SLOVENSKI STANDARD
oSIST prEN 17860-2:2022

01-september-2022

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

Ta slovenski standard je istoveten z: **prEN 17860-2**

ICS:

43.150	Kolesa	Cycles

oSIST prEN 17860-2:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 17860-2

June 2022

ICS 43.150

English Version

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

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

Lastenfahrräder - Teil 2: Leichte einspurige Lastenfahrräder - Mechanische Aspekte

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

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. prEN 17860-2:2022 E

Contents

Page

European foreword

This document (prEN 17860-2:2022) 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 CEN Enquiry.

This document is part of standard series consisting of the following parts:

Parts under drafting:

prEN 17860-1: Cycles - Carrier Cycles - Part 1: Terms and definitions

prEN 17860-2: Cycles - Carrier Cycles - Part 2: Lightweight single track carrier cycles – mechanical and functional aspects

prEN 17860-3: Cycles - Carrier Cycles - Part 3: Lightweight multi track carrier cycles – mechanical and functional aspects

Preliminary parts:

Part 4: Cycles -Carrier Cycles - Heavyweight multi track carrier cycles – mechanical and functional aspects

Part 5: Cycles -Carrier Cycles - Electrical aspects

Part 6: Cycles -Carrier Cycles - Passenger transport

Part 7: Cycles -Carrier Cycles - Trailers

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.

Following the completion of 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 indicated in the scope of this document.

1 Scope

This document applies to single track carrier cycles with a maximum gross vehicle weight of 300 kg, with with or without electric assistance

NOTE Electric assistance will be covered in a separate part 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.

prEN 17860-1, *Cycles -Carrier Cycles - Part 1: Terms and definitions*

prEN ISO 4210-2:2021, *Cycles - Safety requirements for bicycles - Part 2: Requirements for city and trekking, young adult, mountain and racing bicycles (ISO/DIS 4210-2:2021)*

prEN ISO 4210-3:2021, *Cycles - Safety requirements for bicycles - Part 3: Common test methods (ISO/DIS 4210-3:2021)*

prEN ISO 4210-4:2021, *Cycles - Safety requirements for bicycles - Part 4: Braking test methods (ISO/DIS 4210-4:2021)*

prEN ISO 4210-5:2021, *Cycles - Safety requirements for bicycles - Part 5: Steering test methods (ISO/DIS 4210-5:2021)*

prEN ISO 4210-6:2021, *Cycles - Safety requirements for bicycles - Part 6: Frame and fork test methods (ISO/DIS 4210-6:2021)*

prEN ISO 4210-7:2021, *Cycles - Safety requirements for bicycles - Part 7: Wheels and rims test methods (ISO/DIS 4210-7:2021)*

prEN ISO 4210-8:2021, *Cycles - Safety requirements for bicycles - Part 8: Pedal and drive system test methods (ISO/DIS 4210-8:2021)*

prEN ISO 4210-9:2021, *Cycles - Safety requirements for bicycles - Part 9: Saddles and seat-post test methods (ISO/DIS 4210-9:2021)*

EN ISO 11243:2016, *Cycles — Luggage carriers for bicycles — Requirements and test methods (ISO 11243:2016)*

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

EN 1078:2012+A1:2012, *Helmets for pedal cyclists and for users of skateboards and roller skates*

EN ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread*

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 prEN 17860-1:2022 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 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 A gives the higher test values for the relevant tests.

5 General vehicle requirements

5.1 Protrusions

This requirement is intended to address the hazards associated with the users of bicycles falling on projections or rigid components (e.g. handlebars, levers) on a bicycle, 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.

NOTE Handlebar ends are covered in prEN ISO 4210-2:2021.

5.2 Securing and strength of safety-relevant fasteners

5.2.1 General

Any screws used in the assembly of suspension systems, brackets attached to electric generators, brake mechanisms and mudguards 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.

NOTE 1 The screws used to attach hub-generator are not included.

NOTE 2 For example, mechanical and physical properties of bolts are specified, in ISO 898-1:2013.

5.2.2 Minimum failure torque

The minimum failure torque of bolted joints for the fastening of handle bars, handlebar stems, bar ends, saddle and seat-posts shall be at least 20 % greater than the manufacturer's maximum recommended tightening torque.

5.2.3 Mechanism for holding cycles

If a cycle is equipped with a folding mechanism, it shall be designed such that the 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.

5.3 Steering function

The steering shall be free to turn through at least 30° either side of the straight-ahead position 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 steered axle shall be loaded with at least 25 % of the total mass of the carrier cycle, rider and maximum payload when the rider is holding the handlebar grips and sitting on the saddle, with the saddle and rider in their most rearward positions and the carrier cycle loaded with the maximum payload as specified by the manufacturer.

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.

NOTE 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.

5.3.1 Handlebar and steering — Rigidity and strength test for indirect steering systems

5.3.1.1 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 5.3.1.2, the elastic deformation between the handlebar 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 10 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 5.3.1.2.

5.3.1.2 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 handlebar stem. Each torque shall be maintained for 10 s. During this, the steering angle at the handlebar shall be measured with reference to the straight-ahead position.

NOTE Force application can vary depending on the shape of the handlebar; an example of this is shown in Figure 1, where in this case 100N shall be used instead of 160N as noted in the drawing.

5.3.1.3 Steering strength – requirement

No visible crack, fracture or visible plastic deformation shall occur on the handlebar, stem, front fork or any part that transfers the steering movement during the steering strength test. Displacement or slip of parts connected through friction against one another is permissible if it occurs at a test torque of more than 70 Nm, and if it can be reverted with the same test torque ±20 % and, on repetition, the displacement/slip occurs at a minimum of 90 % of the torque determined initially (i.e. the torque at which the slip or displacement is initially noticeable).

No gearshift, brake or electrical cables or hoses shall be damaged during the test. No permanent deformation shall occur on the end stops.

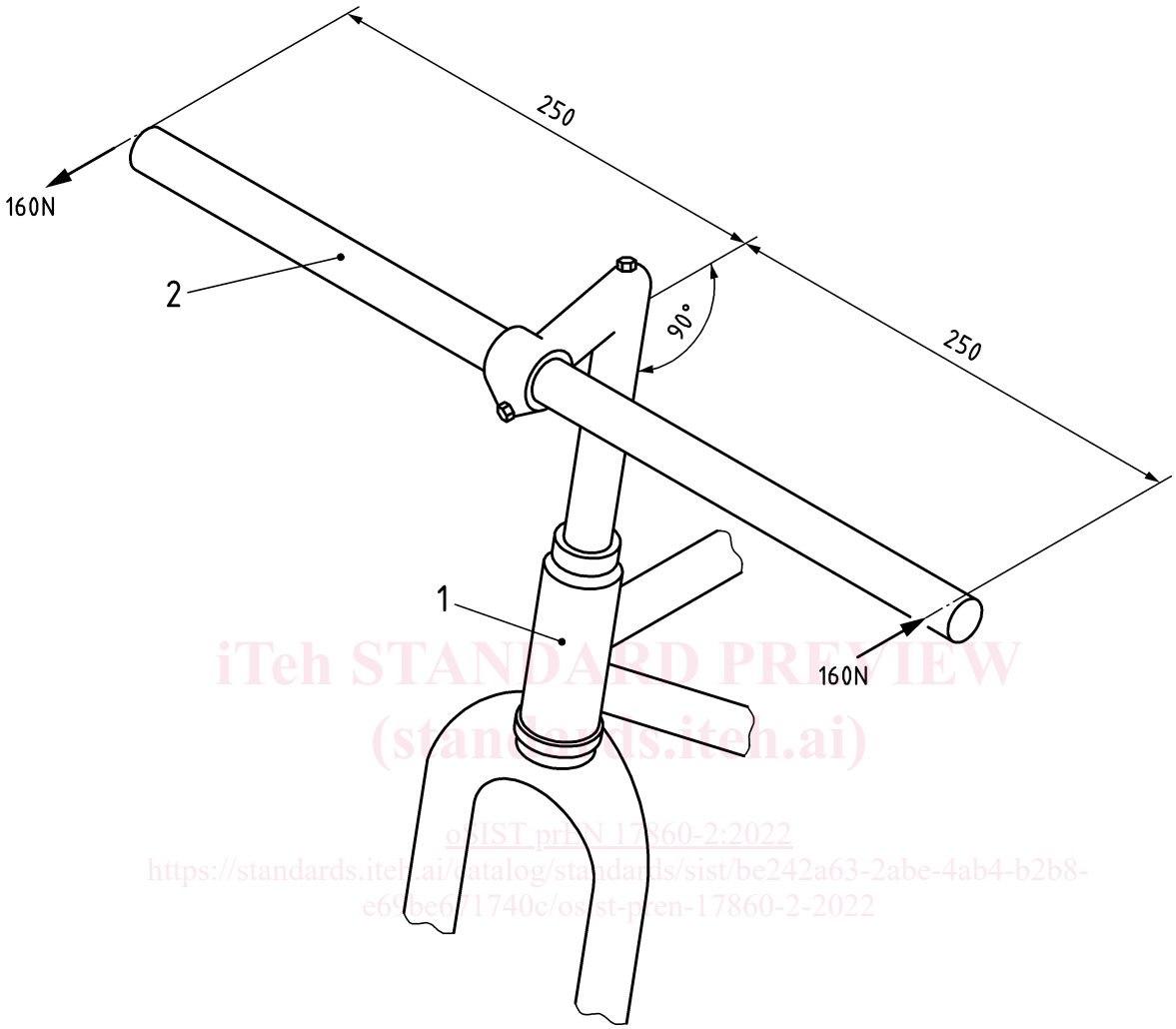
5.3.1.4 Steering strength – test method

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.

A torque of 80 Nm shall be applied once in each direction of the possible rotation on a plane perpendicular to the axis of the handlebar stem. The steering shall be positioned against its end stop at the maximum steering angle. Each torque shall be maintained for 10 s.

NOTE Force application can vary depending on the shape of the handlebar; an example of this is shown in Figure 1.

Dimensions in millimetres



Key

1 frame/front fork unit

2 solid steel bar

Figure 1 — Handlebar stem and fork stem — Steering strength

5.3.2 Dynamic steering fatigue test for indirect steering

5.3.2.1 Requirements

No visible crack, fracture or visible deformation shall occur on the handlebar, stem, front fork or any part that transfers the steering movement when testing the fatigue strength of an indirect steering system.

After the test in accordance with 5.3.2.2, the elastic deformation between the handlebar and the steered axle shall not be less than 70% of the value measured in the test in accordance with 5.3.1.2.

5.3.2.2 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.

Apply 100.000 cycles (*c1*)of dynamic torque of +50 Nm and -50 Nm in each direction of the possible rotation on a plane perpendicular to the axis of the handlebar stem. The number of test cycles (*c1*) for carrier cycles that have been defined by the manufacturer to be intended for commercial/professional use can be found in Annex A.

After completion of the 100.000 cycles, 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 handlebar stem. Each torque shall be maintained for 10 s. During this, the steering angle at the handlebar shall be measured with reference to the straight-ahead position

NOTE Force application can vary depending on the shape of the handlebar; an example of this is shown in Figure 1.

5.4 Shimmy

Informative Annex G gives information on assessing the shimmy effect.

5.5 Requirements for loading areas/load securing

In the case of several loading areas, attention shall be paid to even load distribution.

Each individual loading area shall be clearly marked by the manufacturer with the maximum permissible payload weight.

Design recommendations for loading areas load securing and the position of the payload can be found in informative Annex I

5.6 Parking and stability

5.6.1 Requirement

The carrier cycle shall be equipped with a mechanical parking function. This parking function can be fulfilled, for instance, by a stand and/or a mechanical parking brake.

With the parking function, it shall be possible to secure the loaded and unladen carrier cycle to prevent it from rolling away on a slope of 10 % in one direction.

Suitable, additional measures (wheel chocks, for instance) are permissible for larger slopes.

5.6.2 Test method

5.6.2.1 Test conditions

The carrier cycle shall be in the following condition:

— the carrier cycle shall be presented in running order according to its mass;

— the fully assembled wheels shall be fitted with the appropriate size tyre and inflated to the lower value of maximum inflation pressure recommended on the rim or on the tyre. This shall be checked before the test;

— the gearbox shall be in neutral or, in the case of an automatic gearbox, in the “park” position if such a position exists;

— if it can be locked, the steering system shall be locked. If the steering system can be locked by being turned either to the left or to the right, the tests shall be conducted for both directions;

— if no lock for the steering system is mounted, the test shall be conducted with the following steering angles:

  — straight-ahead position;

  — tilted to the side of the prop stand (if available).

5.6.2.2 Verification of horizontal stability

5.6.2.2.1 Test area

The test area shall consist of a flat, horizontal block with a hard surface which is dry and free of loose construction materials, e.g. sand or gravel.

5.6.2.2.2 Test method

The test shall be conducted in both

  — laden (maximum permissible total weight minus rider 100 ±5 kg) and

  — unladen (without rider) condition.

Procedure:

1.a The carrier cycle is stood on the test block, the prop stand is folded down or in the park position and the carrier cycle is stood on the prop stand.
1.b The carrier cycle is moved to increase the angle between the median longitudinal plane and the bearing surface by three degrees (by moving the carrier cycle further towards the perpendicular).
1.c This movement shall not lead to the prop stand automatically folding up or returning to the riding position.

5.6.2.3 Verification on an inclined surface

5.6.2.3.1 Test equipment

— A test plane shall be used for these tests.

— The parking plane shall have a firm, flat, rectangular surface on which the carrier cycle can stand without the surface bending noticeably.

— The surface of the parking plane shall have sufficiently non-slip characteristics so that the carrier cycle does not slide off the supporting surface during the inclination and leaning tests.

— The parking plane shall be designed such that its lateral inclination and longitudinal inclination can be adjusted.

5.6.2.3.2 Test method

The test shall be conducted in both

— laden (maximum permissible total weight minus rider 100 ±5 kg) and

— unladen (without rider) condition.

Procedure

— The carrier cycle is stood on the parking plane with the prop stand and separately with the centre stand folded down or in the park position, and the carrier cycle may lean on the stand.

— The parking plane is set to its minimum oblique inclination and then separately to its minimum longitudinal inclination according to Table 1.

Table 1 — Values for surface inclination angle/surface slope

Inclination	Prop/centre stand	
	Slope	Inclination angle
Lateral inclination (left and right)	8 %	4,6°
Longitudinal inclination downwards	10 %	5,7°
Longitudinal inclination upwards	10 %	5,7°
See Figure 7.		

— If the carrier cycle is stood on the centre stand and only on one wheel on the inclined parking plane, the centre stand shall be tested in this position. If the carrier cycle is stood on the centre stand on an inclined parking plane and either the front wheel or the rear wheel can be in contact with the supporting surface, the tests shall be conducted such that the carrier cycle is stood only on the centre stand and the wheel that is in contact with the surface.

— The carrier cycle shall remain standing stably when the parking plane is inclined according to the angle given in Table 4.

— Alternatively, the parking plane may be inclined to the required extent before the carrier cycle is moved into position.