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Cycles — Luggage carriers for bicycles — Requirements and test methods

Cycles — Porte-bagages pour bicyclettes — Exigences et méthodes

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Foreword

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The committee responsible for this document is ISO/TC 149, *Cycles*, Subcommittee SC 1, *Cycles and major sub-assemblies*.

This second edition cancels and replaces the first edition (ISO 11243:1994), which has been technically revised.

Introduction

This International Standard has been developed in response to demand throughout the world, and the aim has been to ensure that luggage carrier manufactured in compliance with it will be as safe as is practically possible. The tests have been designed to ensure the strength and durability of the luggage carrier, demanding high quality throughout and consideration of safety aspects from the design stage onwards.

The scope has been limited to safety considerations and has specifically avoided standardization of components.

Cycles — Luggage carriers for bicycles — Requirements and test methods

1 Scope

This International Standard specifies safety and performance requirements for the design and testing of luggage carriers intended for mounting (with or without tool) above and adjacent to the wheels of cycles and lays down guide lines for instructions on the use and care of such luggage carriers.

This International Standard does not apply to removable luggage (for example, handlebar bags or baskets that are not permanently attached).

Toy carrier intended to be mounted on bicycles for young children in the scope of ISO 8098 are not covered by this International Standard.

2 Normative references

There are no normative references cited in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
cycle
vehicle that has at least two wheels and is propelled solely or mainly by the muscular energy of the person on that vehicle, in particular by means of pedals

3.2
luggage carrier
device, including containers such as baskets, that is mounted and permanently attached above and/or adjacent to the rear wheel(s) (in the case of a rear luggage carrier) or front wheel(s) (in the case of a front luggage carrier) of a cycle and that is exclusively designed for carrying luggage or children in child-seats

3.3
luggage carrier platform
flat part of the *luggage carrier* (3.2) upon which loads may be placed or fixed, or the flat top rail from which panniers may be hung, or the bottom part of a container

Note 1 to entry: The bottom part of a container, for example a basket.

3.4
luggage carrier platform length
L
maximum overall length of the *luggage carrier platform* (3.3)

3.5
visible crack
crack which results from a test, wherein that crack is visible to the naked eye

3.6
fracture
unintentional separation into two or more parts

3.7
toy carrier
carrier with a part intended for containing a toy of a maximum weight of 1 kg

3.8
integrated frame luggage carrier
luggage carrier (3.2) which is permanently attached

Note 1 to entry: Luggage carrier welded to the frame.

3.9
normal rear carrier
rear carrier supported by fixings to the bicycle frame close to the rear wheel axle

3.10
frame-mounted beam carrier
rear carrier that is structurally a cantilever, fixed to the bicycle frame in front and/or above the rear wheel

Note 1 to entry: It may also be fixed to the seat post, in addition to the frame, but receives no support from the bicycle frame near to the axle of the rear wheel.

3.11
seat-post mounted beam carrier
rear carrier that is structurally a cantilever, fixed to the seat post of the bicycle without additional fixings to the frame

3.12
above wheel front carrier
front carrier with a platform upon which loads can be placed above the front wheel

3.13
low-load front carrier
front carrier that is exclusively designed for carrying a pair of panniers, where the "platform" is a pair of rails (from which the panniers hang), one each side of the wheel and not more than 200 mm above the lower points of attachment of the carrier near to the axle of the front wheel

3.14
front mounted container
container such as a basket that is mounted and permanently attached above the front wheel of a bicycle and that is exclusively designed for carrying luggage

3.15
maximum load capacity
maximum load that can be carried dependent upon the class of luggage carrier

Note 1 to entry: For load under 27 kg, the mark will warn the user that the product is not suitable for the transportation of a child seat.

Note 2 to entry: Maximum load is defined in Table 1.

3.16
electrically power assisted cycle
EPAC
cycle, equipped with pedals and an auxiliary electric motor, which cannot be propelled exclusively by means of this auxiliary electric motor, except in the start-up assistance mode

4 Classification

The manufacturer shall classify the carrier with the maximum load capacity for which it is intended, taking into consideration any restrictions laid down in Table 1.

If the carrier is intended to carry a child seat, designed to clamp onto the platform of a normal rear luggage carrier and classified for 9 kg to 22 kg (see EN 14344), the maximum load capacity of the luggage carrier shall be at least 27 kg.

In Table 1, the maximum limit (if any) for the load capacity is indicated for each type of luggage carrier that falls within the scope of this International Standard. The applicable requirements and test methods differ according to the type and maximum load capacity.

Table 1 — Maximum load capacity for the types of luggage carrier

Type of luggage carrier	Rear luggage carriers			Front luggage carriers		Front-mounted container
	Normal	Beam		Above wheel	Low-load	
		Seat post-mounted	Frame-mounted			
Maximum load capacity, kg	no limit	10	27	10	18	10
NOTE 1 For transporting heavier load, the maximum load specified in Table 1 can be exceeded provided that the bicycle sustain such load.						
NOTE 2 Maximum load capacity does not include the battery weight if so equipped.						

NOTE Examples of carrier configurations are shown in Annex C.

5 Requirements and test methods

5.1 General

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

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

The test frequency shall be stated in all fatigue test reports.

The luggage carrier shall be tested using the connecting interface position(s) and type(s) according to the luggage carrier manufacturer's specifications.

The luggage carrier shall be tested with all accessories provided (e.g. lock, pumps, etc.).

For luggage carrier intended to be fitted on an EPAC and designed to include a battery, the test shall be performed with the maximum battery load [see 6.1 b)] in addition to the mass defined in Clause 4.

For integrated luggage carrier, all clauses apply except 5.8, 5.9 and 5.10.

5.2 Tolerances

Unless otherwise stated, the following tolerances shall be used:

— all forces shall have an accuracy of 0/+5 %;

— all masses shall have an accuracy of ±1 %;

— all dimensions shall have an accuracy of ±1 mm;

— all time measurements shall have an accuracy of ±1 s;

— all angles shall have an accuracy of ±1°;

— all frequencies and linear stroke shall have an accuracy of ±5 %.

5.3 Sharp edges

Exposed edges that could come into contact with the rider's or a transported person's hands, legs, etc., during normal riding or normal handling and normal maintenance shall be neither sharp nor designed such that injuries can arise when the bicycle is used correctly. Spring ends shall be rounded or fitted with protective caps.

5.4 Security of safety-related fasteners

5.4.1 Security of screws

Any screws used in the internal assembly of the luggage carrier shall be provided with suitable locking devices, for example, lock-washers, lock-nuts or stiff nuts.

5.4.2 Minimum breaking torque

The minimum breaking torque of screws for the fastening of the luggage carrier to the cycle shall be at least 50 % greater than the manufacturer's recommended tightening torque.

NOTE For example, mechanical and physical properties of bolts are specified in ISO 898-1.[1]

5.4.3 Fixation elements

Fixation elements to the bicycle are not covered by this International Standard unless provided by the luggage carrier manufacturer. In this case, fixation elements shall be used during testing.

5.5 Crack detection methods

Standardized methods may be used to emphasize the presence of cracks where visible cracks are specified as criteria of failure in tests specified in this International Standard.

NOTE For example, suitable dye-penetrant methods are specified in ISO 3452-1, ISO 3452-2, ISO 3452-3 and ISO 3452-4.[2][3][4][5]

5.6 Dimensions

The dimensions of luggage carriers are not specified, except as follows.

Normal rear luggage carriers to which a child-seat could be attached (see Clause 4) shall have a luggage-carrier platform width of 175 mm maximum.

5.7 Protrusions

This requirement is intended to address the hazards associated with the users of bicycles falling on projections or rigid components on a bicycle, possibly causing internal injury or skin puncture.

A screw thread that is an exposed protrusion shall be limited to a protrusion length of one major diameter of the screw beyond the internally threaded mating part.

5.8 Assembly

When attached to a fixture resembling a bicycle (or attached to a bicycle) and if necessary assembled in accordance with the luggage carrier manufacturer's instructions, the luggage carrier parts shall be firmly joined and fixed using the fixing devices provided or specified by the manufacturer.

5.9 Rear luggage carriers — Provision for lighting

The rear aspect of any rear luggage carrier not equipped with an integral rear lamp and reflector can be equipped with a bracket or brackets, either as an integral part or separate accessory (or accessories) to allow the fitting of a rear lamp and reflector.

When this requirement is satisfied by the provision of separate accessories, these accessories should be included when the luggage carrier is sold.

5.10 Strength under high and low temperature

5.10.1 General

The requirements in 5.10.2 apply only to carriers of plastics or metal and plastics.

5.10.2 Requirement

When tested by the method described in 5.10.3 and 5.10.4, there shall be no fractures or visible cracks in any part of the luggage carrier, or any distortion which affects the function or safety of the luggage carrier.

5.10.3 High temperature test — Test method

Store the luggage carrier for 4 h ± 1 h in a chamber at a temperature of 65 °C ± 5 °C. Remove and immediately examine the luggage carrier to check if the requirements in 5.10.2 are fulfilled.

5.10.4 Low temperature test — Test method

Store the luggage carrier for 4 h ± 1 h in a chamber at a temperature of −20 °C ± 1 °C. Remove the luggage carrier from the chamber and within 15 s, drop the carrier from a height of 1 m onto a smooth, level, concrete floor. Drop the luggage carrier in such a way that the side hits the floor (the luggage carrier is in horizontal position). Immediately examine the luggage carrier to check if the requirements in 5.10.2 are fulfilled.

5.11 Dynamic load tests

5.11.1 Requirement

When tested by the methods described in 5.11.2, 5.11.3 and 5.11.4, there shall be no fractures or visible cracks in any part of the luggage carrier. If the carrier is made of plastics or metal and plastics, it shall be submitted to the tests in 5.10 before being tested according to 5.11, 5.12 and 5.13.

5.11.2 General test method

Secure the luggage carrier to a rigid fixture which resembles the part of the bicycle to which the luggage carrier is designed to fit, using the fastening devices and screws supplied or specified by the manufacturer. The orientation of the fixture shall be adjusted so that the luggage-carrier platform becomes horizontal with any adjustable means of luggage carrier attachment fully extended. If other adjustments are possible, they shall be made so that the luggage carrier is attached to the rig in a way that resembles the most onerous situation that can occur in practice.

Tighten the fasteners used to mount the luggage carrier with the torque recommended by the manufacturer.

The clamping shall not deform the tube or platform.

Attach a mass equal to the maximum load capacity stated by the manufacturer.

— For luggage carriers with a platform, a weight or weights shall be evenly distributed on more than 70 % area of the top surface of the carrier platform, at a distance, *D*, measured from the rear of the rear luggage-carrier platform, or from the front of a front luggage-carrier platform, as given in 5.11.3 or 5.11.4 and is illustrated in Figure 1. The centre of mass of this weight shall coincide with this position and also lie within 40 mm of the centreline of the top of the platform. The total width of this weight shall not exceed the luggage-carrier platform width by more than 100 mm. A weight or weights shall be attached by the manufacturer's recommended methods such as luggage strap or straps.

— For front-mounted container (within the Scope), fill with balls of which 40 mm ± 0,5 mm diameter and 24 g ± 1 g weight (for example squash balls) until reaching the load capacity. The load is secured by a film to avoid moving during dynamic test.

— For low-load front luggage carriers and low-load rear luggage carriers with special attachments according to the manufacturer specification, separate weights shall be attached on each side with no connecting bar. Each mass shall equal half the rated capacity. This can be arranged with two balanced pairs of weights, one pair clamped around each top rail.

— For the seat-post mounting luggage carriers, secure to a rigid fixture which resembles the seat-post of the bicycle to which the luggage carrier is designed to fit, using the fastening devices and screws supplied or specified by the manufacturer (see examples in Figure 2).

If the luggage carrier is equipped with brackets for the fastening of lamps and reflectors (see 5.9) a 200 g ± 10 g mass shall be attached to the bracket(s) during the test. The centre of gravity of this mass shall be located 20 mm to the rear of the vertical mounting surface.

NOTE 1 A block with dimensions as shown in Figure 3 and with a total weight of 200 g is suitable for the purpose.

Vibrate the luggage carrier with a sinusoidal motion, according to each set of conditions given in 5.11.3 and 5.11.4, for the specified number of cycles. Or, if it is apparent that the luggage carrier has failed before the specified number of cycles is completed, the test shall be stopped at that point.

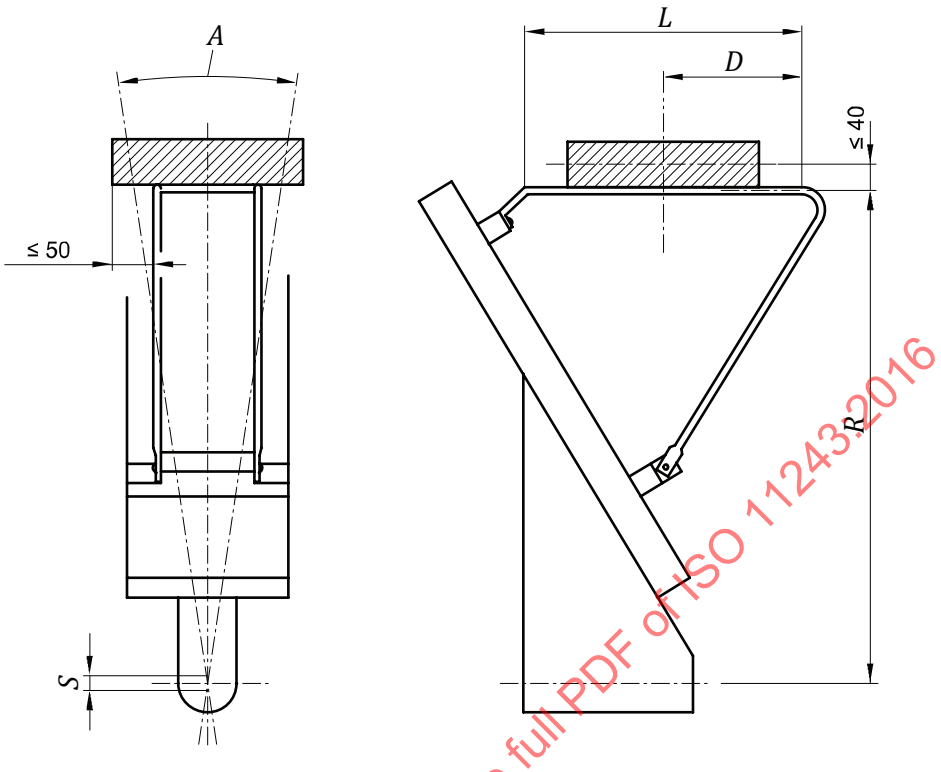
If the natural vibration frequency of the luggage carrier corresponds to the frequency of the test, so that resonance occurs, the frequency shall be reduced by 10 % and the amplitude increased by 23 %.

The machine should reach the required frequency progressively in order to avoid any overload due to inertial effect.

NOTE 2 Typical test configuration is shown in Annex A.

NOTE 3 Longitudinal dynamic load test method is specified in Annex B.

Dimensions in millimetres



Key

A arc

D distance measured from the rear of the rear luggage-carrier platform or from the front of a front luggage-carrier platform

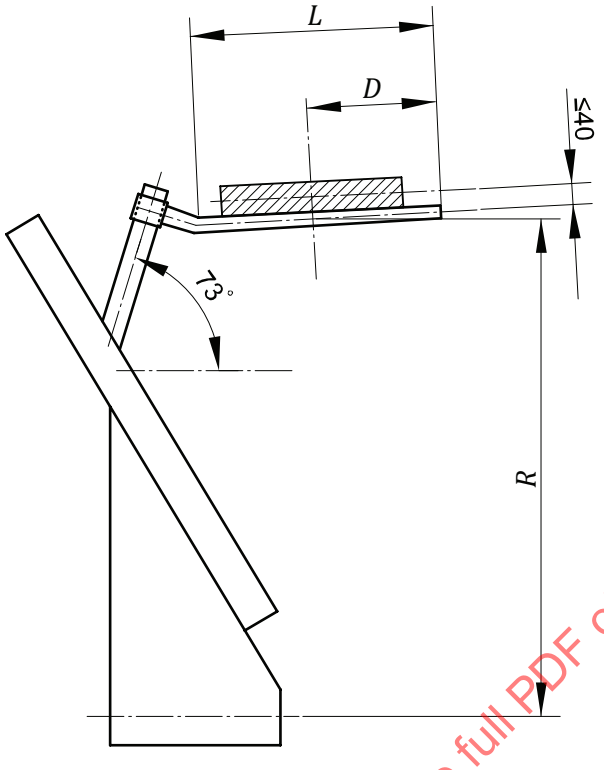
L luggage carrier platform length

R radius

S stroke

Figure 1 — Dynamic test

Dimensions in millimetres



Key

D distance measured from the rear of the rear luggage-carrier platform or from the front of a front luggage-carrier platform

L luggage carrier platform length

R radius

Figure 2 — Dynamic test (seat-post mounting carrier)

Dimensions in millimetres

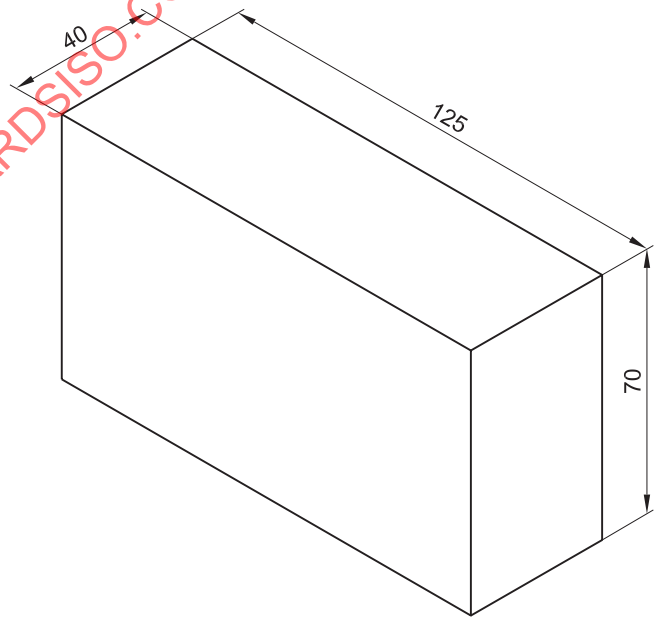


Figure 3 — Examples of test block dimensions for lamp-bracket test

5.11.3 Vertical test method

Attach the mass(es) at a position $D = L/2$ as shown in Figure 1 and vibrate the luggage carrier vertically at a frequency of 7 Hz through a total stroke of S mm for 100 000 cycles. See Table 2 for values of S.

5.11.4 Lateral test method

Attach the mass at a position D = 100 mm as shown in Figure 1 and vibrate the luggage carrier laterally at 1 Hz, by swinging it from side to side, through a total arc of $A°$ about a horizontal longitudinal axis at a distance R measured below the luggage-carrier platform, for 100 000 cycles. See Table 2 for values of A and R. If the luggage carrier is dedicated to a specific size of bicycle (see user's manual), the radius, R, taken for the tests shall be measured on the bicycle.

Table 2 — Arc (A) and radius (R) for vertical dynamic test and stroke (S) for lateral dynamic test

Type of luggage carrier	Rear luggage-carrier	Front luggage-carrier	
	All types	Above wheel	Low-load
Arc, A degrees	10	15	
Radius, R mm	750		550
Stroke, S mm	10	15	

5.12 Static load test — Vertical load

5.12.1 Requirements

When tested by the method described in 5.12.2, the permanent deformation of the luggage carrier, measured at the point of application of the load after the removal of the load, shall not exceed 5 mm.

5.12.2 Test method

Secure the luggage carrier to a rigid fixture with the platform horizontal and any adjustable means of attachment fully extended, as described in 5.11.2.

Apply a load by means of a rigid cylinder, diameter 110 mm, positioned transversely upon the luggage-carrier platform either

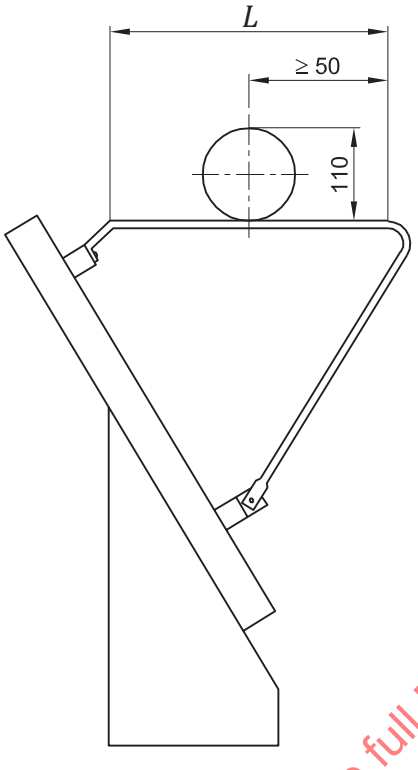
a) at the mid-point of the luggage-carrier platform, or

b) at a distance, D, of not less than 50 mm, measured from the rear of the rear luggage-carrier platform, or from the front of a front luggage-carrier platform, chosen to produce the greatest deflection (see examples in Figure 4).

Apply a load equal to three times the rated capacity of the luggage carrier for 1 min.

Measure the permanent deformation at the point of application of the load.

Dimensions in millimetres



Key

L luggage carrier platform length

Figure 4 — Typical arrangement for vertical load test

5.13 Static load test — Lateral load

5.13.1 Requirement

When tested using the method described in 5.13.2,

a) the maximum lateral deformation under load measured at the load application point shall not exceed the value given in Table 3, and

b) the lateral permanent deformation of the luggage carrier, measured at the point of application of the load after removal of the load, shall not exceed 5 mm.

NOTE For seat-post mounted luggage carrier, rotation of the product is considered as deformation.

5.13.2 Test method

Secure the luggage carrier to a rigid fixture with the platform horizontal and any adjustable means of attachment fully extended, as described in 5.11.2.

Apply a lateral force, *F*, equal to the rated capacity of the luggage carrier (for example, for maximum load capacity 18 kg, use *F* = 180 N) for 1 min to the side of the luggage-carrier platform as shown in Figure 5, or two forces each equal to half this force (*F*/2) to each side of the platform as specified in Table 4 for low-load carriers and as shown in Figure 6.

The application of the force shall be carried out as follows:

a) apply a lateral force, *F*, equal to 20 % of the rated capacity of the luggage carrier for 10 s in one direction;

b) apply a lateral force, *F*, equal to 20 % of the rated capacity of the luggage carrier for 10 s in the opposite direction as in a);

c) apply once, in the same direction as in a), a lateral force equal to 100 % of the rated capacity of the luggage carrier and measure the deformation during the application of the load and after the release of the load.

The test can produce plastic deformation in the material and shall not be repeated on the same luggage carrier.

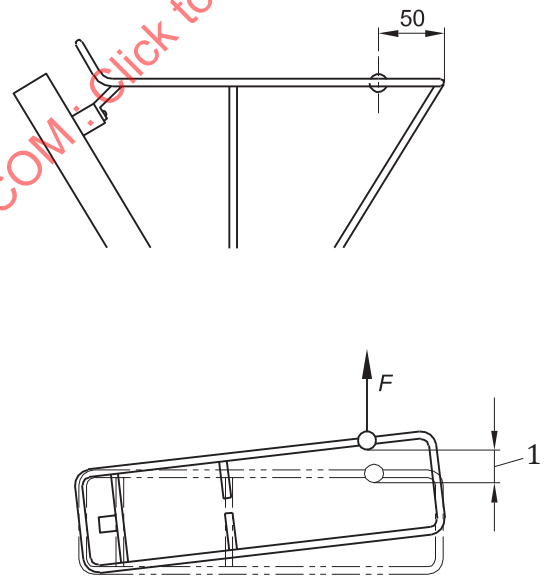
Table 3 — Maximum lateral deformation

Type of luggage carrier	Rear luggage carrier	Front luggage carrier	
	All types	Above wheel	Low-load
Maximum deformation mm	15	10	

Table 4 — Requirements for lateral static load test

Type of luggage carrier	Rear luggage carrier	Front luggage carrier	
	All types	Above wheel	Low-load
Force applied	All on one side of the luggage carrier		Half ($F/2$) on each side of luggage-carrier platform
Point of application and deflection	50 mm from rear of luggage-carrier platform	50 mm from front of luggage-carrier platform	

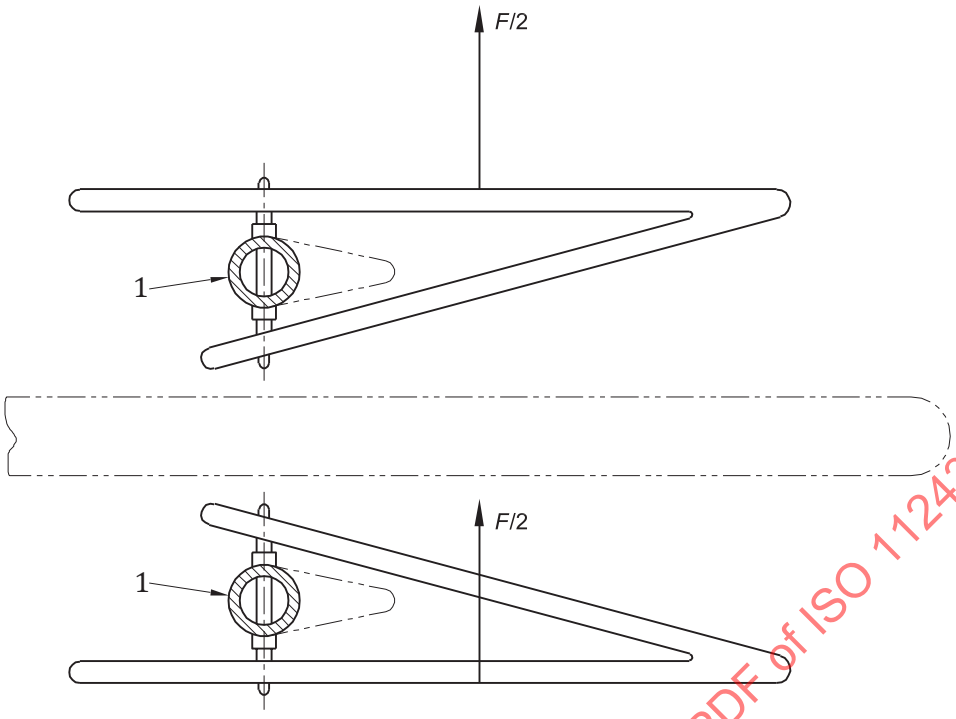
Dimensions in millimetres



Key

1 deflection

Figure 5 — Lateral load test with load *F*



Key

1 connection element luggage carrier/bicycle

Figure 6 — Lateral load test of low-load front carrier with load *F*/2

6 Marking

6.1 Requirements

The luggage carrier shall be visibly and durably marked with the following:

a) the maximum load capacity in kilograms;

b) if applicable, the maximum load of the battery in kilograms as defined by the luggage carrier manufacturer;

c) the name of the manufacturer or the manufacturer's representative;

d) the number of this International Standard, i.e. ISO 11243:2016;

e) the trademark, model and production batch number or reference.

6.2 Durability test

6.2.1 Requirements

When tested by the method described in 6.2.2, the marking shall remain easily legible. It shall not be easily possible to remove any label nor shall any label shows any sign of curling or shrivelling.

6.2.2 Test method

Rub the marking by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked in petroleum spirit.

7 Instructions

If a luggage carrier is sold as an accessory, it shall be provided with a set of instructions containing information on items a) to o) below. If the luggage carrier is sold already mounted on a cycle, information on items b) to o) below shall be included in the instructions for the cycle (unless the same information is supplied in a separate set of instructions).

a) Warning to the buyer to check that the geometric data and the strength of the bicycle, on which the carrier is to be mounted, are compatible with the luggage carrier specifications.

b) How and where the luggage carrier is to be attached to the bicycle with recommended tightening torque of fasteners and the specifications for these fasteners and screws (e.g. size, geometry, strength).

c) Maximum load capacity of the carrier, i.e. the maximum load for which the luggage carrier is designed and whether or not it is suitable for the attachment of a child-seat.

d) Instruction that the permissible load of the bicycle should not be exceeded.

e) Instruction that the fasteners are to be secured and checked frequently.

f) Warning that luggage can only be safely carried on the carrier.

g) Warning to the buyer not to modify the luggage carrier.

h) Advice as to whether or not the luggage carrier is designed to pull a trailer.

i) Warning to the buyer that the bicycle may behave differently (particularly with regard to steering and braking) when the luggage carrier is loaded.

j) Warning to the buyer to ensure that any luggage or child-seat feature fitted to the luggage carrier is securely fitted in accordance with the manufacturer's instructions and that there are no loose straps that can get caught in the wheel.

k) Advice to the buyer regarding the positioning of reflectors and lamps such that these are not obscured when luggage is attached to the luggage carrier.

l) Advice to distribute luggage evenly between the two sides of the luggage carrier.

m) Maximum compatible wheel size and tyre for the luggage carrier.

n) Information containing the name and address of the manufacturer, importer or representative, trademark, model and production batch number or reference.

o) Information on the type(s) of bicycles for which the luggage carriers are intended, unless the product is sold as part of the bicycle and already attached to it.

Any other relevant information may be included in the instructions at the discretion of the manufacturer.

8 Test report

The test report shall include the following information:

— the type and maximum load capacity of the sample;

— the type of fixture (bike or dummy) used for dynamic and static tests.

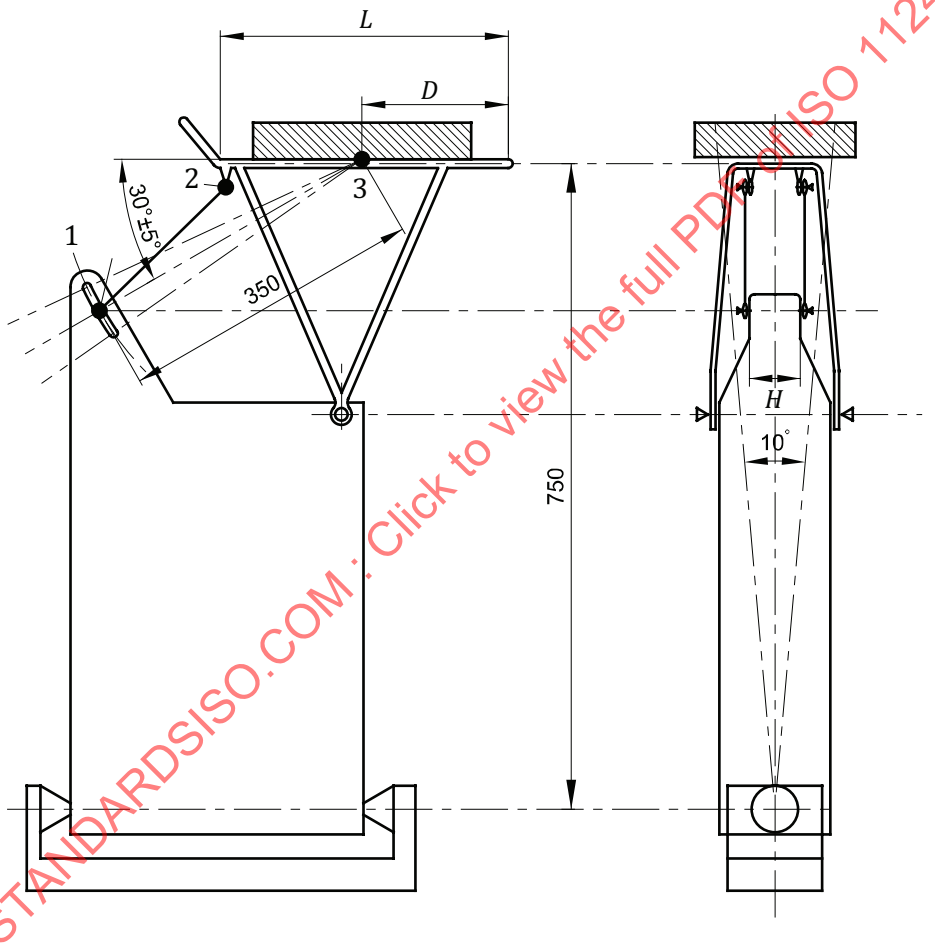
Annex A
(informative)

Typical test configuration

Figure A.1 shows suggested mounting of carriers using additional stays.

For vertical, longitudinal, and lateral testing, if exchangeable mounting means are used like double stays or single-fender mounting stays, the lateral test bench and the mounting on the vertical test bench should use the same geometry.

Dimensions in millimetres



Key

1 mounting point on the test bench
2 mounting point on the carrier
3 middle of the platform
D distance measured from the rear of the rear luggage-carrier platform or from the front of a front luggage-carrier platform
H mounting broadness
L luggage-carrier platform length

Figure A.1 — Examples of test bench configurations

The mounting point on the test bench, *Mpb*, has a distance of 350 mm from the middle of the platform, *Pm*. The line between the point *Mpb* and *Pm* and the horizontally aligned platform form an angle of 30°. This angle may differ from 25° to 35° if the 30° angle is not convenient. If double stays are used, the mounting broadness, *H*, shall not be more than 60 mm.

Annex B
(informative)

Longitudinal dynamic load test

B.1 Requirements

When tested by the method prescribed in B.3, there should be no fractures or visible cracks in any part of the luggage carrier. If the carrier is made of plastics or metal and plastics, it shall be submitted to the tests in 5.10 before being tested according to 5.11, 5.12 and 5.13.

B.2 Test bench

The test bench (see Figure B.1) consists of a rigid structure able to carry the loads deriving from the accelerated carrier.

The structure can be moved linearly with a sinusoidal-shaped stroke of 11,55 mm and a 7/s frequency.

The linear movement shall follow a direction of 30° towards the vertical line.

B.3 Longitudinal test

Attach the mass at the position $D = L/2$ as shown in Figure B.1 and move the luggage carrier attached structure linearly with a sinus shaped stroke of 11,55 mm at a frequency of 7 Hz for 100 000 cycles. The linear movement follows a direction of 30° towards the vertical line.

Figure B.2 shows different carriers mounted on the test bench.

Dimensions in millimetres