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Frame—Assembly for bicycles

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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 9401 : 2002** is replaced with this Standard.

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.

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Contents

	Page
1 Scope	1
2 Normative references	1
3 Definitions	2
4 Constitution and classification	2
4.1 Constitution	2
4.2 Classification	2
5 Names of parts	3
6 Construction	4
6.1 Frame-fork assembly.....	4
6.2 Folding or dividing structured frame	4
6.3 Front fork.....	4
6.4 Frame parts	5
7 Performance.....	5
7.1 Durability of frame-fork assembly	5
7.2 Falling mass impact resistance or energy absorbing property	9
7.3 Falling frame-fork assembly impact resistance	11
7.4 Fatigue test on seat pillar	13
7.5 Strength of frame parts.....	15
7.6 Runout of bottom bracket spindle	16
8 Dimensions	17
9 Plating and painting	17
9.1 Plating	17
9.2 Painting	17
10 Appearance	18
11 Marking	18

Frame—Assembly for bicycles

1 Scope This Japanese Industrial Standard specifies frame-fork assemblies to be used for bicycles for general use and bicycles for young children defined in **JIS D 9111** (hereafter referred to as “frame-fork assembly”).

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 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 0209-4 *ISO general purpose metric screw threads—Tolerances—Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*
- JIS B 0209-5 *ISO general purpose metric screw threads—Tolerances—Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*
- JIS B 0225 *Cycle threads*
- JIS B 1501 *Steel balls for ball bearings*
- JIS D 0202 *General rules of coating films for automobile parts*
- JIS D 9111 *Cycles—Classification and essential characteristics*
- JIS D 9301 *Bicycles—General specification*
- JIS D 9302 *Bicycles for young children*
- JIS D 9402 *Front forks for bicycles*
- JIS D 9418 *Bicycles—Free wheels and hub cogs*
- JIS H 8617 *Electroplated coatings of nickel and chromium*
- JIS Z 2245 *Rockwell hardness test—Test method*

3 Definitions For the purpose of this Standard, the following definitions apply.

- a) **frame central plane** plane determined by the centrelines of the head tube, top tube, seat tube, down tube, or members corresponding thereto. Practically, this plane should be considered as a plane made by the centres of the internal diameter at the both ends of head tube and a point nearby the bottom bracket joint on the centreline either of the seat or down tube or a member corresponding thereto.
- b) **frame size** distance from the centre of the bottom bracket spindle to the upper extreme of the seat tube or a member corresponding thereto (refer to attached figure 1)
- c) **frame parts** generic term of head set, bottom bracket parts and seat parts

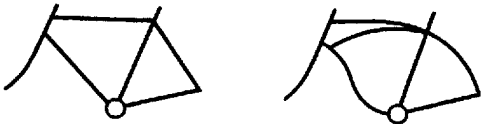
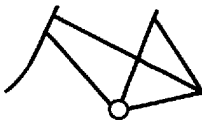
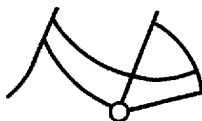
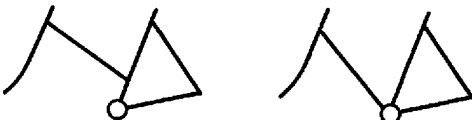
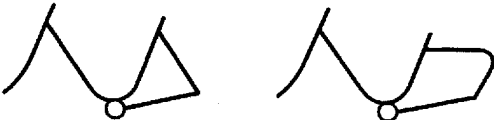
4 Constitution and classification

4.1 Constitution Frame-fork assemblies shall be constituted with frame, front fork and frame parts.

4.2 Classification Frame-fork assemblies shall be classified according to the shape and use as follows:

- a) **Classification by shape** Frame-fork assemblies shall be classified according to the shape into two types; diamond shape and the other shapes. See table 1 for examples.

Table 1 Shape examples of frame-fork assembly

Shape	Examples of shape of frame-fork assembly
Diamond shape	
Other shapes	 Staggered  Parallel  Mixte  Double loop  Loop  Berceau  H shape  U shape  L shape

- b) **Classification by use** Frame-fork assemblies shall be classified according to their use into three classes; those for adults⁽¹⁾, for children, and for young children.

Note ⁽¹⁾ Adults bicycle means bicycles for general use excepting those for children.

5 Names of parts Examples of the names of parts of frame-fork assembly are shown in attached figures 1 to 3.

Attached figures 4 and 5 indicate the names of parts of front fork and frame parts and 6 to 8 detail those of head set, bottom bracket parts, and seat parts.

6 Construction

6.1 Frame-fork assembly

Frame-fork assembly shall be constructed as follows:

- a) The tubes and lugs of frame, adjacent tubes of frame fork, and required fittings, etc. shall be jointed securely by brazing, welding or other method.
- b) Each wheel attachment part of both rear fork ends shall be parallel to the frame central plane.
- c) The centreline of mudguard and caliper brake attachment holes shall lie on the frame central plane.
- d) The bottom bracket fixed cup shall be of left-hand screw thread. Provided a locking device exists, right-hand thread may also be used.
- e) The bottom bracket spindle shall be assembled at right angles to the frame central plane.

Further, radial run-out at the bottom bracket spindle right end shall not exceed 0.5 mm.

- f) The seat pillar shall be capable of being securely fixed⁽²⁾ by tightening the seat clamping bolt or the like, and of sliding up-and-down easily after releasing fastness by loosening of the fixing means.

Note (2) "Securely fixing" means that it complies with the regulation for fixing of seat part in **JIS D 9301** or **JIS D 9302**, when attaching a saddle intended to be used.

- g) The rotational structure of head and bottom bracket assembly shall run smoothly without visible play.
- h) The frame surfaces shall be subjected to plating, painting or other suitable treatments except those using corrosion resistant materials.

6.2 Folding or dividing structured frame

The folding and dividing structure of the frame shall be as follows:

- a) The frame tightening metal and the like shall be capable of fixing securely by means of a multiple structure and shall cause no looseness nor ricketiness while running of the bicycle.

6.3 Front fork

The front fork shall have the following construction and shape or be at least equivalent thereto in quality.

- a) Every joint shall be joined firmly by brazing, welding or other means.
- b) The top face of fork stem to be engaged with handlebar stems shall be free from burrs, dents and the like, to allow a handlebar stem to be easily mounted.
- c) There shall be no visible coaxial difference in the fork collar regarding the fork stem axis.
- d) The centreline of internal thread for crown screw or through hole for caliper brake attachment in the fork crown shall lie on the fork central plane⁽³⁾.

Note ⁽³⁾ Plane containing the fork stem axis and normal to a line connecting two points close to the fork crown on the front edge of both fork blades.

- e) The front axle attaching part of both fork ends shall be in parallel to the fork central plane⁽³⁾.
- f) The point evenly parting the interval of both fork end front axle attaching points shall not deviate more than 1 mm from the fork central plane⁽³⁾.
- g) The difference between both axle slots, measured in right angles to the fork central plane⁽³⁾, shall be as shown in figure 1.

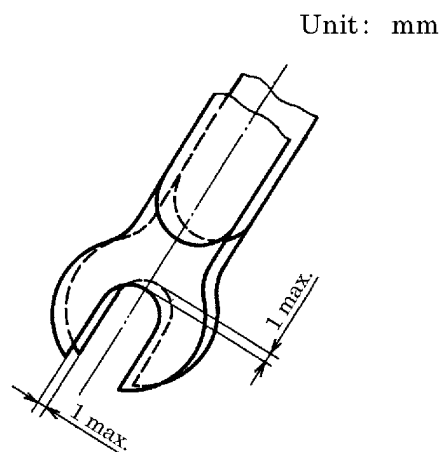


Figure 1 Difference between both axle slots

6.4 Frame parts The frame parts shall be constructed as follows:

- a) The phase difference between both square tapered faces shall not exceed 2°.
- b) Where steel balls are used for the frame parts, these shall be in accordance with **JIS B 1501** or annex 2 of **JIS D 9418**.

Any steel ball retainer, if used, shall not obstruct the function of steel balls and shall allow the bearing assembly to rotate smoothly.

7 Performance

7.1 Durability of frame-fork assembly A frame-fork assembly, when tested by the following **a)** and **b)**, shall cause no fracture nor visible deformation or distortion on any part.

a) **Vibration test** The vibration test shall be as follows:

- 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 figure 2, test shall be made by application of vertical up-and-downward vibrations under the conditions given in table 2.

The front wheel attachment part shall be freely movable in the length-wise orientation.

- 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. For loading to the seat part, secure the saddle shape loading base as shown in figure 3 onto the seat area and suspend the circular weights dividedly on both sides through the hanger metals to take the sum (mass) of the loading base, hanger metals, and weights as the load. The loading base shall be secured to the seat pillar at 20 mm below on the axis from the upper extreme thereof by using a fastening metal.
- 3) For loading to the bottom part, fix circular weights to the bottom bracket area dividedly on both sides.
- 4) For loading to the head part, fix the weight at the position where no clearance remains between the under surface of mass support and the upper surface of head lock nut by using a metal fitting as shown in figure 4.
- 5) The frequency of vibration shall be selected arbitrarily in the range of 5 Hz to 12 Hz, as avoiding resonance frequency.
- 6) For a frame-fork assembly of bicycle with auxiliary driving power unit (hereafter referred to as "motor assist bicycle"), regarding the battery, drive unit, control unit, etc. to be mounted on the frame as the loads to be applied actually to the frame-fork assembly, the actual subjects or masses equivalent thereto shall be attached onto the actual portions.

In this case, the battery and drive and control units attached as the loading mass are themselves not the subject of evaluation for the vibration proof performance.

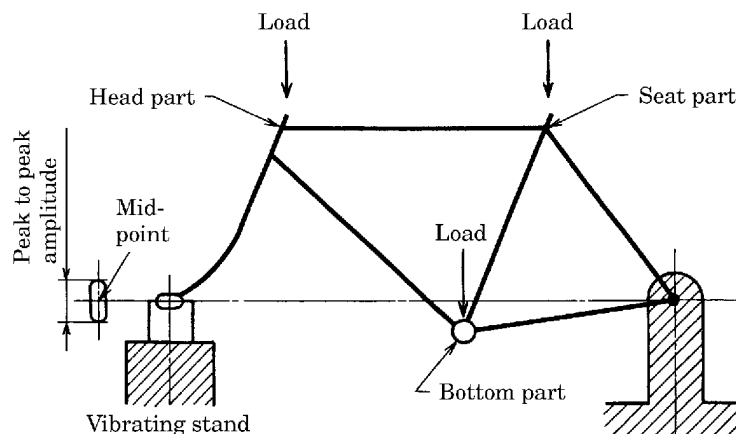


Figure 2 Vibration test of frame-fork assembly

Table 2 Test conditions for vibration test of frame-fork assembly

Type of frame-fork assembly		Load (mass) kg				Frequency Hz	Acceleration of vibrating part m/s ²	Number of vibrations cycles
		Head part	Seat part	Bottom part	Total			
For adults	Diamond shape	5	50	20	75	5 to 12	19.6	100 000
	Other shapes		45	15	65		17.6	70 000
For children			40	10	55			
For young children			30	10	45		15.7	40 000
MTB-look		10	50	25	85		22.0	150 000

Unit: mm

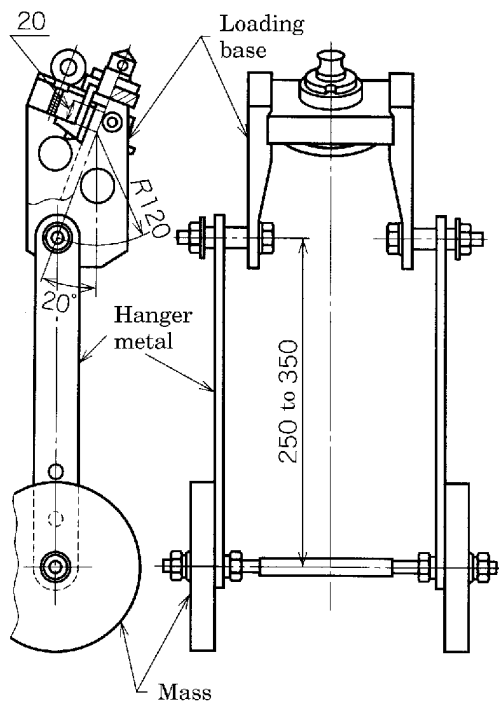


Figure 3 Loading device to seat part

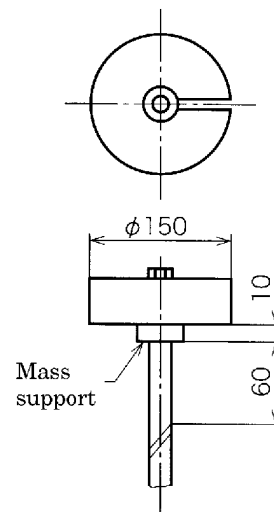


Figure 4 Loading device to head part

b) Repeated load test

- 1) With the front fork allowed to be turning in the head assembly, fix the frame-fork assembly on a test stand as shown in figure 5. The rear axle, about which the frame can rotate, shall be fixed uppermost of the prop having a length equal to the radius of the intended wheel $R_w \pm 30$ mm.

The prop bottom base shall comprise a spherical joint which can rotate in any direction. The front axle, about which the fork can rotate, shall be fixed as attaining the state of 2).

- 2) The frame-fork assembly shall be mounted as positioning both wheel axles being horizontal. For that designed as differing in both nominal wheel diameters, it shall be mounted as each contact point of both wheels being horizontal.
- 3) In the test, the front fork may be replaced with a rigid fork so that there is no variation in the head height.
- 4) Substitute the adaptors of boomerang shape (see figure 6) connected with a test spindle being free to rotate in the bottom bracket for the cranks-spindle assembly. Both adaptors shall be fixed at an angle of $45^\circ \pm 2^\circ$ downward. The length, L , between the test spindle and the test pedal shaft to be fitted shall coordinate with the crank length intended.
- 5) The boomerang adaptors shall be fixed through the lever arm taking place of a chainwheel and connecting rod, of a chain. The connecting rod shall be installed between a portion 75 mm above the centre of test spindle and the rear axle attachment point.
- 6) Apply a force F of 850 N (or 500 N for that for children's or young children's bicycle) downward with an inclination toward inside the frame at an angle of $7.5^\circ \pm 0.5^\circ$ for 100 000 cycles.

The load shall be applied onto each test pedal shaft alternately at a portion of $150 \text{ mm} \pm 1.5 \text{ mm}$ from the frame central plane.

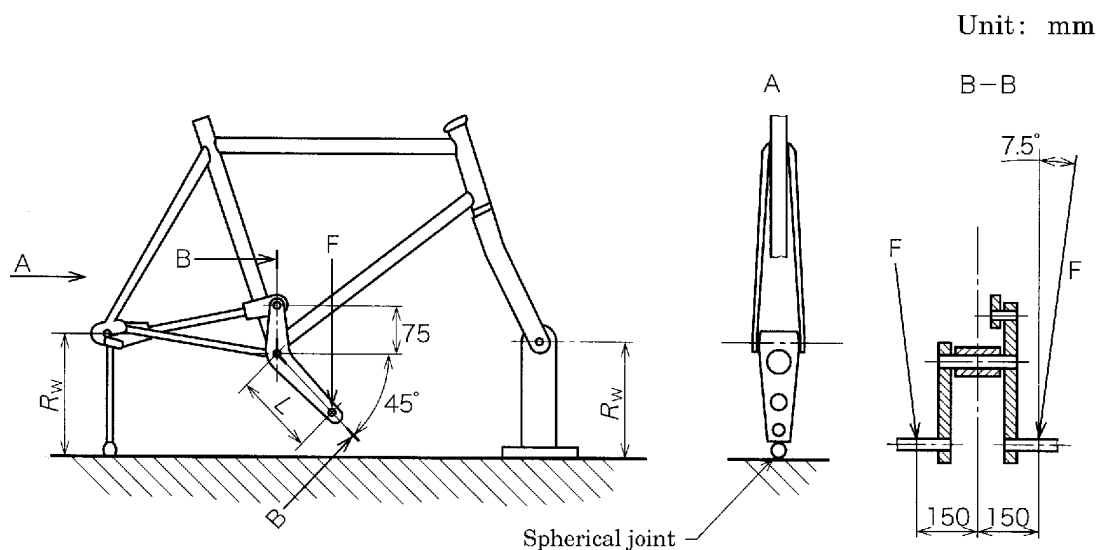


Figure 5 Repeated load test for frame-fork assembly

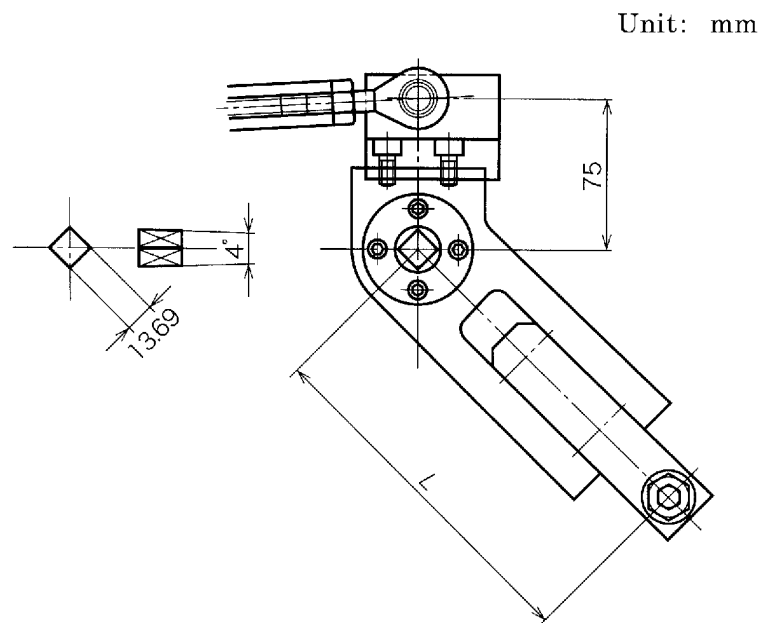


Figure 6 An example of boomerang adaptor

7.2 Falling mass impact resistance or energy absorbing property When the following **a)** falling mass impact test or **b)** energy absorption test is carried out, the permanent deformation of distance between both axle centrelines (wheel base) shall not exceed 40 mm (20 mm for young children's bicycle), and there shall be no visible fracture on any part of the frame-fork assembly.

- a) **Falling mass impact test** Assemble a low-mass roller of less than or equal to 1 kg in the front fork of the frame-fork assembly and holding their assembly in the vertical to clamp to a rigid fixture by the rear axle attachment points as shown in figure 7, drop a mass of 22.5 kg vertically through a height of 180 mm (or 50 mm for young children's bicycle) so as to strike the low-mass roller in the front axle attachment part at a point in line with both wheel centres. Compare the wheel-bases measured before and after test to determine the permanent deformation.

Where the frame has detachable or movable top tube, it shall be tested with the top tube being removed or converted to the downward attachment.

Unit: mm

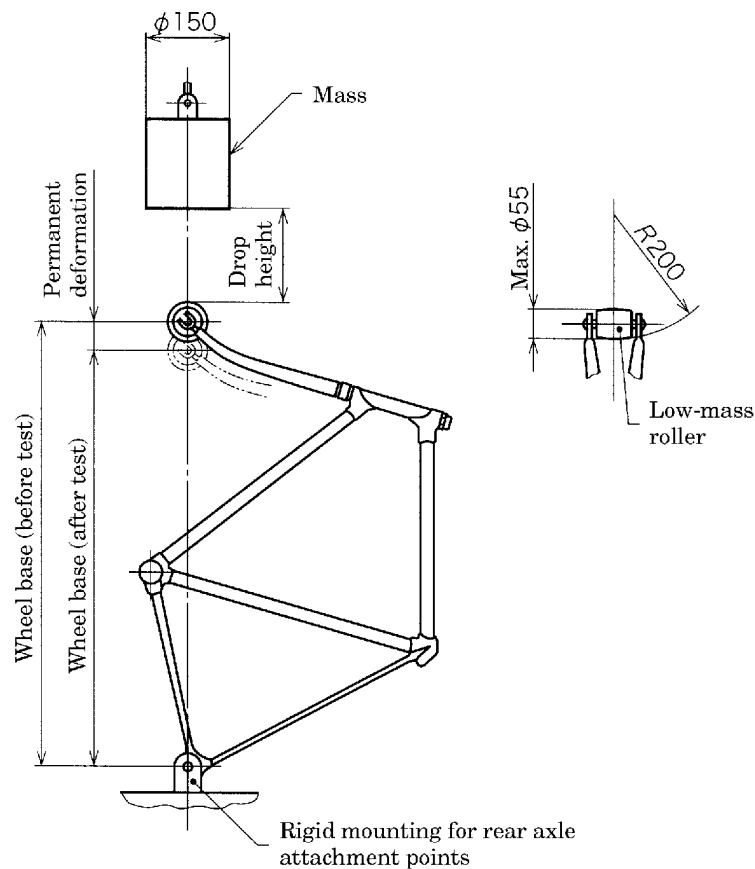


Figure 7 Frame-fork assembly falling mass impact test

- b) **Energy absorption test** Assemble a low-mass roller of less than or equal to 1 kg in the front fork of the frame-fork assembly and holding them in the vertical to clamp to a rigid fixture by the rear axle attachment points as shown in figure 8, apply a force onto the low-mass roller in the front axle attachment part in the direction of rear axle to let it absorb an energy of 40 J (or 11 J for young children's bicycle) and compare the wheel-bases measured before and after test to determine the permanent deformation. Further, the maximum force loaded shall be measured while testing.

The maximum force shall not be less than 880 N.

For a front fork only, clause 3 of **JIS K 9402** applies.

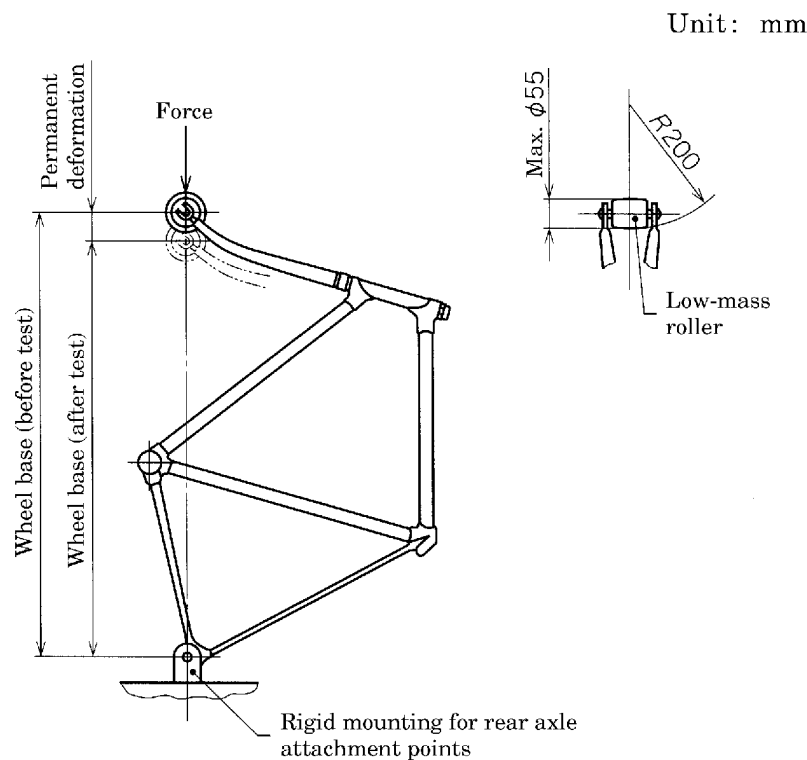


Figure 8 Frame-fork assembly energy absorption test

7.3 Falling frame-fork assembly impact resistance

- a) **Falling frame-fork assembly impact test** With the frame-fork assembly used for the test of 7.2 a) or 7.2 b) assembled with the low-mass roller, their assembly shall be mounted on a fixture so that it is free to rotate about the rear axle attachment axis in a vertical plane as shown in figure 9. And then, the front fork shall be supported by a flat steel anvil so as both wheel axles are in the horizontal, and a mass (an example of shape is shown in figure 10) of 70 kg (30 kg for young children's bicycle) shall be securely fixed so that its centre of gravity is on extension of axis of, and 75 mm from the top face of the seat tube. When the assembly, in this state, is raised up by a falling height⁽⁴⁾ where the front fork ends are at 300 mm from the anvil (250 mm for adult bicycles other than diamond shape and for children's and for young children's bicycles) and then dropped on the anvil repeatedly twice, there shall be no visible fracture of any part.

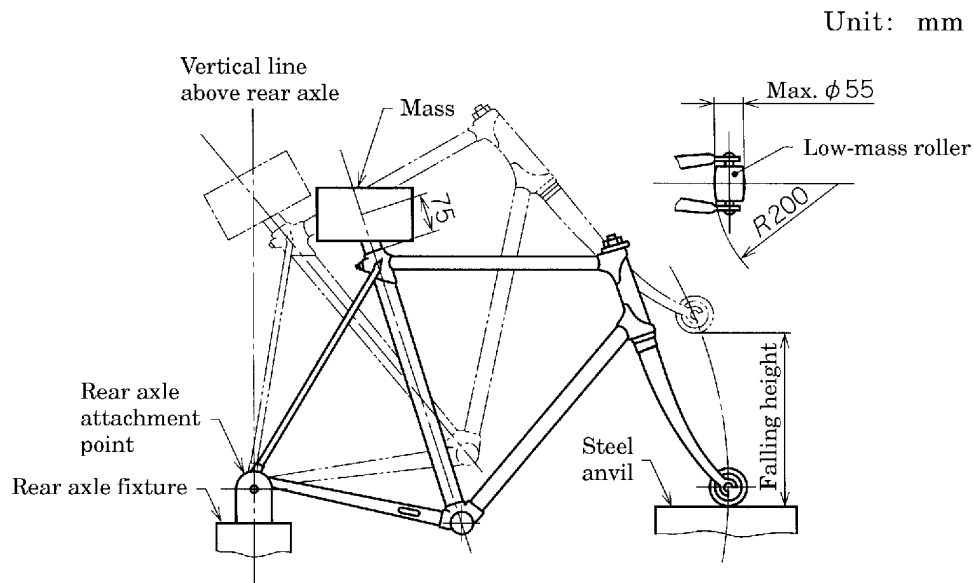


Figure 9 Falling frame-fork assembly impact test

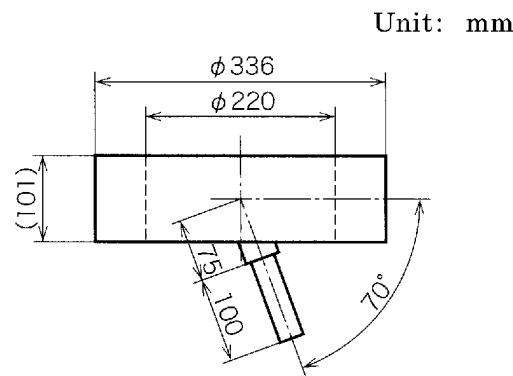


Figure 10 Mass (informative)

- b) **Falling frame-fork assembly for MTB-look bicycle impact test** The frame-fork assembly used for the test of 7.2 a) or 7.2 b) shall be assembled with a light-mass roller and mounted on a fixture so that it is free to rotate about the rear axle attachment axis in a vertical plane as shown in figure 11. And then, the front fork shall be supported by a flat steel anvil so as both wheel axles are in the horizontal, and a mass of 5 kg to the head and 35 kg to the bottom bracket and a mass of 30 kg to the seat, so that its centre of gravity is on extension of the axis of, and 75 mm from the top face of the seat tube, shall be fixed securely (examples of each mass are shown in figure 12). When the assembly, in this state, is raised up by a falling height⁽⁴⁾ where the front fork ends are at 300 mm from the anvil and then dropped on the anvil repeatedly twice, the permanent deformation of wheel-base shall not exceed 60 mm, and further there shall be no visible fracture on any part.

Note ⁽⁴⁾ Where the centre of gravity of the seat mass reaches the vertical line above the rear axle, the position is regarded as the falling height.

Unit: mm

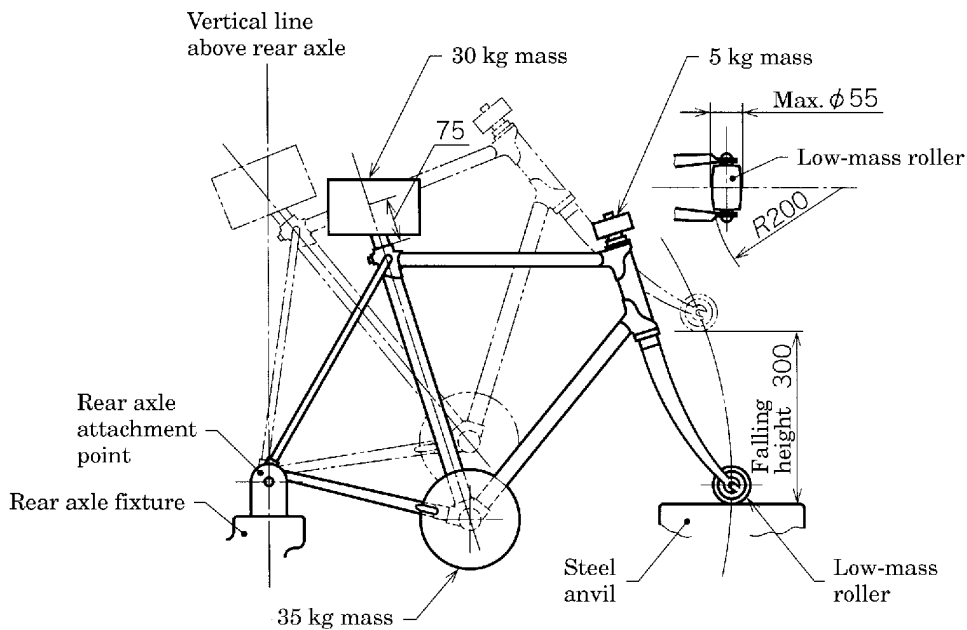


Figure 11 Falling frame-fork assembly for MTB-look bicycle impact test

Unit: mm

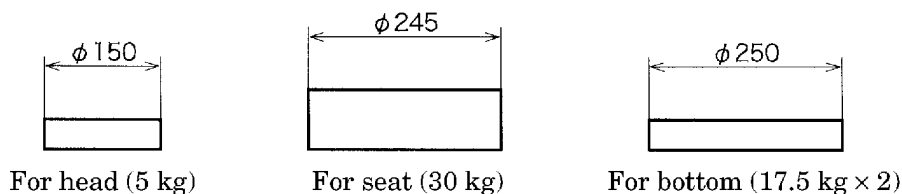


Figure 12 Masses (informative)

7.4 Fatigue test on seat pillar The seat pillar, when tested by the method either of 7.4.1 or 7.4.2, shall be free from any fracture or visible cracks.

7.4.1 Fatigue test on seat pillar 1 The fatigue test on seat pillar 1 shall be as follows:

- The test subject, being in the fully-finished state, shall be inserted to the minimum insertion depth and clamped in a fixture representative of a bicycle seat cluster by means of the usual tightening device. The axis of the seat pillar shall be inclined at 73° to the horizontal (see figures 13 and 14).
- Position and directions of test forces** The seat pillar shall be subjected to two stages of dynamic loading. The respective directions of loading are as shown in figures 13 and 14.

In the first stage, a repeated, vertical downforce, F_4 , shall be applied alternatively to each end of a suitable test adaptor which represents a saddle and which is securely clamped to the seat pillar (see figure 13).

The adaptor shall be clamped to the top portion where the saddle clamp would fit, and the mid-span of the adaptor shall be located in the clamp bolt portion. The test forces shall be applied each 70 mm ahead and rear, respectively, of the midspan. If impossible to apply a force to the point of 70 mm, any correlative adjustment of the force with distance is permitted. For a seat pillar with a choice of horizontal positions for the clamp, the adaptor shall be located in the rearmost position.

In the second stage, a repeated rearward force, F_5 , shall be applied at 90° to the main axis of the pillar. For a straight pillar, the force shall be applied through the centre of that position of the tube intended for the saddle clamp. For a seat pillar with a horizontal extension, the force shall be applied through the intersection of the axes of the main tube and the extension.

- c) **Test forces, number of test cycles and test frequency** The test forces are given in table 3. In each stage, test forces shall be applied for 50 000 cycles. Where, a cycle represents the application of the two alternating forces in the first stage and of the single force in the second stage. The maximum test frequency shall be 25 Hz.

Table 3 Condition of repeated force application

Material	Test force N	
	F_4	F_5
Ferrous	850	650
Non-ferrous	1 200	900

- d) **Accuracy of test forces** Applied forces shall be accurate to within (0 to +5) % of their normal values.

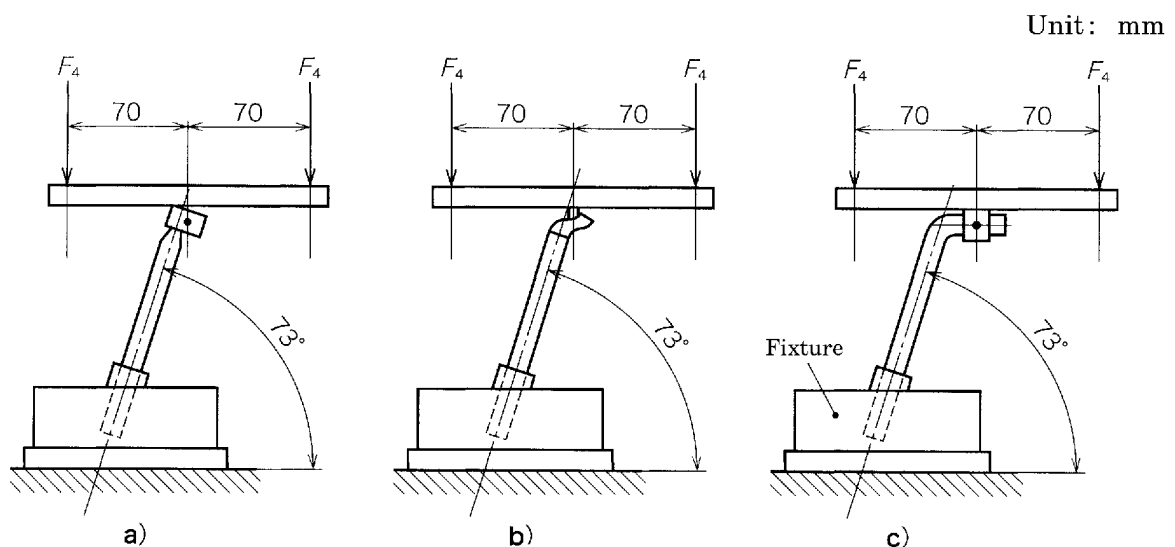


Figure 13 Fatigue test on seat pillar 1 (first stage)

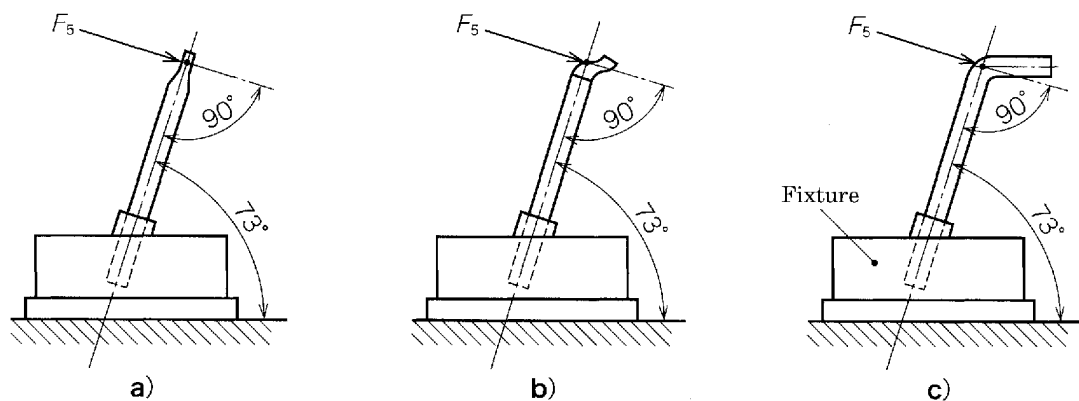


Figure 14 Fatigue test on seat pillar 1 (second stage)

7.4.2 Fatigue test on seat pillar 2 (for combination seat pillar) With the seat pillar fixed at the position of the minimum insertion mark with an inclination angle of 73° as shown in figure 15, attaching a loading bar onto the saddle fitting part and tightening the seat pillar adjusting bolt to a torque of $30 \text{ N} \cdot \text{m}$, an alternate force of 200 N each shall be applied upwards and downwards onto the points A and B of the loading bar at a rate of 60 cycles per minute for 200 000 cycles.

The accuracy of the applied forces shall be as defined in 7.4.1 d).

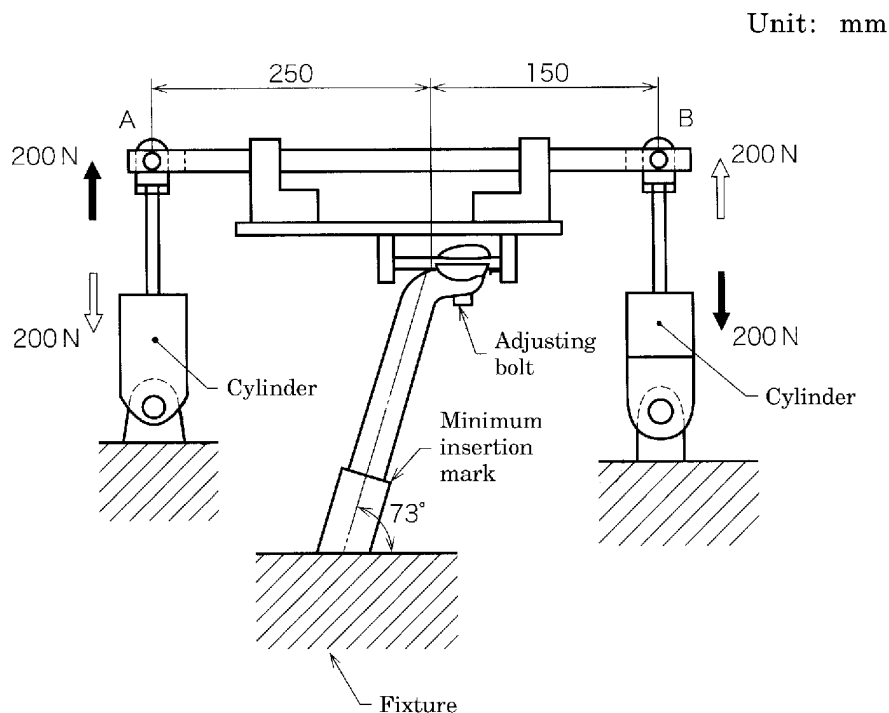


Figure 15 Fatigue test on seat pillar 2

7.5 Strength of frame parts The strength of frame parts shall be as follows:

- The upper head cup, lower head cup and crown race, when a force is applied gently onto both ends through the diameter to compress the internal diameter by 3 %, shall not be broken.

- b) When a force is applied onto a bottom bracket spindle as shown in figure 16 to break it, the breaking force shall not be less than 20 kN, and then the product of the force (kN) and the deflection at the centre of spindle (mm) shall not be less than 30 N·m.
- c) The hardness of the ball race surfaces of head set and bottom bracket parts, when tested according to **JIS Z 2245**, shall be as given in table 4.

Table 4 Hardness of ball race surfaces of head set and bottom bracket parts

Parts	Hardness
Upper and lower head cups, head cone and crown race	HRA 73 min.
Bottom bracket fixed cup and adjusting cup	HRA 77 min.
Bottom bracket spindle	HRC 52 min.

Unit: mm

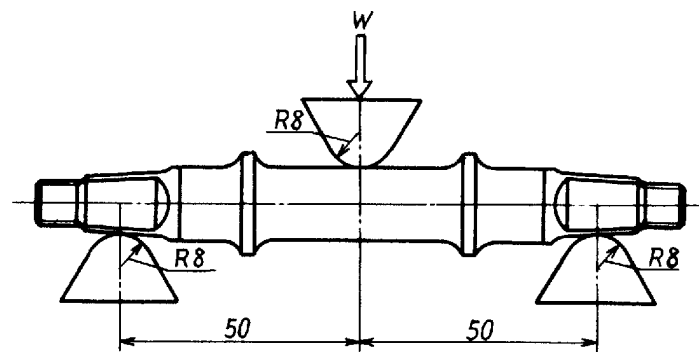


Figure 16 Strength of bottom bracket spindle

7.6 Runout of bottom bracket spindle With the bottom bracket spindle assembled within the test bottom bracket unit as shown in figure 17, when measured on the gauge of 55 mm in outer diameter fitted onto the spindle end of chainwheel side, the radial runout at the gauge periphery and the axial runout at 25 mm from the centre of gauge circumference shall not exceed 0.3 mm respectively.

Unit: mm

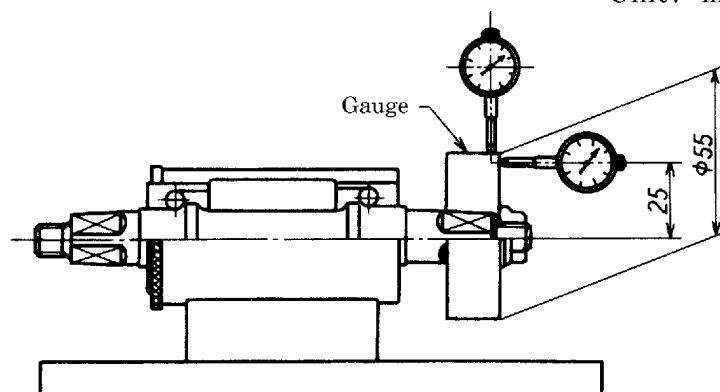


Figure 17 Runout measurement on bottom bracket spindle

8 Dimensions Dimensions of frame-fork assembly shall generally be as given in attached figures 1 to 6, and further be according to the following:

- a) Deviation of centre of the top extreme of seat tube or the corresponding member from the frame central plane shall not exceed 2 mm.
- b) Deviation of centre of inside interval between both rear fork ends from the frame central plane shall not exceed 3 mm.
- c) Centre of inside interval between both the chainstays at 50 mm backward from the bridge or at the point of rim passing through shall be within a range of 2 mm from the frame central plane, and further, the deviation from the centring position of inside interval between both rear fork ends **b)** shall not exceed 1.5 mm.
- d) Difference between both the rear fork end slots, measured on parallel planes viewing in a direction of normal to the frame central plane, shall be as shown figure 18.

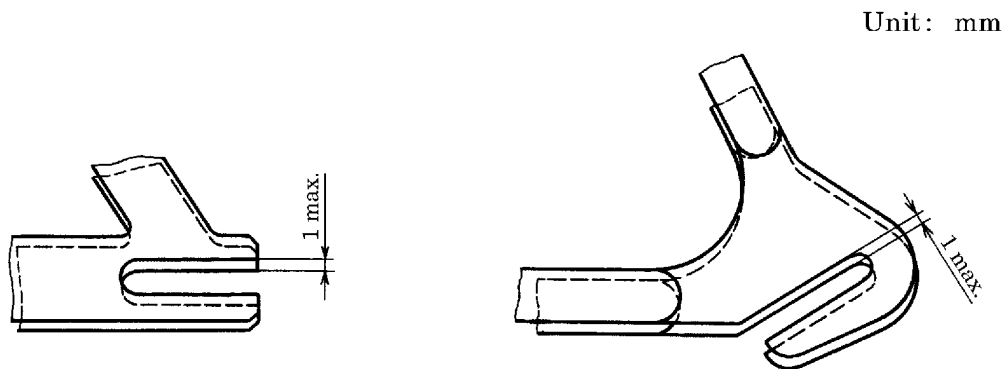


Figure 18 Difference of rear fork end slots

- e) The screw threads other than those specified in **JIS B 0225** shall be in accordance with the specifications of **JIS B 0205-1** to **-4**, and the permissible limits and tolerances shall generally be 6H·6g specified in **JIS B 0209-1** to **-5** or finer.

9 Plating and painting

9.1 Plating The thickness and corrosion resistance of plating on the frame, front fork and frame parts shall be grade 3 of table 1 and table 2 specified in **JIS H 8617** or superior. This does not apply to corners, threaded portions and parts processed after plating.

9.2 Painting The painted surfaces shall be as follows:

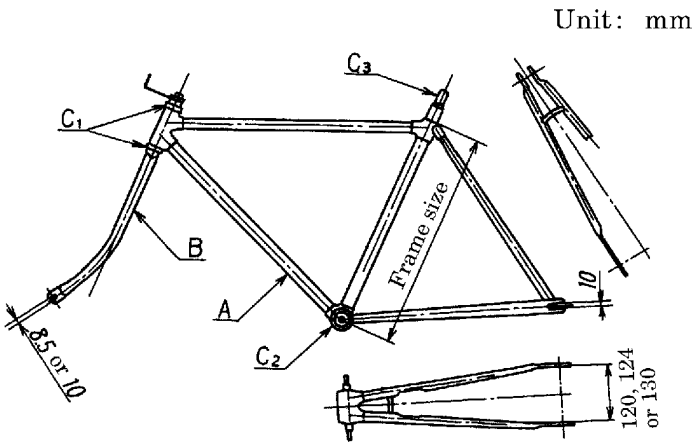
- a) When tested by pencil scratch test using a pencil of lead type F according to the specifications of **JIS D 0202**, there shall be no breakage of paint film on tested surface.
- b) When a steel ball of ball size 1/2 specified in **JIS B 1501** is dropped from a height of 1 500 mm vertically onto the paint coated film, there shall be no peeling, cracking and the like on the impacted surfaces.

10 Appearance Appearance of frame-fork assembly shall be as follows:

- a) There shall be no visible flaws, exposure or incomplete polishing of substrate, peeling, rust or other visible defects on the surfaces subjected to plating or painting.
- b) There shall be no rust, cracks, visible flaws or other visible defects on the surfaces subjected neither to plating or painting.
- c) There shall be no sharp edges, visible fins, burrs or the like on any part.
- d) Marks shall be free from incomplete stamping, positional deviation, irregular colour, blur, and other visible defects.

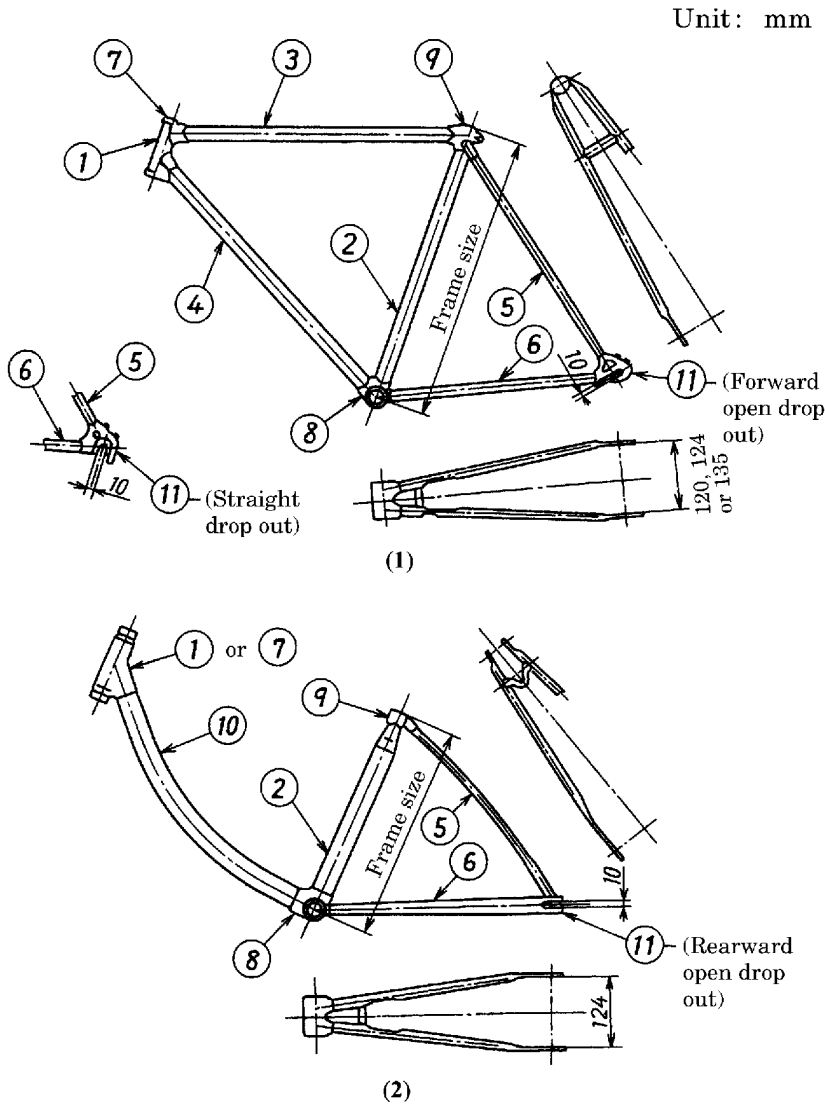
11 Marking Markings on the frame and frame parts shall be as follows:

- a) The frame-fork assembly shall be marked with the manufacturer's name or abbreviation at a conspicuous place and shall be indelible.
- b) The seat pillar shall contain a permanent mark that indicates the minimum insertion depth of the pillar into the frame. The minimum insertion mark shall be located at a portion not less than two diameters of the pillar from the bottom of the pillar, and not affect the strength of the pillar.



Division of constitution		Symbol
Frame		A
Front fork		B
Frame parts	Head set	C ₁
	Bottom bracket parts	C ₂
	Seat parts	C ₃

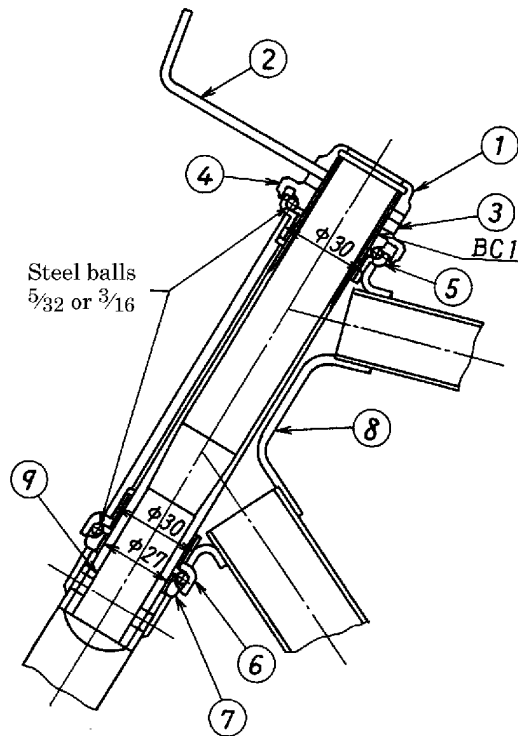
Attached Figure 1 Frame-fork assembly



No.	Name of part
1	Head tube
2	Seat tube
3	Top tube
4	Down tube
5	Seat stay
6	Chain stay
7	Head lug
8	Bottom bracket shell
9	Seat lug
10	Main tube
11	Rear fork end

Attached Figure 2 Frame

Unit: mm

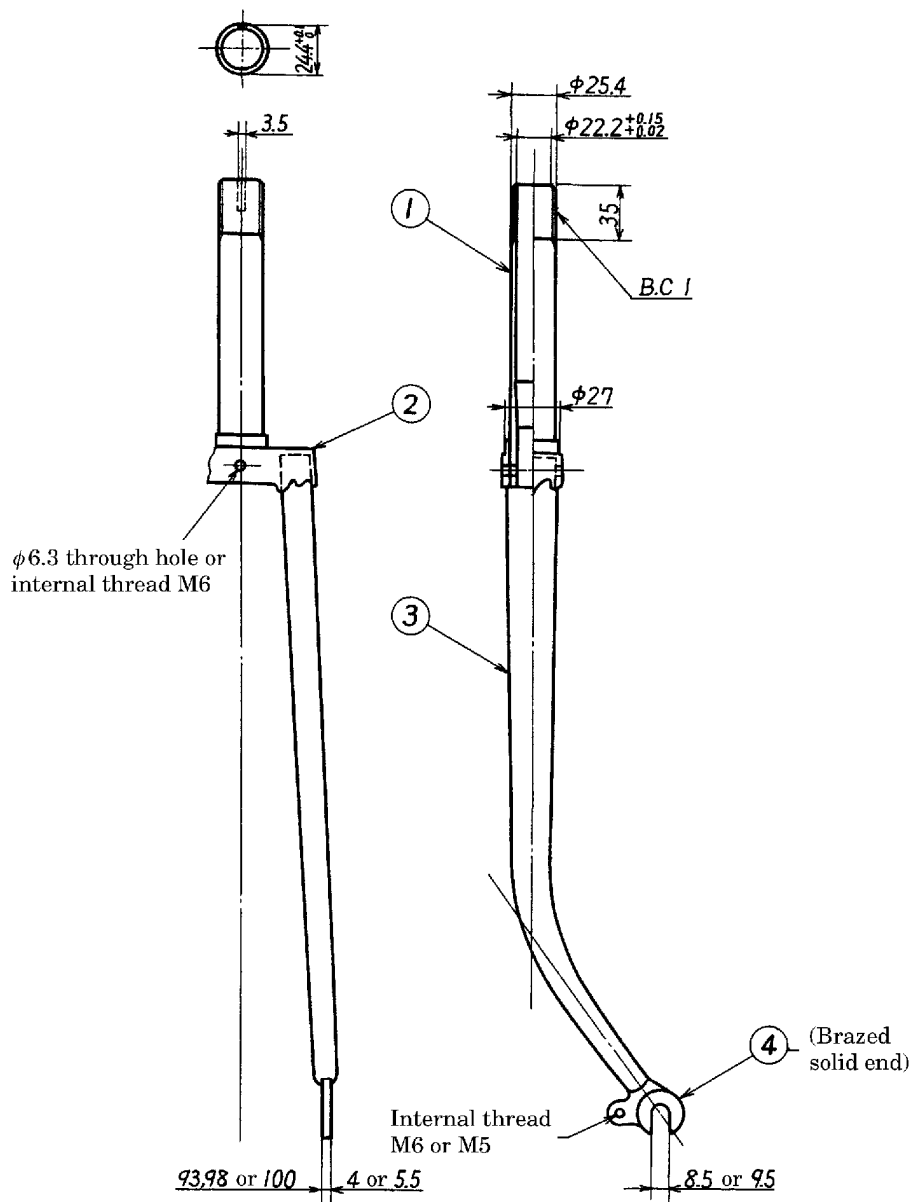


No.	Name of part
1	Head lock nut
2	Spacing key washer ⁽⁵⁾
3	Head plain lock nut
4	Head cone
5	Upper head cup
6	Lower head cup
7	Crown race
8	Head lug
9	Fork stem

Note ⁽⁵⁾ Lamp bracket and basket bracket are included.

Attached Figure 3 Head assembly

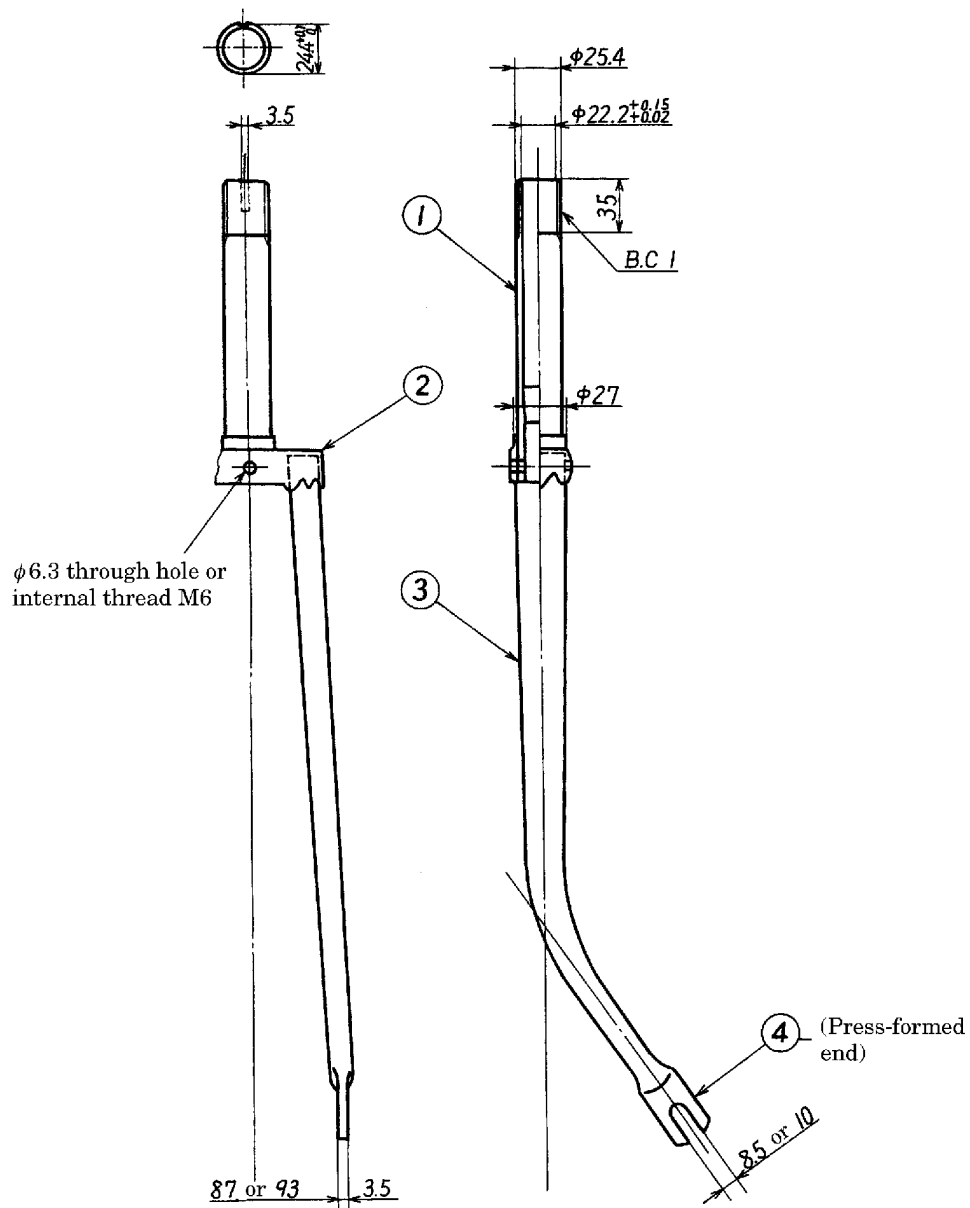
Unit: mm



No.	Name of part
1	Fork stem
2	Fork crown
3	Fork blade
4	Front fork end

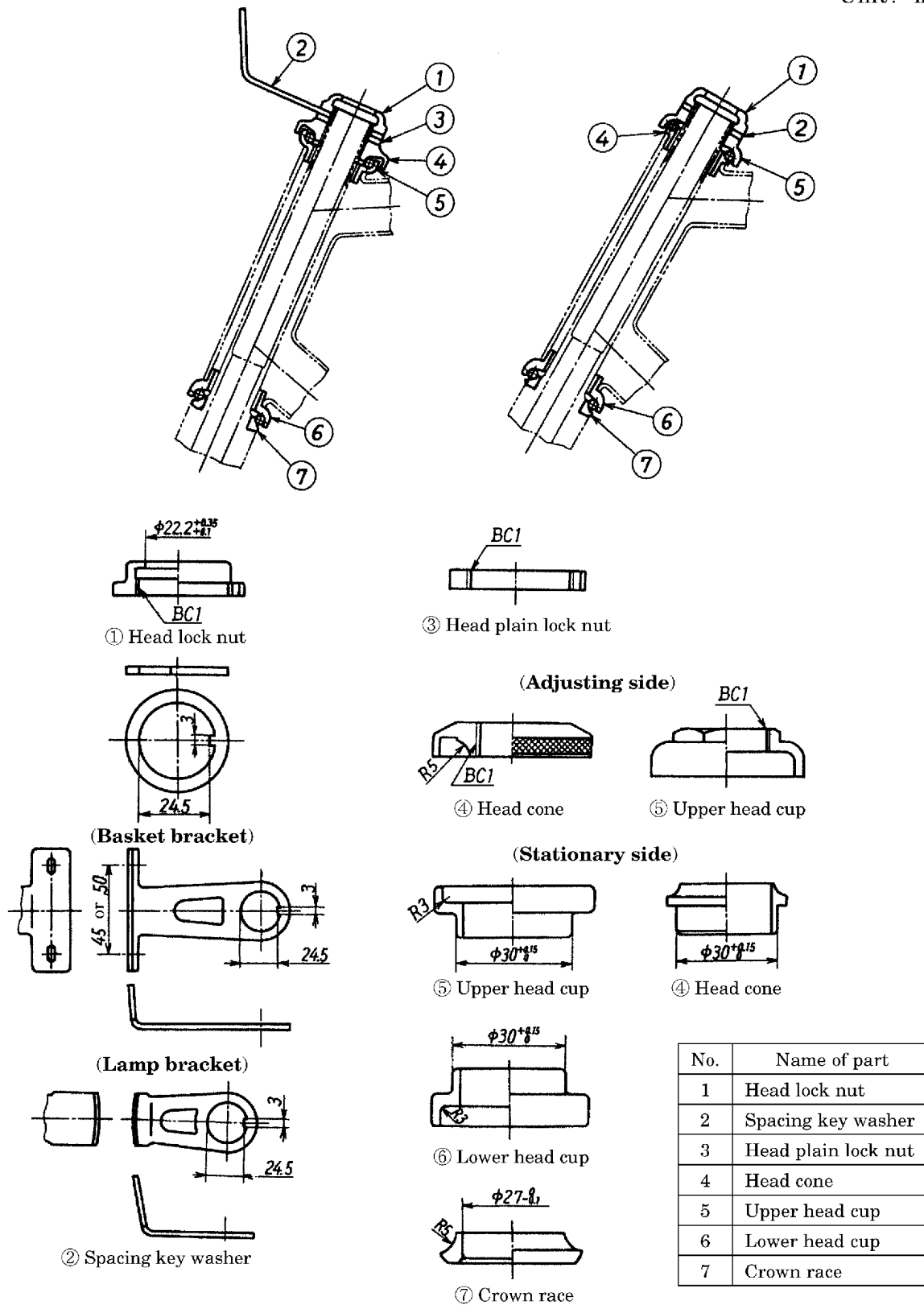
Attached Figure 4 Front fork (with brazed solid ends)

Unit: mm



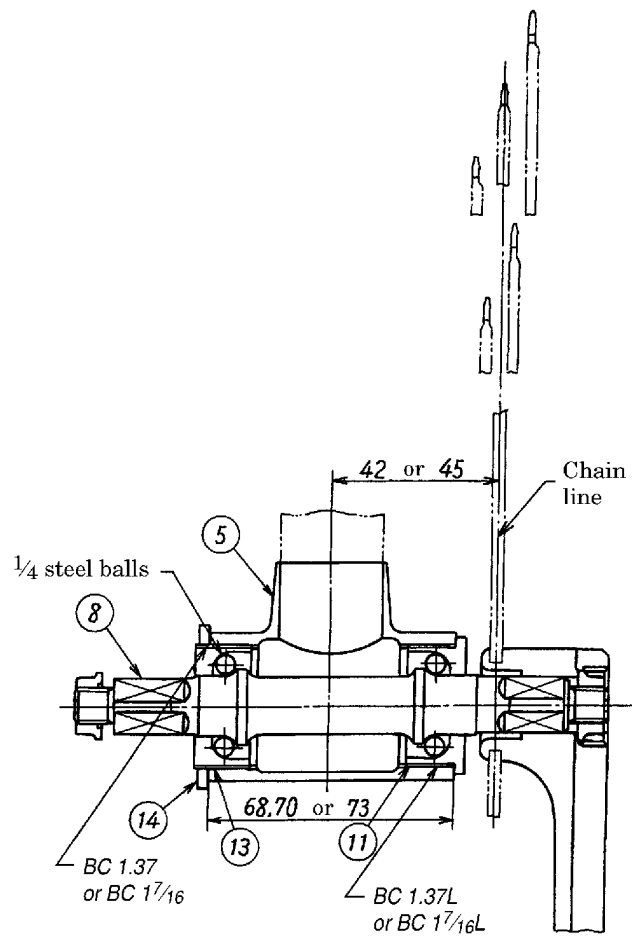
Attached Figure 5 Front fork (with press-formed ends)

Unit: mm



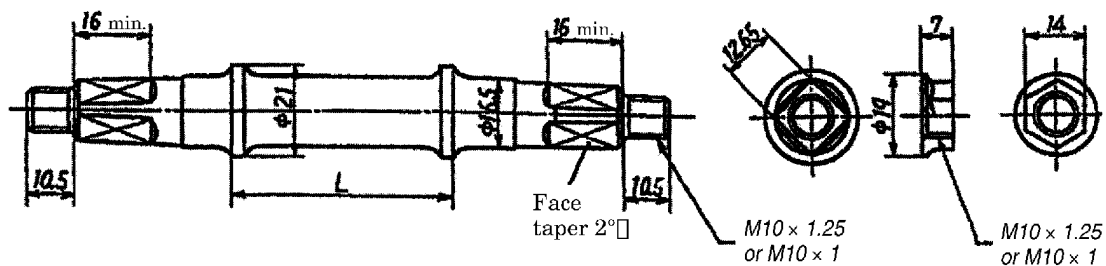
Attached Figure 6 Head set

Unit: mm



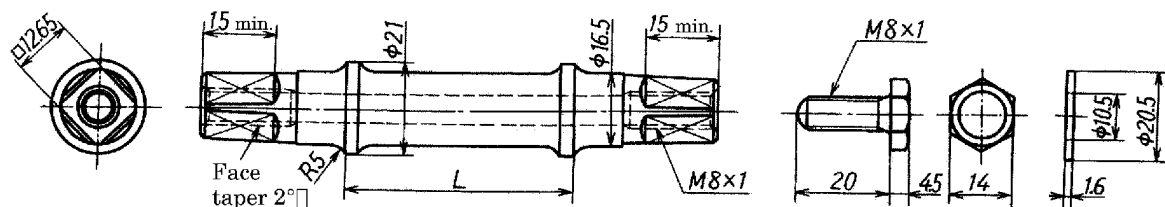
No.	Name of part
8	Bottom bracket spindle
9	Crank retaining nut
10	Crank retaining bolt
11	Bottom bracket fixed cup
12	Chain guard fixing nut
13	Bottom bracket adjusting cup
14	Bottom bracket cup lock ring

Unit: mm



⑧ Bottom bracket spindle (nut fixing type)

⑨ Crank retaining nut

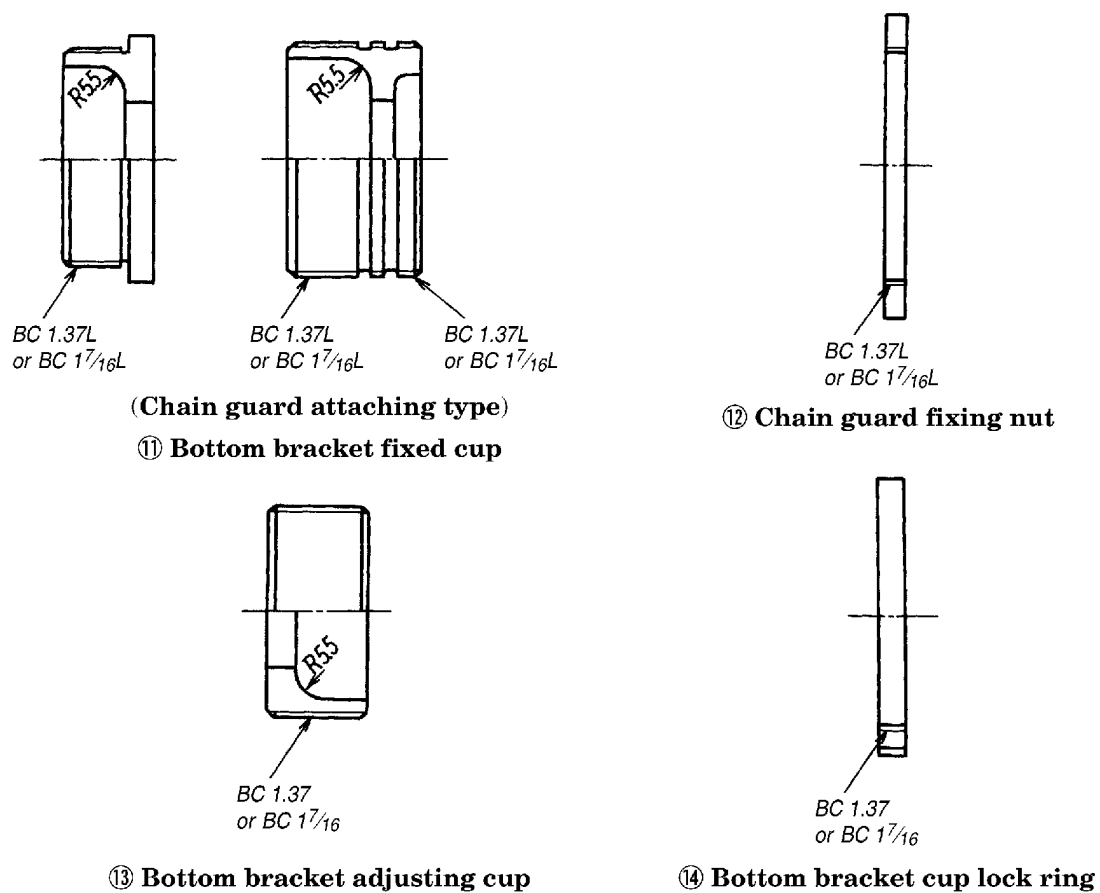


⑧ Bottom bracket spindle
(bolt fixing type)

⑩ Crank retaining bolt

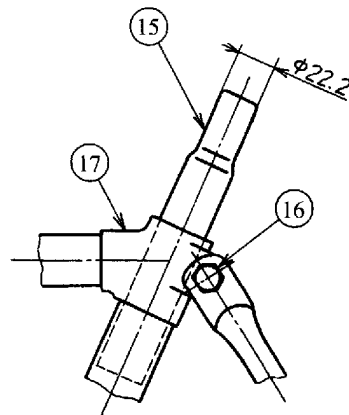
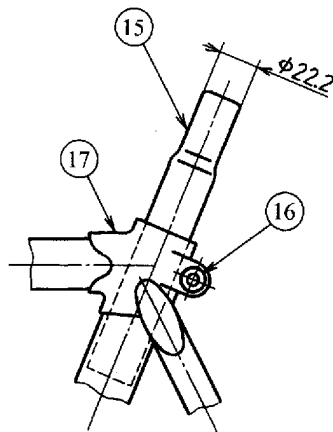
Width of bottom bracket shell	L
70	52
73	55

Attached Figure 7 Bottom bracket parts



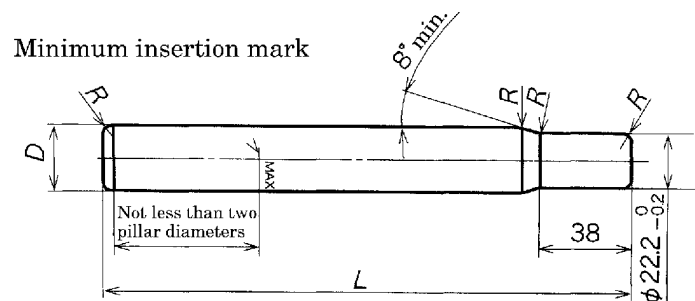
Attached Figure 7 (concluded)

Unit: mm

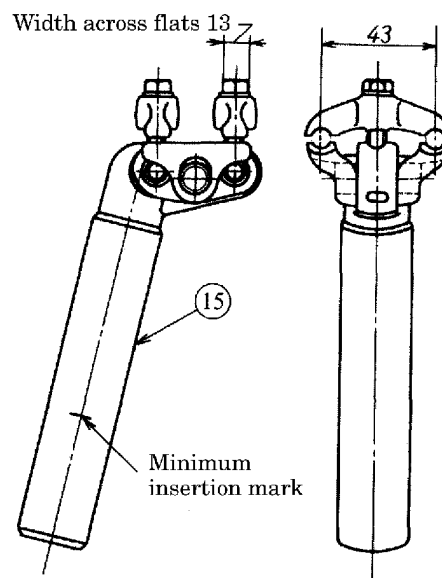


No.	Name of part
15	Seat pillar
16	Seat clamp bolt
17	Seat lug

Unit: mm



a) Straight seat pillar

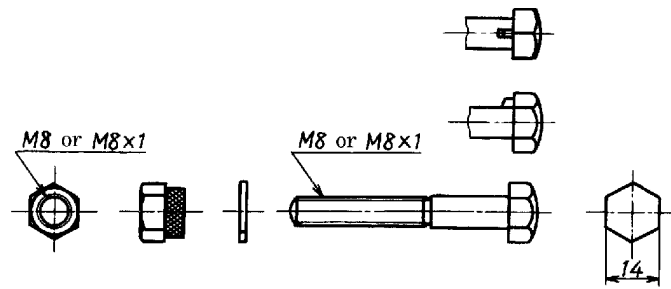


b) Saddle clamp combined seat pillar

⑮ Seat pillar

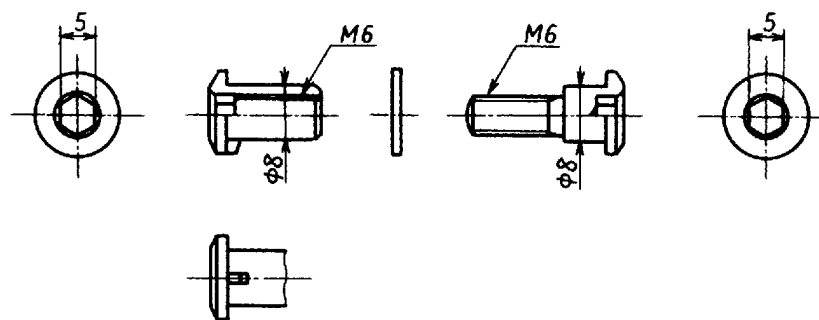
Attached Figure 8 Seat assembly and seat parts

Unit: mm



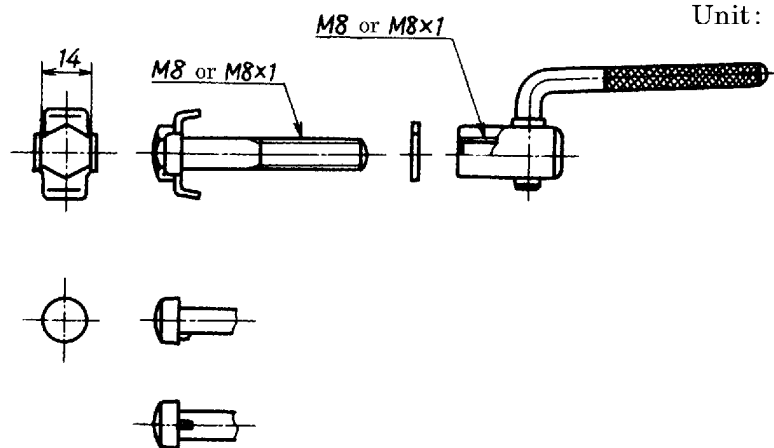
⑩ Seat clamp bolt

Unit: mm



⑩ Seat clamp bolt (hexagon socket head type)

Unit: mm



⑩ Seat clamp bolt (levered)

Attached Figure 8 (concluded)

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:

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