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Tovorna kolesa - 2. del: Lahka enosledna kolesa za prevoz - Mehanski vidik

Carrier Cycles - Part 2: Lightweight single track carrier cycles - Mechanical aspects

Lastenfahrräder - Teil 2: Leichte einspurige Lastenfahrräder - Mechanische Aspekte

Cycles utilitaires - Partie 2 : Cycles utilitaires légers à 2 roues - Aspects mécaniques

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

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European foreword

This document (EN 17860-2:2024) has been prepared by Technical Committee CEN/TC 333 “Cycles”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2025, and conflicting national standards shall be withdrawn at the latest by March 2025.

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.

This document is part of standard series consisting of the following parts, users are invited to check which parts are applicable to their situation

— EN 17860-1:2023, Cycles — Carrier Cycles — Part 1: Vocabulary

— FprEN 17860-2:2023, Cycles — Carrier Cycles — Part 2: Lightweight single track carrier cycles – mechanical and functional aspects

— FprEN 17860-3:2023, Cycles — Carrier Cycles — Part 3: Lightweight multi track carrier cycles – mechanical and functional aspects

— prEN 17860-4, Cycles — Carrier Cycles — Heavyweight multi track carrier cycles – mechanical and functional aspects

— prEN 17860-5:2023, Cycles — Carrier Cycles — Electrical aspects

— prEN 17860-6, Cycles — Carrier Cycles — Passenger transport

— prEN 17860-7:2023, Cycles — Carrier Cycles — Trailers

Examples of carrier cycle configurations can be found in Annex A. Annex B provides a reading guide for parts 2,3 and 4 of this standard series.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

This document gives requirements and test methods for mechanical and functional aspects for single track carrier cycles.

This document has been developed in response to demand throughout Europe. Its aim is to provide a standard for the assessment of mechanical aspects for single track carrier cycles of a type which are excluded from type approval by Regulation (EU) No. 168/2013.

Because of the diversity of geometries and solutions of carrier cycles not all requirements and test methods in this document may apply to every carrier cycle.

— Annex A gives an overview of vehicle configurations.

— Annex B provides a reading guide for the parts of this standard series.

— Annex J contains a rationale explaining the choices made when developing the standard series

This document is based on a risk analysis, the focus is on mechanical aspects for single track carrier cycles. This document is a type C standard as specified in EN ISO 12100. The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

1 Scope

This document is applicable to single track carrier cycles with or without electric assistance and a maximum gross vehicle weight of:

— 300 kg in case the manufacturer defines the carrier cycle to be intended for both private and commercial use; or

— 250 kg in case the manufacturer defines the carrier cycle to be intended for solely private use.

NOTE Requirements for electrical power assisted carrier cycles are be covered in part 5 of this standard 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 17860-1, *Cycles — Carrier Cycles — Part 1: Terms and definitions*

EN ISO 4210-2:2023, *Cycles - Safety requirements for bicycles - Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles (ISO 4210-2:2023)*

EN ISO 4210-3:2023, *Cycles - Safety requirements for bicycles - Part 3: Common test methods (ISO 4210-3:2023)*

EN ISO 4210-4:2023, *Cycles - Safety requirements for bicycles - Part 4: Braking test methods (ISO 4210-4:2023, Corrected version 2023-08)*

EN ISO 4210-6:2023, *Cycles - Safety requirements for bicycles - Part 6: Frame and fork test methods (ISO 4210-6:2023, Corrected version 2023-08)*

EN ISO 4210-7:2023, *Cycles - Safety requirements for bicycles - Part 7: Wheel and rim test methods (ISO 4210-7:2023)*

EN ISO 4210-8:2023, *Cycles - Safety requirements for bicycles - Part 8: Pedal and drive system test methods (ISO 4210-8:2023)*

EN ISO 4210-9:2023, *Cycles - Safety requirements for bicycles - Part 9: Saddles and seat-post test methods (ISO 4210-9:2023)*

ISO 5775-1:2023, *Bicycle tyres and rims — Part 1: Tyre designations and dimensions*

ISO 5775-2:2023, *Bicycle tyres and rims — Part 2: Rims*

EN ISO 11243:2023, *Cycles - Luggage carriers for bicycles - Requirements and test methods (ISO 11243:2023)*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

ISO 9633:2001, *Cycle chains — Characteristics and test methods*

ISO 6742-1:2015, *Cycles — Lighting and retro-reflective devices — Part 1: Lighting and light signalling devices*

ISO 6742-2:2015, *Cycles — Lighting and retro-reflective devices — Part 2: Retro-reflective devices*

ISO 6742-3:2015, *Cycles —Lighting and retro-reflective devices — Part 3: Installation and use of lighting and retro-reflective devices*

ISO 14878:2015, *Cycles — Audible warning devices — Technical specification and test methods*

3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 17860-1:2024 and EN ISO 12100:2010 apply.

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 http://www.iso.org/obp

4 Use cases: private and commercial/professional use

The requirements in the main part of this standard refer to carrier cycles for private use. In case the manufacturer defines the carrier cycles to be intended for commercial/professional use, higher test values for dynamic tests apply. Annex C gives the higher test values for the relevant tests.

Annex D shows proposals for labels for private use and commercial/professional use. Annex J contains a rationale explaining the choices made when developing the standard series.

5 General vehicle requirements

5.1 Numbers and condition of specimens for the strength tests

In general, for static, impact and fatigue tests, each test shall be conducted on a new test sample, but if only one sample is available, it is permissible to conduct all of these tests on the same sample with the sequence of testing being fatigue, static and impact.

When more than one test is conducted on the same sample, the test sequence shall be clearly recorded in the test report or record of testing.

NOTE It will be noted that if more than one test is conducted on the same sample, earlier tests can influence the results of subsequent tests. Also, if a sample fails when it has been subjected to more than one test, a direct comparison with single testing is not possible.

In all strength tests, specimens shall be in the fully-finished condition.

5.2 Accuracy tolerances of test conditions for brake tests and strength tests

Unless stated otherwise, accuracy tolerances based on the nominal values shall be as follows:

Forces and torques	0/+5 %
Masses	±1 %
Dimensions	±1 mm
Angles	±1°
Time duration	±5 s
Temperatures	±2 °C
Pressures	±5 %

5.3 Protrusions

This requirement is intended to address the hazards associated with the users of carrier cycles falling on projections or rigid components (e.g. handlebars, levers) on a carrier cycle, possibly causing internal injury or skin puncture. Tubes and rigid components in the form of projections which constitute a puncture hazard to the rider should be protected. The size and shape of the end protection has not been stipulated, but an adequate shape shall be given to avoid puncturing of the body. Screw threads which constitute a puncture hazard shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part. Handlebar ends shall comply with EN ISO 4210-2:2023.

5.4 Sharp edges

Exposed edges that could come into contact with the limbs of rider, passenger or other road users during normal riding or normal handling and normal maintenance shall not be sharp, e.g. deburred, broken, rolled or processed with comparable techniques.

NOTE Attention is drawn to ISO 13715 [3].

5.5 Securing and strength of safety-relevant fasteners

5.5.1 General

Any screws used in the assembly of safety critical parts, e.g. indirect steering parts, to the frame or fork shall be provided with suitable locking devices, e.g. lock- washers, lock-nuts, thread locking compound, or stiff nuts. Fasteners used to assemble hub and disc brakes should have heat-resistant locking devices. The screws used to attach hub-generator are not subject to these requirements.

5.5.2 Minimum failure torque

The minimum failure torque of any bolted joints used in the assembly of safety critical parts, shall be at least 20 % greater than the manufacturer's maximum recommended tightening torque.

NOTE Examples of safety critical parts are indirect steering parts, to the frame or fork, handle bars, handlebar stems, bar ends, saddle and seat-posts

5.5.3 Mechanism for folding carrier cycles

If a carrier cycle is equipped with a folding mechanism, it shall be designed such that the carrier cycle can be locked for use in a simple, stable, safe way, and when folded, no damage shall occur to any cables. No locking mechanism shall contact the wheels or tyres during riding, and it shall be impossible to unintentionally loosen or unlock the folding mechanisms during riding.

5.6 Steering function

5.6.1 General

The steering shall allow manoeuvring up to the minimum turning radius as defined in the stability test and shall exhibit no tight spots, stiffness or slackness in the bearings, ball joint(s) or cable(s) when correctly adjusted.

No free play shall be determined in the steering over the entire steering travel. This shall be tested by moving the handlebar back and forth in different steering positions.

The carrier cycle shall be loaded with the maximum payload. If there are several loading areas, distribution shall be carried out as specified by the manufacturer; if there are no specifications, the most unfavourable case (loading with the lowest possible load on the steered axle) shall be used. At least 25 % of the maximum gross vehicle mass when the rider is holding the handlebar grips and is sitting on the saddle, with the saddle and rider in their most rearward positions is at the steered axle.

For indirect steering systems with linkage, cable or chain, the steering action shall be limited with an end stop to prevent overstretching of the steering system and/or blockage of the front wheel.

5.6.2 Steering — Rigidity and strength test for indirect steering systems

5.6.2.1 Steering rigidity - requirement

No visible slip or deformation shall take place when testing the rigidity between the handlebar and the steered axle.

During the test in accordance with 5.6.2.2, the stiffness between the steerer and the steered axle shall be measured as the rotational angle at the handlebar under the influence of steering torque. The stiffness of the torque transmission shall not be less than 7 Nm/°. No slip or permanent deformation in any of the components transmitting steering torque between the handlebar and the steered vehicle axle shall be ascertained after the test in accordance with 5.6.2.2.

5.6.2.2 Steering rigidity - test method

The fork steerer tube in front fork steering systems or the steering column in the case of other designs shall be correctly installed in the frame and the handlebar/stem combination shall be installed on the fork steerer tube or on the steering axis. All connections shall be tightened according to the manufacturer's specification.

The steering shall be fixed at the axle of the steered wheel by means of a suitable rigid jig.

A torque of 50 Nm shall be applied once in each direction of the possible rotation on a plane perpendicular to the axis of the steerer, in accordance with Figure 1. Each torque shall be maintained for 10 s. During this, the steering angle at the steerer shall be measured with reference to the straight-ahead position.

Force application can vary depending on the shape of the steerer; an example of this is shown in Figure 2, where in this case 100 N shall be used.