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Cycles - Components and assemblies used in bicycles - Innovative requirements and test methods

Fahrräder - Verbundwerkstoffe für Fahrräder - Neue Spezifische Prüfverfahren für aus Verbundwerkstoffe hergestellte Komponenten

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European foreword

This document (CEN/TR 17653:2021) has been prepared by Technical Committee CEN/TC 333 “Cycles”, the secretariat of which is held by UNI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

1 Scope

The purpose of this document is to provide innovative requirements and test methods applicable to any components and assemblies of any category of bicycles (city, trekking, MTB, young adult and racing). Its aim is to provide technical solutions that reduce the risk of component failure and rider injury during the specified use of such bicycles.

This document makes reference to current "state of the art" standards in the field of bicycles, agreed at CEN level through the publication of the EN ISO 4210 series of standards. Therefore, the requirements and tests proposed in this document are intended to be read and applied in accordance with the appropriate EN ISO 4210 standard.

NOTE The tests described in this document refer in places to clause numbers from the applicable EN ISO 4210 series.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 4210-2:2015, *Cycles - Safety requirements for bicycles - Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles (ISO 4210-2:2015)*

EN ISO 4210-3:2014, *Cycles - Safety requirements for bicycles - Part 3: Common test methods (ISO 4210-3:2014)*

EN ISO 4210-4:2014, *Cycles - Safety requirements for bicycles - Part 4: Braking test methods (ISO 4210-4:2014)*

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

EN ISO 4210-7:2014, *Cycles - Safety requirements for bicycles - Part 7: Wheels and rims test methods (ISO 4210-7:2014)*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

4 Frames designed for disc brake

4.1 Background

The forces applied to a bicycle frame by disc brakes are different in magnitude and location to those applied by rim brakes, so specific tests and requirements are necessary to ensure safety. This section sets out test procedures and minimum safety requirements for disc brake frames.

4.2 Test methods

4.2.1 Rear brake mount tests

4.2.1.1 General

When a frame is intended for use with a disc brake and whether supplied as original equipment or as an accessory, the frame manufacturer shall provide an attachment point on the frame for the caliper.

4.2.2 Static rear brake torque test

Mount the frame in its normal attitude in a fixture and secured either at the rear wheel axis or at the bottom bracket so that is not restrained in a rotary sense as shown in Figure 1a) or Figure 1b). Fit a suitable roller to the front axle in order to permit the frame to flex in a fore/aft sense under the test forces. A dummy fork can be fitted in place of the front fork.

Install a stiff, vertical link with an arm length R_w according to the maximum outer radius of the tyre intended for use with the frame or, if this value is not specified by the manufacturer, according to the maximum wheel diameter as given in Table 2. Further install a rigidly mounted brake disc of appropriate diameter at the rear dropouts by means of an axle being free to swivel about the axis of the axle but providing rigidity in a lateral plane.

The brake torque shall be introduced into the brake mount via the link arm in the same way as the actual caliper would do, i.e.:

a) the link arm can rotate freely on the rear axle;

b) the minimum brake rotor diameter specified by the manufacturer is simulated appropriately; and

c) the link arm is supported by the brake mounts so that only the tangential force, acting on the effective rotor radius in actual use, is introduced into a suitable brake caliper dummy.

Under no circumstances a rigid connection is to be created between link arm and brake caliper mount, as shown in Figure 1 c).

Apply a rearward force of 700 N to the link arm against the direction of travel. Maintain this force for 1 min, then reduce the force to 0 and apply a force of 300 N in direction of travel, again maintain this force for 1 min and release the force.

4.2.3 Rear brake mount fatigue test

Mount the frame in its normal attitude in a fixture in the same manner as for the static rear brake torque test as shown in Figure 1a) or Figure 1b).

Apply cycles of dynamic, horizontal forces of F_1 in a rearward direction and F_2 in a forward direction to the link arm for 20 000 test cycles as shown in Table 1 and Figure 1.

Table 1 — Forces at rear disc brake

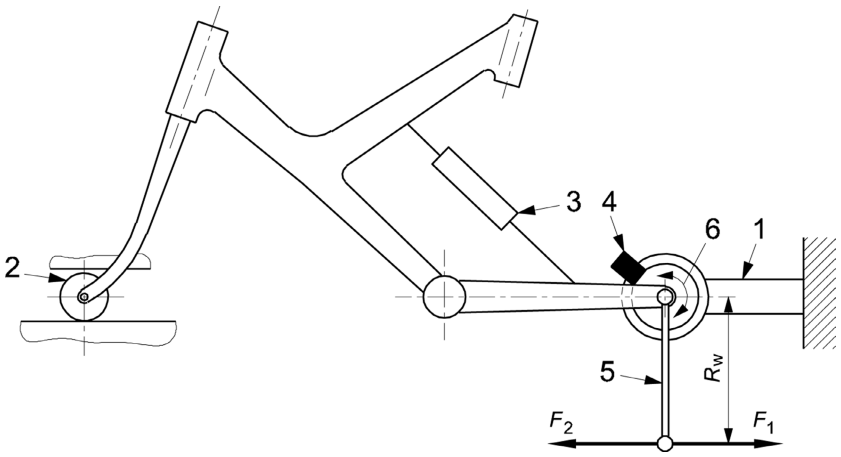
Forces in Newton

Bicycle type	City and trekking bicycle	Young adult bicycle	Mountain bicycle	Racing bicycle
Rearward force, F_1	500	300	500	400
Forward force, F_2	50	50	200	50

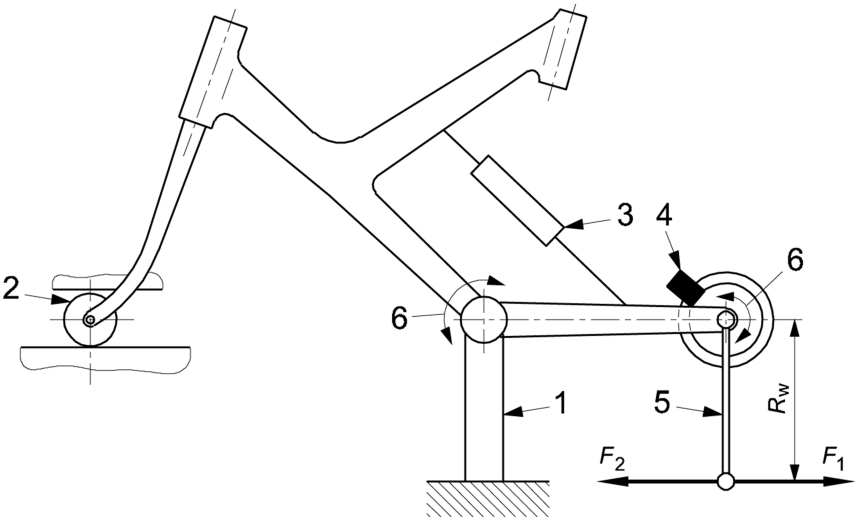
Table 2 — Fixture length

Dimensions in millimetres

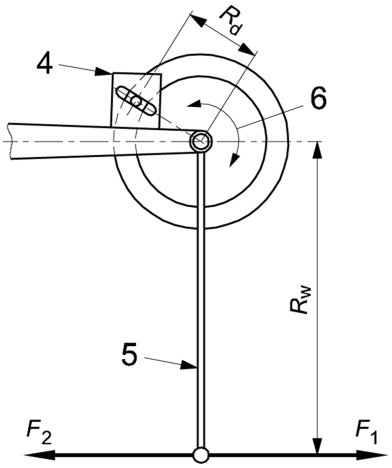
Wheel diameter	20”	24”	26”	650b	29” or 700c
Arm length, R_W	254	305	330	349	368



a) fixing the frame to the rear wheel axis



b) fixing the frame to the bottom bracket



c) applying of the test force via the link arm

Key

1 rigid, pivoted mounting
2 free-running guided roller or similar movable bearing
3 locked suspension unit or solid link for pivoted chain stays
4 locking device on brake mount / caliper dummy
5 test adapter for force attachment, free to rotate around the axis of rotation of the rear wheel
6 rotational degree of freedom
R_W wheel radius according to the maximum outer radius of the tire or according to Table 2
R_d disc brake mean radius

Figure 1 — Frames for disc-brakes — Rear brake mount fatigue test