amber.
 - 2) Side reflectors or reflective devices shall be fitted each one on the front half and on the rear half of the bicycle.
 - 3) Side reflectors shall be fitted on the side face of the bicycle or wheel. At least one of these shall be mounted on the spokes of the wheel.

5.14 Warning device

Bicycles shall be fitted with a bell or buzzer, the trigger, lever or switch of which shall be located so as to be easily operated while riding.

5.15 Lock

The lock shall be smooth in locking and unlocking. The lock with a key shall be constructed to be opened by insertion of the key which rotates or shifts the cylinder, and shall not be opened easily without the exclusive key. For a bicycle fitted with a side lock, any preventive means for turning and slip-down shall be provided.

5.16 Stand

The stand shall allow an easy handling by user's strength, and shall be capable of holding the bicycle stably so as not to fall down easily.

5.17 Road test

When tested by the road test method as described in 7.16, the bicycle shall be free from abnormal noise, loosening, falling down, wire snapping, deformation and the like in any part.

6 Appearance

The appearance of bicycles shall be as follows.

- a) The surface subjected to plating or painting shall be free from exposure of substrate, peeling, rust and other visible defects.
- b) The unplated or unpainted surfaces shall be free from rust, cracks and other visible defects.
- c) Markings shall be free from incomplete adhesion and stamping, positional deviation and the like.

7 Test methods

7.1 Brake block test

With a bicycle fully assembled with a rider or equivalent weight placed on the saddle and the brakes adjusted correctly, each brake lever shall be actuated with a force of

180 N (or a force sufficient to bring the brake lever into contact with the handlebar grip), which shall be maintained throughout the test, and the bicycle shall then be subjected to five forward and five rearwards movement, each of which is not less than 75 mm distance, on a dry and flat paved road surface. The assembly shall then be examined for detachment of brake block, brake lining, etc. and generation of cracks.

Each tyre shall be inflated to the indicated inflation pressure (the maximum, if given by the range). The combined mass of bicycle and rider (or a weight of equivalent mass) shall be $100 \text{ kg} \pm 1 \text{ kg}$.

7.2 Brake system load test

7.2.1 Hand operated brake test

For a bicycle with handbrake(s), after it has been ensured that the braking system is correctly adjusted, either a force of 450 N or a force sufficient to attain any one of the states as listed below shall be applied to the brake lever at a point 25 mm from the end of lever normal to the handlebar grip (or handlebar in the absence of grip) within the plane of the lever to travel as shown figure 7. The brake system and its components shall then be examined for abnormalities.

- a) A brake lever being in contact with the handlebar grip (or handlebar in the absence of grip).
- b) An extension lever being in contact with the handlebar grip (or handlebar)
- c) A brake lever or extension lever levelling with the upper surface of the handlebar.

This test shall be repeated for a total of 10 times on each hand-brake lever and on each extension lever.

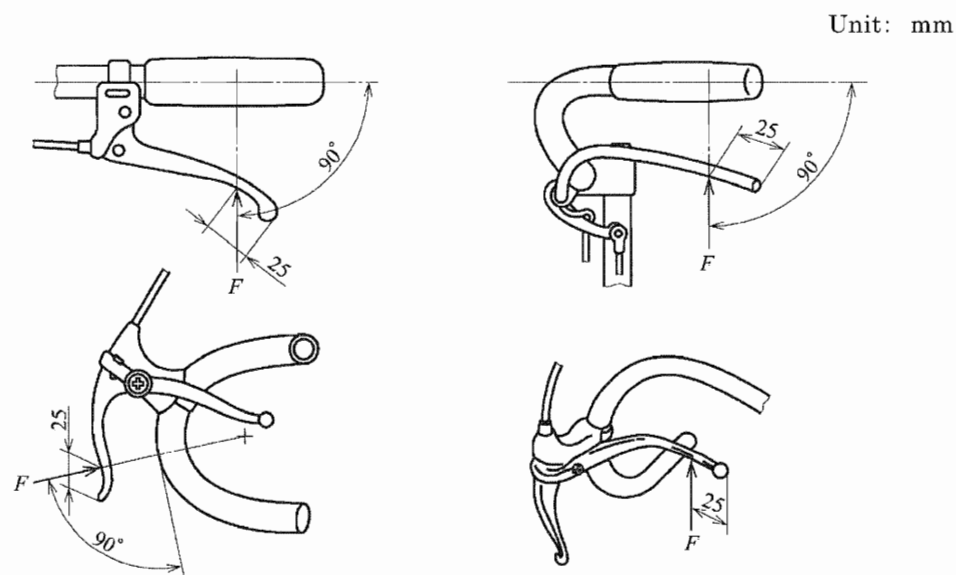


Figure 7 Position and direction of applied force on handbrake levers