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Carrier cycles - Part 7: Cargo trailers

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European foreword

This document (prEN 17860-7:2023) 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:

- prEN 17860-1:2022, Carrier cycles — Part 1: Terms and definitions
- prEN 17860-2:2022, Carrier cycles — Part 2: Lightweight single track carrier cycles — Mechanical aspects
- prEN 17860-3:2022, Carrier cycles - Part 3: Lightweight multi track carrier cycles — Mechanical aspects
- prEN 17860-4, Cycles - Carrier cycles — Heavyweight multi track carrier cycles — Mechanical and functional aspects
- prEN 17860-5:2023, Carrier cycles — Electrical aspects
- prEN 17860-6, Carrier cycles — Passenger transport
- prEN 17860-7:2023, Carrier cycles — Cargo trailers

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Introduction

This document gives requirements and test methods for mechanical and functional aspects for cargo trailers.

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 cargo trailers of a type which are excluded from type approval by Regulation (EU) No. 168/2013.

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

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1 Scope

This document specifies safety requirements and test methods for single and multi-axle cargo trailers and their connecting devices.

This document applies to cargo trailers with a maximum gross vehicle weight of 600 kg.

This document is not applicable to trailer for transportation of passengers, usually children and for type of trailers which use fifth wheel for connecting to the front cycles as listed in the Table 1 in this document.

Table 1 — Types of cycle trailers

Type of trailer	Applicability of this document
Multi track single axle	Applicable
Multi track multi axle	Applicable
Single track with single axle or multi axle	Not applicable
Fifth wheel trailer with single axle or multi axle	Not applicable
Usage	
Cargo	Applicable
People/children/pet	Not applicable

NOTE Requirements and test methods for electrical assistance for electrically assisted cargo trailers are covered by prEN 17860-5:2023.

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 15918:2011+A2:2017, *Cycles — Cycle trailers — Safety requirements and test methods*

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)*

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

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

ISO 5775-1:2014, *Bicycle tyres and rims — Part 1: Tyre designations and dimensions*

ISO 5775-2:2021, *Bicycle tyres and rims — Part 2: Rims*

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

prEN 17860-1:2022, *Carrier cycles — Part 1: Terms and definitions*

prEN 17860-2:2022, *Carrier cycles — Part 2: Lightweight single track carrier cycles — Mechanical aspects*

prEN 17860-3:2022, *Carrier cycles — Part 3: Lightweight multi track carrier cycles — Mechanical aspects*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 17860-1:2022 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1**cargo trailer**

single or multi axle trailer with or without electrical assistance for the conveyance of loads connected to a cycle with device for connection behind a cycle

Note 1 to entry: For electrically assistance, please see definition of electrically power assisted cargo trailer.

3.2**connecting device**

part of the cargo trailer that is used for coupling to the towing cycle

3.3**overrun brake (system)**

brake which is actuated by the decrease in relative distance between cycle and cargo trailer

3.4**drawbar**

part of the cargo trailer that is used to connect the cargo trailer with the towing cycle and is used to steer the cargo trailer while maintaining specific distance from the towing cycle

3.5**secondary safety device**

safety device which prevents a complete disconnection of the cargo trailer connected to a cycle or an electrical safety device which deaccelerates the cargo trailer in case it is getting disconnected from a cycle

3.6**electrically power assisted cargo trailer****EPACT**

cargo trailer, equipped with auxiliary electric motor, whereas the electric motor only propels by the movement of the towing cycle, except in the hand-cart assistance mode

4 Cargo trailer cycle combination

The recommended maximum gross vehicle weight of the cargo trailer is:

- 600 kg when the trailer is pulled by a multi track carrier cycle;

- 350 kg when the trailer is pulled by a bicycle, EPAC or single track carrier cycle.

5 General vehicle requirements

5.1 Design of the surface requirements

Shall be according to prEN 17860-2:2022, 5.1.

5.2 Securing and strength of safety-relevant fasteners

Shall be according to prEN 17860-2:2022, 5.2.

5.3 Mudguards/wheel covers

5.3.1 Requirement

The requirements in accordance with EN ISO 4210-2:2023, 4.11 apply.

5.3.2 Test method

The test shall be conducted in accordance with EN ISO 4210-3:2023, 4.2.

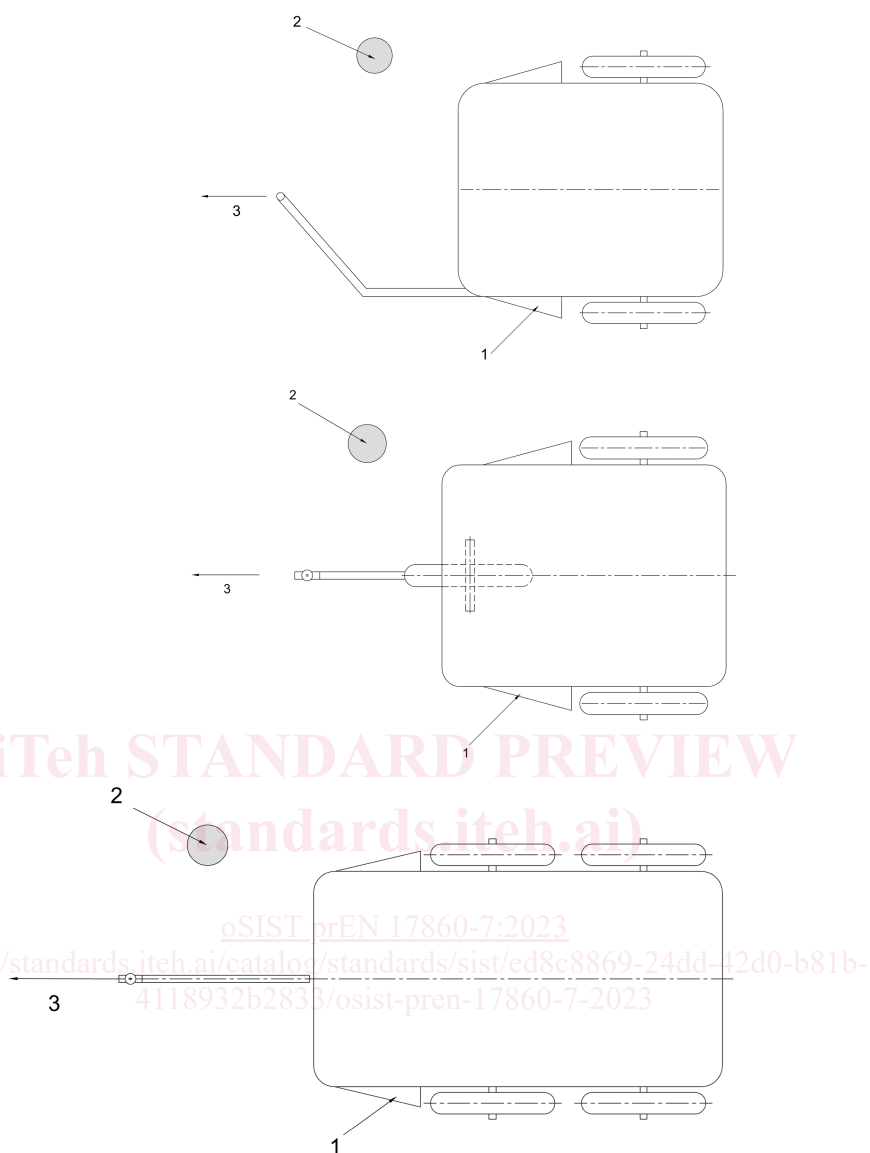
5.4 Deflection device

Cargo trailers shall be designed in accordance with EN 15918:2011+A2:2017 such that a vertical obstacle cannot be caught between a wheel and the body of the cargo trailer when the cargo trailer is drawn forwards past any such obstacle. An example is shown in Figure 1.

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**Key**

- 1 deflection devices
- 2 vertical obstacle
- 3 moving direction

Figure 1 — Example of the deflection devices for single and multi axle cargo trailers

The width of cargo trailer in front of the wheels shall not be less than the distance between the tyre centrelines and be shaped so that the cycle trailer is deflected sideways when drawn past a vertical obstacle with a minimum height of 750 mm and diameter of 90 mm (see Figure 1).

The deflection device shall be strong enough not to collapse if a trailer with maximum payload is hitting the obstacle.

5.5 Position of payload

The position of the transported load shall be selected such that the cargo trailer can be ridden and braked safely in each loading and operating situation, the cyclist in the front is not hindered and vision is not limited. A rear-view mirror on the towing cycle shall be recommended if vision to the rear is limited due to normal positioning of the payload or the vehicle's construction.

The manufacturer shall outline in the user manual the allowed load distribution on the cargo trailer such that the load distribution does not result in the cargo trailer having too aft centre of gravity.

Uniform wheel load distribution and the lowest possible overall centre of gravity shall be strived for.

5.6 Recommendations for loading areas/load securing

Design recommendations can be found in prEN 17860-2:2022, Annex I Part 2.

5.7 Braking

5.7.1 General

A cargo trailer shall be equipped with at least two brake systems which are operated simultaneously. The brake systems shall function without jamming.

The cargo trailer until total mass of 100 kg (including payload) are exempted from overrun brakes only if the connection point to the cycle is not higher than 400 mm above the ground. Additionally, the manufacturer shall confirm the braking performance according to the test in 5.7.2 with the lightest possible cycle available. The manufacturer shall also recommend the cycle type (including brake type, frame type, tire profile and empty weight of the cycle) according to the results of the braking distance test to its customers for operations.

The requirements in accordance with Table 2 shall be met.

NOTE See EN ISO 4210-4:2023, 4.6.5.7, Point h), Test method — Simple check on the test track.

5.7.2 Hand-operated brakes

If the said equipment is used in the intended operational mode than compliance to prEN 17860-2:2022, 6.2 applies.

5.7.3 Requirements for test method on a test track

The general requirements in accordance with 5.7.2 apply.

The requirements in accordance with a), b) and c) shall be met.

- a) When testing on a test track, the cargo trailer shall meet the requirements listed in Table 2 in both fully laden condition as specified by the manufacturer and in unladen condition. A reference cycle will be used to perform this test, while the reference cycle is defined as a city commuter cycle having a functional brake on the front and the rear wheel. Independent from the trailer, the cycle alone can achieve the same braking performance as described in EN ISO 4210-4:2023.

If there are several loading areas, the payload determined in this way shall be distributed proportionally according to the maximum individual loads specified by the manufacturer.

Table 2 — Minimum values for the braking deceleration for individual axles on cargo trailers

Cargo trailer type	Conditions	Velocity	Minimum braking deceleration a_{min}
Single and multi axle	dry	25 km/h	3,4 m/s ²
	wet	16 km/h	2,2 m/s ²

NOTE The velocity given in the table is the design speed.

When design speed is less than 25 km/h, shall minimum breaking deceleration meet the maximum design speed and for wet condition 65 % of the maximum design speed.

b) The cargo trailer shall exhibit uniform, safe braking behaviour, taking into account its intended use and the rider's skills. When testing on the test track, the characteristics of uniform, safe braking means that the following shall not occur when stopping within the required, specified braking performance:

- increased juddering;
- blocking of the front wheel(s) of the cycle;
- cycle tilting (uncontrollable lifting of the rear wheel(s));
- loss of control by the rider;
- excessive side skidding causing the rider to step on the ground to maintain control;
- connecting device on the cycle disconnects;
- the trailer is no longer in line with the cycle.

With some types of braking systems, it may not be possible to completely avoid some wheel skidding back during braking; this is considered acceptable provided it does not cause events (loss of control by the rider).

When bedding-in the brakes in accordance with 5.7.4.1.2, make sure that left and right side generate equal, balanced braking force. If this is not the case, adjust the brake according to the manufacturer's instructions and 5.7.2 (Brake adjustment) and repeat the brake application. Continued braking imbalance fails the test.

c) The following applies to cargo trailers: to ensure safety when braking in both wet and dry conditions, the wet: dry braking effect ratio shall be greater than 4:10.

The methods for calculating this ratio are provided in EN ISO 4210-4:2023, 4.6.3.11, Point c) for the test track.

5.7.4 Brake performance testing

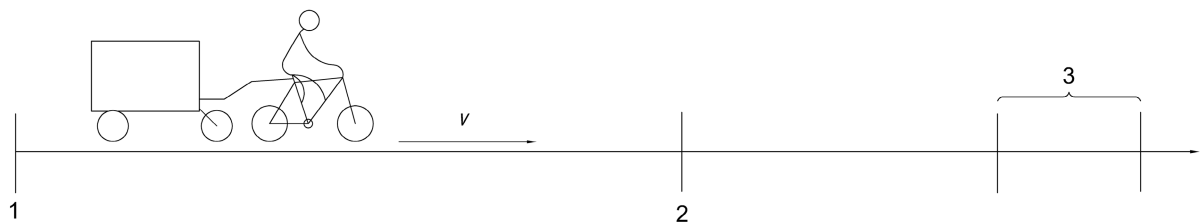
5.7.4.1 Test method on a test track

5.7.4.1.1 General

The requirements in accordance with 5.7.3 (Requirements for the test method on a test track) apply. The braking decelerations in accordance with Table 2 shall be fulfilled in both fully laden and unladen condition.

5.7.4.1.2 Bedding-in the brakes

Prior to the start of each braking effect test, braking to a stop shall be performed to bed all brakes in.



Key

- 1 start of the test run
- 2 start of the braking
- 3 stationary zone after braking
- V velocity

Figure 2 — Schematic representation of bedding-in the brake surfaces

Reasonable cargo trailer and cycle speeds of between 12,5 km/h and 25 km/h shall be selected for the bedding-in process. After reaching the starting line, the braking process is begun (see Figure 2).

Locking up is not permissible during the bedding-in process.

This braking to a stop shall be repeated a maximum of 25 times or until reliable bedding-in of the friction partners is guaranteed. After the bedding-in process, the braking distance shall be as constant as possible. This is regarded as fulfilled if the mean value of the braking distances of the last 5 braking processes varies by no more than $\pm 10\%$.

5.7.4.1.3 Test runs

The brake test shall be conducted with a max. reasonable starting speed of between 12,5 km/h and 25 km/h; the starting speeds shall be documented.

The minimum braking deceleration shall be documented using a suitable method. A recording system (precise within $\pm 1\%$) shall be selected for this.

During the brake test, a cargo trailer and cycle combination shall not depart from the track by more than $\pm 5\%$ of the braking distance. Active counter-steering is not permissible in this case.

The load shall be applied centrally at the loading areas identified by the manufacturer in accordance with 5.6 (Recommendations for loading areas/load securing) until the mass stated by the manufacturer is achieved. The maximum mass is defined in accordance with Clause 1 (Scope).

The test procedure (wet and dry) is described in EN ISO 4210-4:2023, 4.6.1 and shall be applied.