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**Cycles—Part 4: Body unit test
methods**

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Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment 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.

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JIS D 9313 series consists of the following 7 parts under the general title *Cycles*:

Part 1: General rule for test method and parts test methods

Part 2: Braking device test methods

Part 3: Steering device test methods

Part 4: Body unit test methods

Part 5: Running device test methods

Part 6: Driving device test methods

Part 7: Seating device test methods

Cycles—Part 4: Body unit test methods

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 4210-6:2015**, Edition 2, with some changes made in the technical contents to reflect the needs and conditions specific to Japan and to ensure safety of the products.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies test methods for body unit of bicycles for general use and bicycles for exclusive sports usage as defined in **JIS D 9111**.

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

ISO 4210-6:2015 *Cycles—Safety requirements for bicycles—Part 6: Frame and fork test methods* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards 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 D 9111 *Cycles—Classification, terminology and essential characteristics*

NOTE Corresponding International Standard: ISO 4210-1:2014 *Cycles—Safety requirements for bicycles—Part 1: Terms and definitions* (MOD)

JIS D 9301 *Bicycles for general use*

NOTE Corresponding International Standard: ISO 4210-2:2015 *Cycles—Safety requirements for bicycles—Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles* (MOD)

JIS D 9304 *Bicycles for exclusive sports usage*

NOTE Corresponding International Standard: ISO 4210-2:2015 *Cycles—Safety requirements for bicycles—Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles* (MOD)

JIS D 9313-1 *Cycles—Part 1: General rule for test method and parts test methods*

NOTE Corresponding International Standard: ISO 4210-3:2014 *Cycles—Safety requirements for bicycles—Part 3: Common test methods* (MOD)

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS D 9111** apply.

4 Frame test methods

4.1 Frame — Impact test (falling mass)

4.1.1 General

The falling mass impact test of frames shall be as follows.

- a) Manufacturers of frames are permitted to conduct the test with a dummy fork (see Annex A) fitted in place of a front fork.
- b) If the frame has a detachable or movable bar, test it with the bar removed, or moved to the lower position.
- c) Where a suspension fork is fitted, test the assembly with the fork extended to its unloaded free length.
- d) Where a rear suspension system is incorporated in the frame, secure the suspension in a position equivalent to that which would occur with an 80 kg rider (40 kg rider for young adult bicycles) seated on the bicycle. If the type of suspension system does not permit it to be locked, then replace the spring/damper unit by a solid link of the appropriate size and with end fittings similar to those of the spring/damper unit.
- e) When testing an electric power assisted cycle having a drive system whose housing etc. is integral with the frame, test it with the housing etc. fitted.

4.1.2 Test method

Assemble a roller of mass less than or equal to 1 kg and with dimensions conforming to those shown in Figure 1 in the fork. The hardness of roller shall be not less than 60 HRC at impact surface. If a dummy fork is used in place of a fork, the bar shall have a rounded end equivalent in shape to the roller.

Hold the frame-fork or frame-bar assembly vertically through clamping to a rigid fixture by the rear-axle attachment points. Rest a striker of mass 22.5 kg on the roller in the fork-end slots and measure the wheelbase. Raise the striker to a height of h_1 above the low-mass roller and release it to strike the roller or the steel bar at a point in line with the wheel centres and against the direction of the fork rake. The drop heights are given in Table 1. The striker will bounce and this is normal. When the striker has come to rest on the roller, measure the wheelbase again to determine permanent deformation.

If the fork fails, the frame shall be tested with a dummy fork.

NOTE See 4.4 of **JIS D 9313-1**.

Table 1 Drop heights

Unit: mm

Bicycle type	Bicycles for general use		Bicycles for exclusive sports usage	
	Sporty bicycles, city bicycles, compact bicycles, roadsters	Young adult bicycles	Mountain bicycles	Racing bicycles
Drop height, h_1	180	180	360	212

Unit: mm

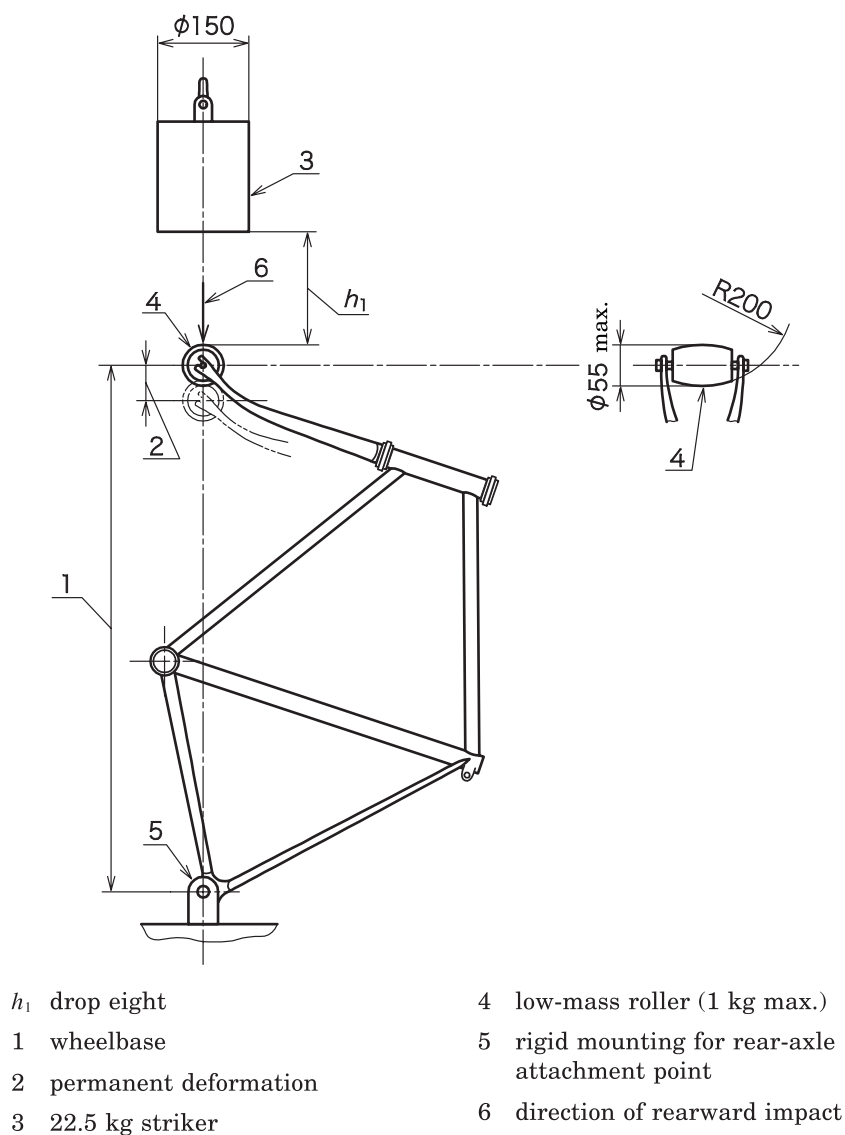


Figure 1 Frame — Impact test (falling mass)

4.2 Frame and front fork — Impact test (falling frame)

4.2.1 General

The falling frame impact test for frame and front fork assembly shall be as follows.

- a) Manufacturers of complete bicycles shall conduct the test with the frame fitted with the appropriate front fork.
- b) For manufacturers of frames, where the fork intended for the frame is not available, the test can be conducted with the frame fitted with a fork which meets the requirements of the fork impact test as described in **5.4.2.5** of **JIS D 9301** for bicycles for general use, and in **4.4.2.5** of **JIS D 9304** for bicycles for exclusive sports usage.
- c) Where the frame has a detachable or movable bar, test it with the bar removed, or moved to the lower position.
- d) Where a suspension fork is fitted, it shall be at its unloaded length prior to the impact. If the spring/damper unit can be locked, it shall be locked in its unloaded length position. If the spring/damper cannot be locked, use one of the two following alternative procedures.
 - 1) secure the fork at its extended length by an external locking method, or
 - 2) replace the fork by a rigid fork which is known to meet the requirements of the impact test described in **5.4.2.5** of **JIS D 9301** for bicycles for general use and in **4.4.2.5** of **JIS D 9304** for bicycles for exclusive sports usage and of a length which is consistent with an 80 kg (in the case of young adult bicycles, apply 40 kg) rider seated in a normal riding position on the bicycle when it is equipped with the suspension fork.
- e) Where a rear suspension system is incorporated in the frame, secure the spring/damper unit in a position equivalent to that which would occur with an 80 kg (in the case of young adult bicycles, apply 40 kg) rider seated on the bicycle; if the type of suspension system does not permit it to be locked, then replace the spring/damper unit by a solid link of the appropriate size and with end fittings similar to those of the spring/damper unit.
- f) When testing a frame for electric power assisted cycle, test it with the actual battery, drive system and controls of the cycle fitted at the positions where they will be mounted in use, or attach a weight to the frame to simulate the same mass. In this case, the battery, drive system and controls are excluded from evaluation of the test. When testing an electric power assisted cycle having a drive system whose housing etc. is integral with the frame, test it with the housing etc. fitted.

4.2.2 Test method

Conduct the test on the assembly used for the test in **5.4.1.4** of **JIS D 9301** for bicycles for general use and in **4.4.1.2** of **JIS D 9304** for bicycles for exclusive sports usage, or, in the case of a frame manufacturer who does not make forks, with the same frame with a suitable fork fitted (see **4.2.1**).

As shown in Figure 2, mount the frame-fork assembly at its rear axle attachment points so that it is free to rotate about the rear axle in a vertical plane. Support the front fork on a flat steel anvil so that the frame is in its normal position of use.

Securely fix mass 1 to the seat-post as shown in Table 2 with the centre of gravity at distance D ($=75$ mm) along the seat-post axis from the insertion point (shape and dimensions of mass 1 and the mass receiver are shown in Figure 3), and fix mass 2 and mass 3 (Table 2) to the top of the steering head and the bottom bracket, respectively.

Measure the wheelbase with the three masses in place. Rotate the assembly about the rear axle until the distance between the low-mass roller and the anvil is h_2 , and then allow the assembly to fall freely to impact on the anvil. Repeat the test and then measure the wheelbase again with the three masses in place to determine permanent deformation.

Table 2 Drop heights and distribution of masses

Bicycle type	Bicycles for general use		Bicycles for exclusive sports usage	
	Sporty bicycles, city bicycles, compact bicycles, roadsters	Young adult bicycles	Mountain bicycles	Racing bicycles
Mass 1 Seat-post, M_1 kg	50	40	30	30
Mass 2 Steering head, M_2 kg	10	10	10	10
Mass 3 Bottom bracket, M_3 kg	30	20	50	50
Drop height, h_2 mm	200	200	300	200

Unit: mm

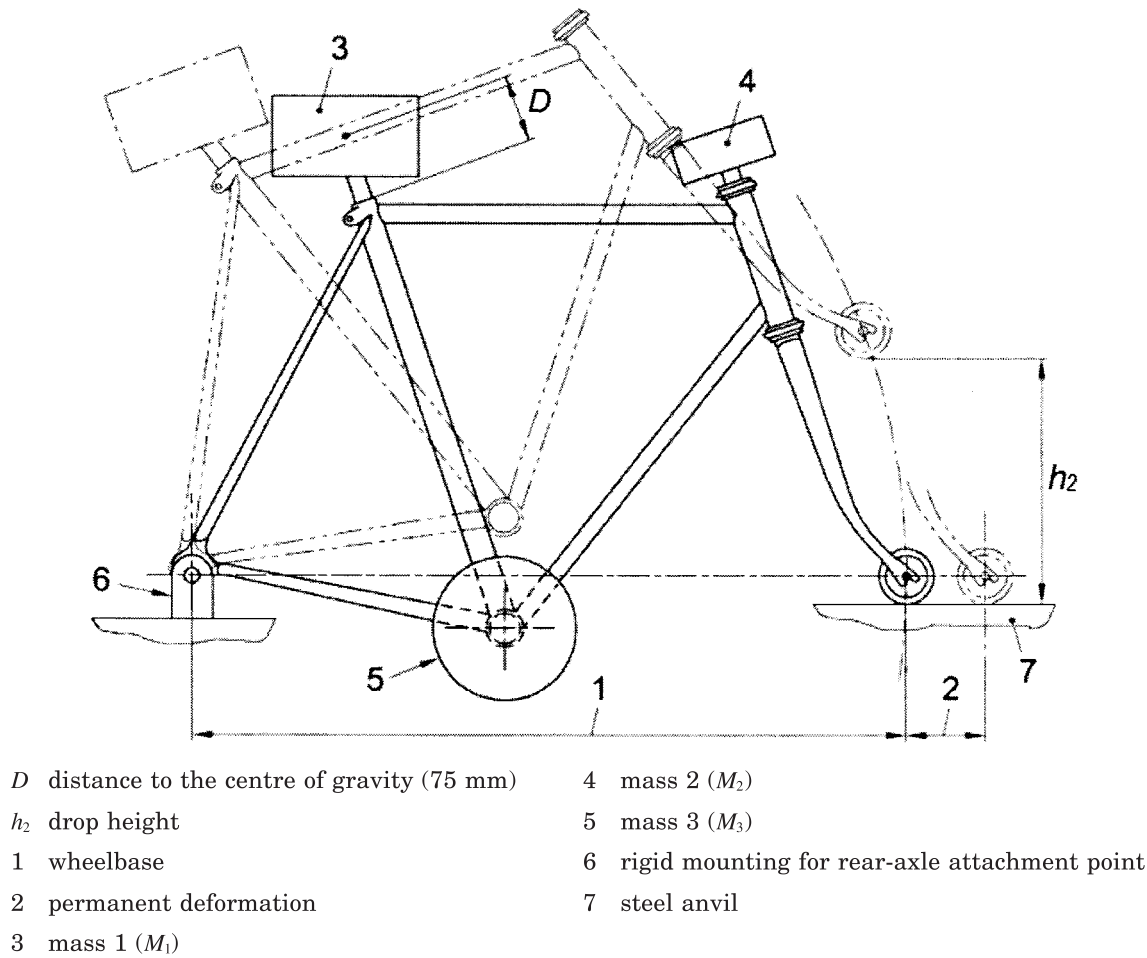


Figure 2 Frame and front fork — Impact test (falling frame)

Unit: mm

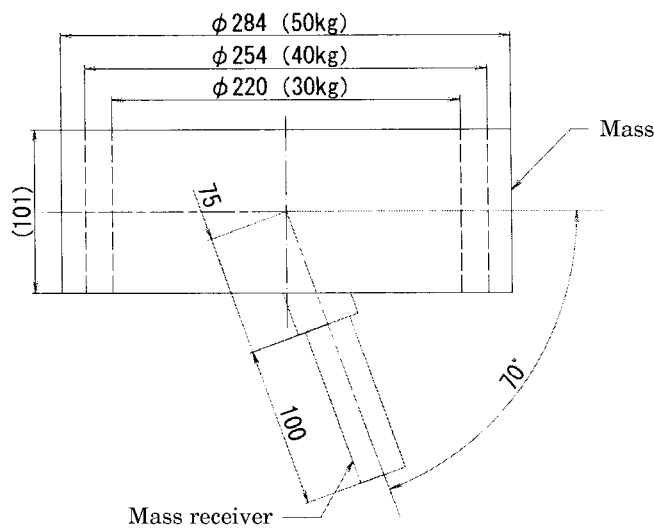


Figure 3 Mass 1 (example)