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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**:2005 is replaced with this Standard.

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Frame—Assembly for bicycles

Introduction

This Japanese Industrial Standard was established in 1963 and has gone through 10 revisions to this day. The last revision was made in 2005, and this revision has been made so as to include requirements for motor assist cycles and carbon fiber frames.

The corresponding International Standard has not yet been published at this moment.

1 Scope

This Standard specifies frame-fork assemblies to be used for bicycles for general use, bicycles for young children and motor assist cycles specified in **JIS D 9111** (hereafter referred to as “frame-fork assembly”). This Standard does not apply to frame-fork assemblies used for tricycles in the category of motor assist cycles. However, the test procedures specified in this Standard may be applied, using necessary jigs, to frame-fork assemblies for tricycles in the category of motor assist cycles with respect to the frame strength.

For those frames having a swing mechanism, each test shall be performed with the swing mechanism being locked.

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 0225 *Cycle threads*

JIS B 1501 *Rolling bearings—Balls*

JIS D 0202 *General rules of coating films for automobile parts*

JIS D 9101 *Cycles—Terminology*

JIS D 9111 *Cycles—Classification and essential characteristics*

JIS D 9402 *Bicycles—Front forks*

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 Terms and definitions

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

3.1 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 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.

3.2 frame size

distance from the centre of the bottom bracket spindle to the upper extreme of the seat tube or a member corresponding thereto (see figure 1)

3.3 frame parts

generic term of head set, bottom bracket parts and seat parts

3.4 rigid fork

front fork having high rigidity for testing, which is fitted to a frame

4 Constitution and classification

4.1 Constitution

Frame-fork assemblies shall consist of frame, front fork and frame parts, shall be as shown in figure 1 and table 1.

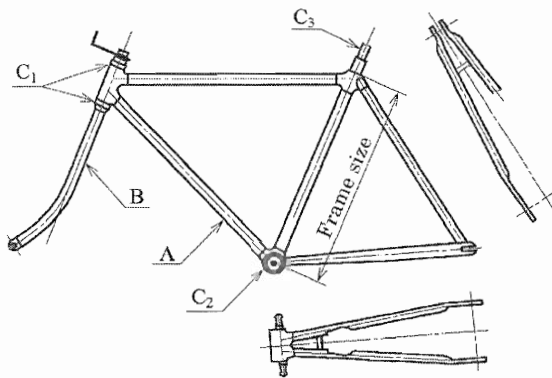


Figure 1 Constitution of frame-fork assembly

Table 1 Constitution of frame-fork assemblies

Division of constitution			Symbol in figure 1
Frame-fork assembly	Frame		A
	Front fork		B
	Frame parts	Head set	C ₁
		Bottom bracket parts	C ₂
Seat parts ^{a)}		C ₃	
Note ^{a)} Seat parts may be omitted from the frame-fork assembly.			

4.2 Classification

Frame-fork assemblies are classified according to the type of the bicycle to which they are applied, usage and shape, and are as follows.

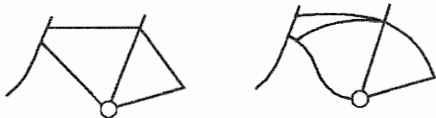
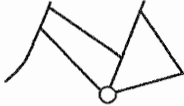
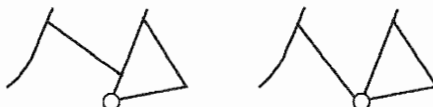
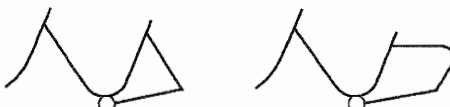
- a) **Classification of frame-fork assemblies by the type of bicycles to which they are applied and by usage** The classification of frame-fork assemblies by the type of bicycles to which they are applied and by usage are as shown in table 2.

Table 2 Classification of frame-fork assemblies by the type of bicycles to which they are applied and by usage

Type	Usage	Bicycle models
Bicycles for general use	For adults	Sport bicycles (including MTB-look bicycles)
		City-cycles
		Compact bicycles
		Utility bicycles
	For children	Children bicycles
Bicycles for young children	For young children	Bicycles for young children
Motor assist cycles	For adults	Sport bicycles (including MTB-look bicycles)
		City-cycles
		Compact bicycles
		Utility bicycles

- b) **Classification of frame-fork assemblies by shape** For classification of shape, frame-fork assemblies are either diamond-shaped or other than diamond-shaped, as exemplified in table 3.

Table 3 Shapes of frame-fork assembly

Shape	Example of shape of frame-fork assembly
Diamond-shaped	
Other than diamond-shaped	 Staggered  Parallel  Mixte  Double loop  Loop  Berceau  H-shaped  U-shaped  L-shaped

5 Names of parts

The names of parts of frame are shown in figure 19.

The names of parts of front fork shall be in accordance with **JIS D 9402**. The names of parts of head set, bottom bracket parts and seat parts shall be in accordance with figures 20 to 22.

6 Construction

6.1 Frame-fork assembly

Frame-fork assemblies 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 centrelines 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. For those provided with locking device, right-hand thread may also be used.
- e) The bottom bracket spindle shall be installed 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 fixed¹⁾ by tightening the seat clamping bolt or the like, and of sliding up and down easily when fixation is released by loosening the fixing means such as a seat clamping.

Note ¹⁾ The seat pillar is regarded as “securely fixed” if, when a load is applied to a saddle, which is expected to be used and fitted to the seat pillar, in the same manner as specified for the saddle fixing performance in **JIS D 9301** or **JIS D 9302**, there is no relative movement between the seat pillar and the frame-fork assembly.

- g) The rotational structure of head and bottom bracket assembly shall run smoothly without visible play.
- h) The frame-fork assembly shall be given plating, painting or other suitable surface treatments, except where the material used is corrosion resistant.

6.2 Folding or dividing structured frame

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

- a) Frame fastening metal using a quick release device or other mechanisms shall be securely fixed by means of a multiple structure²⁾, and shall be free from looseness or visible play during running of the bicycle.

Note ²⁾ Mechanism which can be deactivated by an operation consisting of two or more actions

6.3 Front fork

The construction and shape of front fork shall be as specified in **JIS D 9402**, or at least equivalent thereto in quality.

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 B 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 Frame-fork assembly

7.1.1 Durability of frame-fork assembly

A frame-fork assembly, when subjected to the vibration test of **9.1.1 a)** or the fatigue test of **9.1.1 b)**, shall be free from fracture, visible deformation, and distortion on any of its parts.

When a frame-fork assembly made of carbon fiber is subjected to a fatigue test of **9.1.1 b)**, the maximum deflection during the test at the point where the force (F) is applied as specified in **9.1.1 b) 6)** shall not increase by 20 % or more from the initial value.

7.1.2 Impact resistance or energy absorbing property

When a frame-fork assembly is subjected to the following impact test in **9.1.2 a)** or the energy absorption test in **9.1.2 b)**, the permanent deformation of distance between both axle centrelines (wheel base) shall not exceed 40 mm (20 mm for those for bicycles for young children), and there shall be no visible fracture on any of its parts.

The maximum value of the force used in the energy absorption test in which the frame-fork assembly is made to absorb energy shall be 880 N or more.

7.1.3 Falling frame-fork assembly impact resistance

When frame-fork assemblies for adult bicycles, children bicycles and bicycles for young children are subjected to the falling frame-fork assembly impact resistance test in **9.1.3 a)**, there shall be no visible fracture on any of their parts. When frame-assemblies for MTB-look bicycles are subjected to the falling frame-fork assembly impact resistance test of **9.1.3 b)**, there shall be no visible fracture on any of their parts. Furthermore, the permanent wheel base deformation shall not exceed 60 mm.

7.2 Frame parts

7.2.1 Strength of head set

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

7.2.2 Strength of bottom bracket parts

When a bottom bracket spindle is subjected to the test of **9.2.1**, the breaking force shall not be less than 20 kN, and the product of the force (kN) and the deflection at the centre of the spindle (mm) shall not be less than 30 N · m.

If the bottom bracket spindle constitutes a part of the auxiliary driving power unit of a motor assist cycle, this test shall not apply.

7.2.3 Hardness of ball race surfaces of head set and bottom bracket parts

The hardness of the ball race surface of head set and bottom bracket parts, when tested according to **9.2.2**, 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	73 HRA min.
Bottom bracket fixed cup and adjusting cup	77 HRA min.
Bottom bracket spindle	52 HRC min.

7.2.4 Strength of seat pillar

The seat pillar, when tested by the method in 9.3.1 or 9.3.2, shall be free from any fracture or visible cracks.

Combined seat pillars for MTB-look bicycles shall be tested in accordance with 9.3.2.

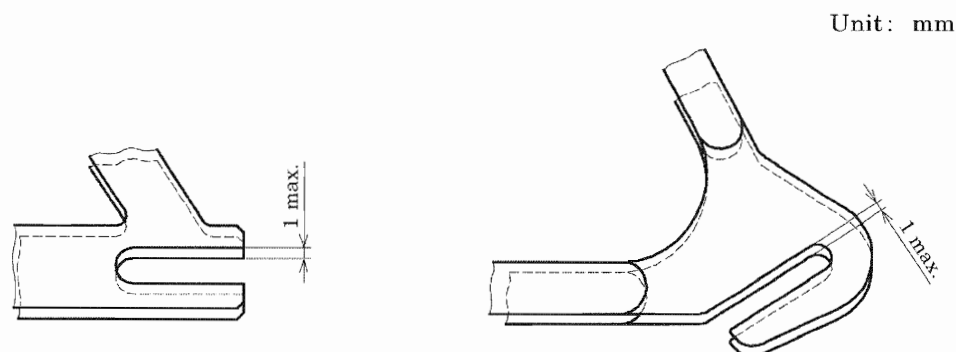
8 Dimensions

Dimensions of frame-fork assembly and frame parts shall generally be as given in figures 19 to 22, and further be according to the following:

Dimensions without indicated tolerances are recommended dimensions.

8.1 Frame-fork assembly

- Deviation of centre of the top extreme of the seat tube or a corresponding member from the frame central plane shall not exceed 2 mm.
- Deviation of centre of inside interval between the rear fork ends from the frame central plane shall not exceed 3 mm.
- Centre of inside interval between the chainstays at 50 mm backward from the bridge or at the point where rim passes through shall be within a range of 2 mm from the frame central plane, and further, the deviation from the centering position of inside interval between the rear fork ends **b)** shall not exceed 1.5 mm.
- The misalignment between the left-hand and right-hand rear slots shall not exceed 1 mm when viewed at right angles to the frame central plane and measured on a plane parallel to the frame central plane (see figure 2).

**Figure 2 Misalignment of rear fork end slots**