SLOVENSKI STANDARD
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Kolesa - Sestavni deli in sklopi za kolesa - Inovativne zahteve in preskusne metode

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

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

Ta slovenski standard je istoveten z: FprCEN/TR 17653

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This draft Technical Report is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 333.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

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

This document is currently submitted to the Vote on TR.

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 http://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 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

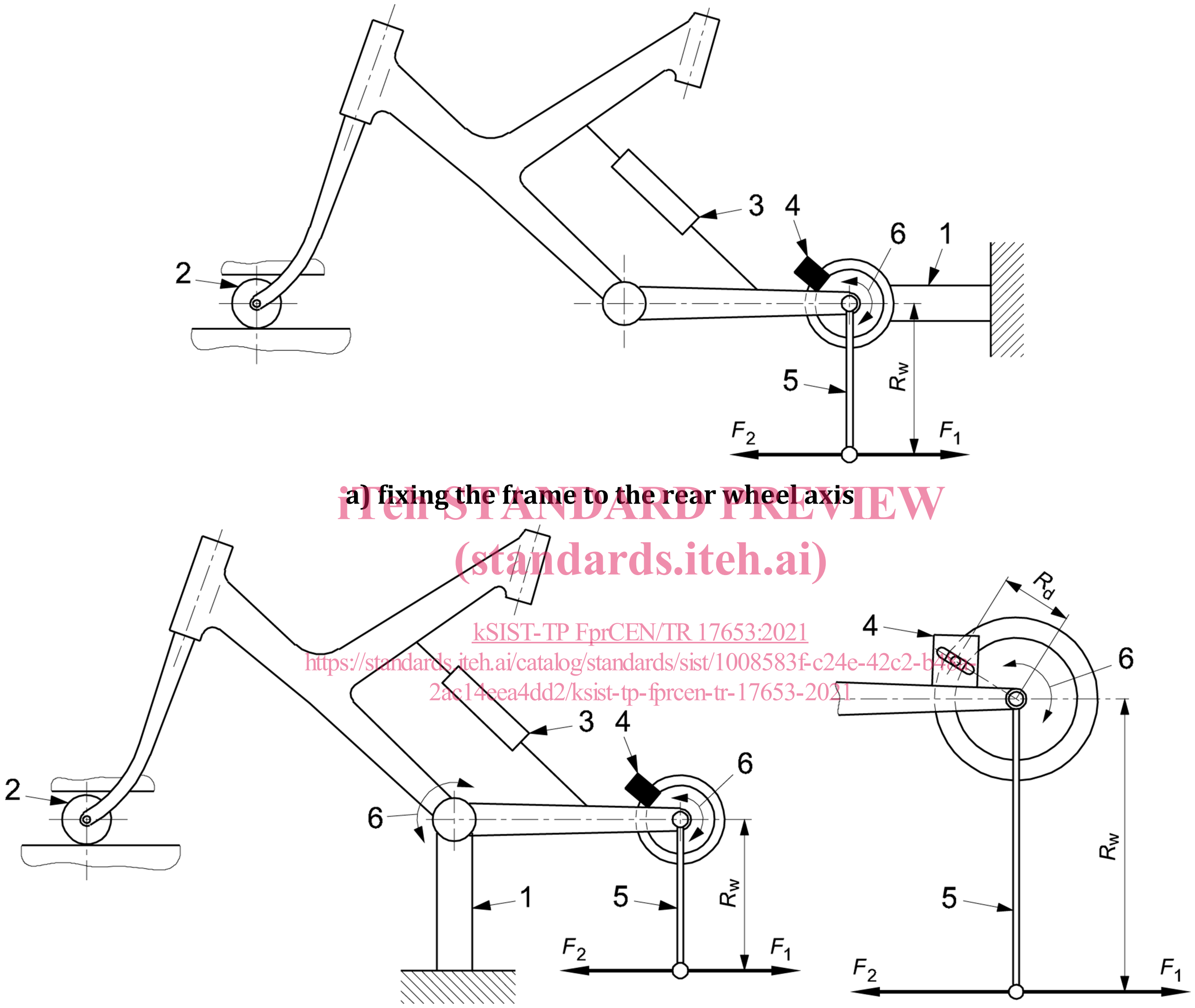
Forces in Newton

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

5 Fork made of composite materials designed for disc brakes

5.1 General

This test shall only apply to forks that contain composite structure at the disc brake caliper mount.

With the development of road (racing) bicycles that utilize new disc brake technology for stopping (either hydraulic or cable actuated) it is important to understand the result of thermal impact on composites. This type of thermal loading or thermal input to the brake caliper, brake mount or fork drop out could possibly cause delamination or dis-bonding. While most scenarios will never see this type of heat application, it is possible for this happen. It is necessary for safety standards to address this issue.

Requirements (addition to EN ISO 4210 series)

When tested by the method described in 5.2, there shall be no fracture or visible cracks in any part of the fork and, in the case of suspension forks, there shall be no separation of any parts.

5.2 Test methods

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

Where more than one mounting point is provided for a disc brake, the following shall apply:

a) where a complete bicycle is supplied, the test adaptor shall be secured to the mounting point used on the bicycle. If bracket is supplied, it shall be used to perform the test;

b) where a fork is supplied as an accessory with more than one mounting point, separate tests shall be conducted on each of the mounting points on separate forks. The smallest rotor size permitted by the manufacturer shall be the rotor size used as a test dimension when conducting the test. The rotor clamp point (size dependent) should be consistent with the test fixture.

Mount the fork in a fixture representative of the head tube according to EN ISO 4210-6:2015, Annex B and gripped in the normal head-bearings to fit an axle to the fork, and mount on the axle a pivoted, straight adaptor as shown in Figure 2 to provide a torque arm of L_2 in length (Table 3). The brake mounting point shall also act as a heat sink capable of applying a constant temperature (Table 4), for phase one of the test (see Table 4). The brake attachment arm and brake mounting point with heat sink for disc brake fatigue is shown in Figure 2 and Figure 3.

The position of the shoulder bolt (item 5 in Figure 2) shall be the same as the brake pad intended to be used. Washers shall not be used for the thermal sensor at the brake mounting points.

Apply repeated, dynamic forces of 600 N rearward to the end of the torque arm, perpendicular to the fork steerer axis and in the plane of the wheel (as shown in Figure 2) for the specified cycles and phase one temperature (see Table 4).

The maximum test frequency shall be maintained as specified in EN ISO 4210-3:2014, 4.5.

Following phase one of the test (at constant temperature), the heating device shall be turned off and the remaining test cycles shall be applied while the temperature returns to ambient temperature.The maximum test frequency shall be maintained as specified in EN ISO 4210-3:2014, 4.5.

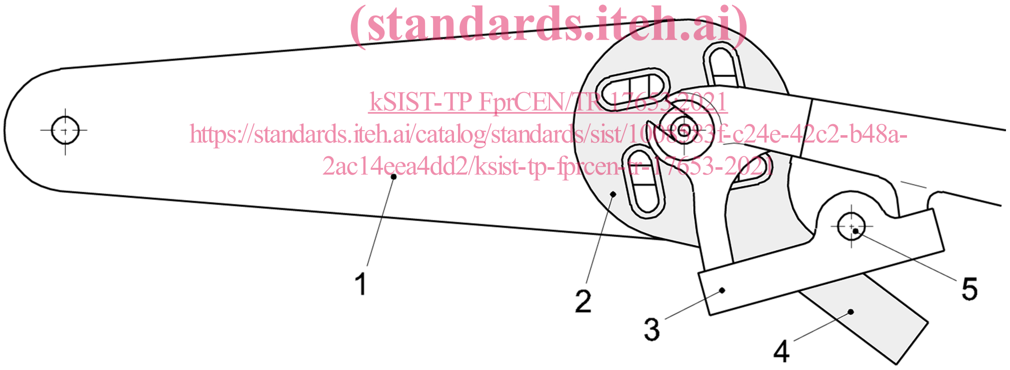
Table 3 — Fixture length

Dimensions in millimetres

Wheel diameter	**24”**	**26”**	**650b**	**29” or 700c**
Arm length, L_2	305	330	349	368

Table 4 — Test cycles and test temperature

Bicycle type	**City and trekking bicycle**	**Young adult bicycle**	**Mountain bicycle**	**Racing bicycle**
Disc brake force	600 N	600 N	600 N	600 N
Test cycles, Phase 1	1 000	1 000	1 000	1 000
Test cycles, Phase 2	11 000	11 000	11 000	19 000
Test temperature, Phase 1	100 °C	100 °C	100 °C	100 °C
Test temperature, Phase 2	Ambient temperature	Ambient temperature	Ambient temperature	Ambient temperature



Key

1 load arm (size dependent of wheel, see Table 3)
2 disc brake hub fixture
3 disc brake attachment and heat sink
4 disc brake hub load tongue
5 shoulder bolt

Figure 2 — Fork for hub/disc-brake - Brake mount fatigue test with thermal input