

PUBLICLY
AVAILABLE
SPECIFICATION

**ISO/PAS
11154**

First edition
2006-12-15

Road vehicles — Roof load carriers

Véhicules routiers — Porte-charges de toit



Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/PAS 11154 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 14, *Exterior fittings*.

This first edition cancels and replaces the first edition of ISO 11154-1 (ISO 11154-1:1995) and the first edition of ISO 11154-4 (ISO 11154-4:2004), which have been technically revised.

Introduction

Considering the state of the art and the ongoing work on the revision of DIN 75302, a city crash test and a short dynamic test were added. Furthermore, ISO 11154-1 and ISO 11154-4 were merged into a single document. German and French committee members declared their wish to replace their existing national standard by this revised version of ISO PAS 11154.

Standardized test bench method of subsystems which could be used as an alternative of the road test are still under development. Alternative method to city crash test might also be considered.

For some products, for example ladder holder, national regulation must be considered.

At the time of publication, dedicated roof bars complying with car manufacturers specifications already on sales or under development was considered satisfactory. They are encouraged to apply this Publicly Available Specification for their products as soon as possible.

At the time of publication, roof load carriers developed to previous ISO 11154 series or equivalent national standards were considered satisfactory.

Road vehicles — Roof load carriers

SAFETY PRECAUTIONS — This Publicly Available Specification is not applicable to vacuum fixing devices and roof containers (boxes) with magnetic fixation. The experience with and testing results of those devices shows that they are not able to guarantee a minimum safety level for carrying goods on either vehicle roof or rear.

1 Scope

This Publicly Available Specification specifies the minimum safety requirements for all roof load carriers intended for mounting on or above the roofs of passenger cars and light commercial vehicles with a maximum authorized total mass up to 3,5 t (ISO M08) as defined in ISO 1176.

It applies to:

- a) mechanically attached general use roof bars suitable for carrying a load,
- b) accessories and their attachments to roof bars for special purpose applications,
- c) mechanically attached specific purpose roof devices suitable for carrying a defined load, and
- d) magnetic fixing devices suitable for carrying a defined load.

This Publicly Available Specification establishes technical specifications and test methods which offer the user of the roof load carriers, other road users and pedestrians a minimum level of safety when these fixing devices are being used in accordance with the manufacturer's instructions.

Moreover, the requirements of ISO/PAS 11154 complete the provisions of Directive 74/483 EEC and ECE R 26 concerning these products.

For additional devices intended for example to limit the movement of the load, requirements and test methods are not defined in this Publicly Available Specification. If needed, both manufacturer and laboratories will work out additional test(s) or choose the most appropriate test(s) described in this Publicly Available Specification.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 179 (all parts), *Plastics — Determination of Charpy impact properties*

ISO 527 (all parts), *Plastics — Determination of tensile properties*

ISO 612: 1978, *Road vehicles — Dimensions of motor vehicles and towed vehicles — Terms and definitions*

ISO 1176, *Road vehicles — Masses — Vocabulary and codes*

ISO 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 4130, *Road vehicles — Three dimensional reference system and fiducial marks — Definitions*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 6487, *Road vehicles — Measurement techniques in impact test — Instrumentation*

ISO 9227:2006, *Corrosion tests in artificial atmospheres — Salt spray tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4130 and the following apply.

3.1

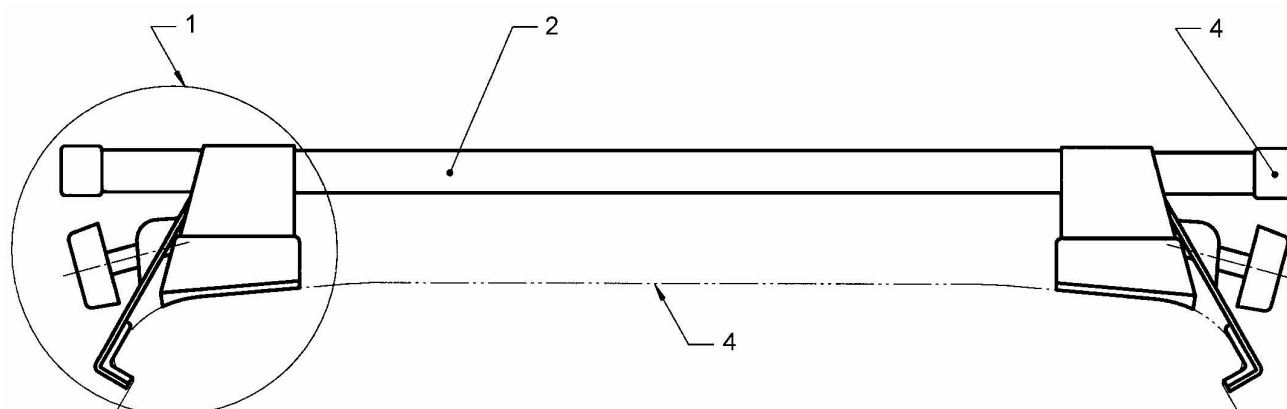
roof bar

supporting bar with connecting devices which enables a load to be carried on the roof of a vehicle

NOTE 1 Generally, roof bars are compatible with the use of additional accessories.

NOTE 2 Roofs bars are fixed on the roof or on original-equipment rails of the vehicle.

EXAMPLE See Figure 1.



Key

- 1 connecting devices
- 2 supporting bar
- 3 vehicle roof
- 4 end-cap

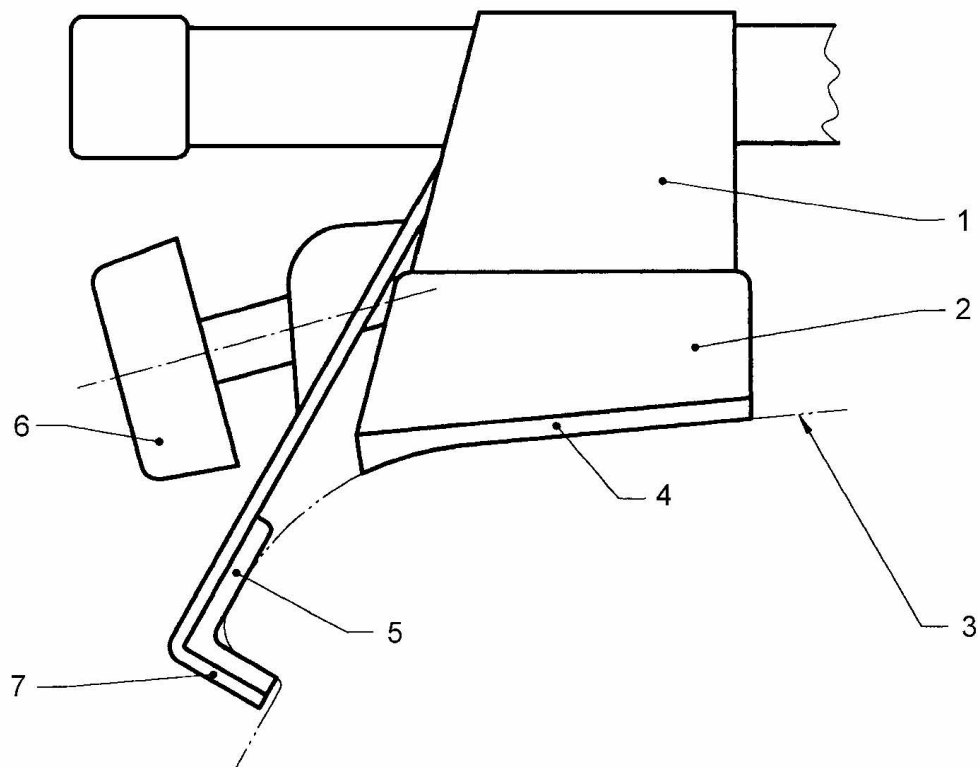
Figure 1 — Components of roof bar

3.2

connecting device

set of parts connecting the supporting bar to the vehicle

EXAMPLES See Figure 1 and 2.



Key

- 1 foot
- 2 pad
- 3 vehicle roof
- 4 body protector
- 5 body protector
- 6 tightening system
- 7 fixing clamp

Figure 2 — Components of connecting device

3.3

specific purpose roof device

roof device designed for a specific type of load or use having its own fixation to the vehicle

3.4

additional accessory

device used in conjunction with the roof bars, roof racks and roof decks to carry a specific type of load

3.5

bicycle carrier

any device intended for carrying bicycle(s) on roof bars

EXAMPLES See Figures 3 and 4.

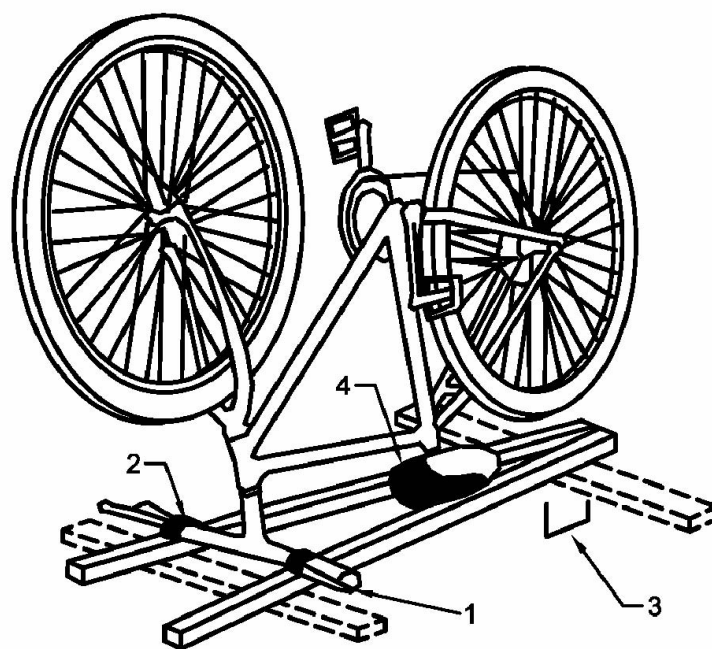


Figure 3 — Bicycle carrier, saddle down

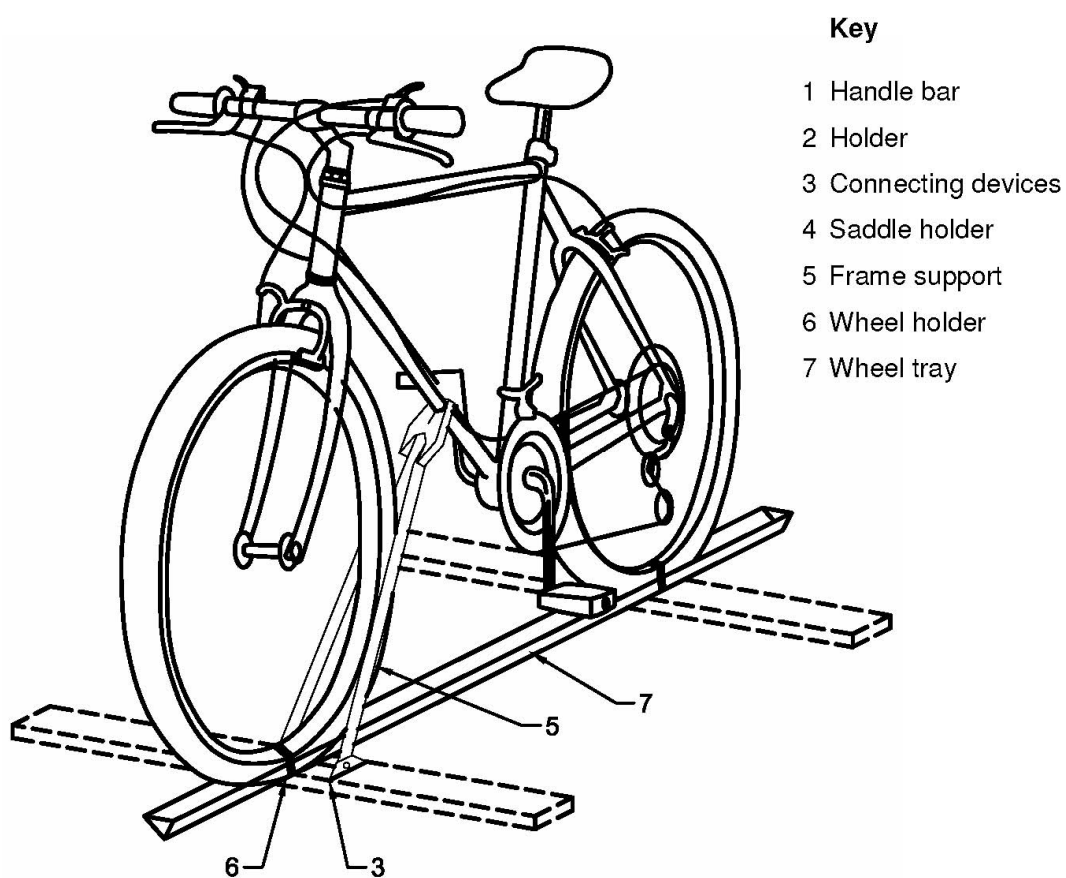
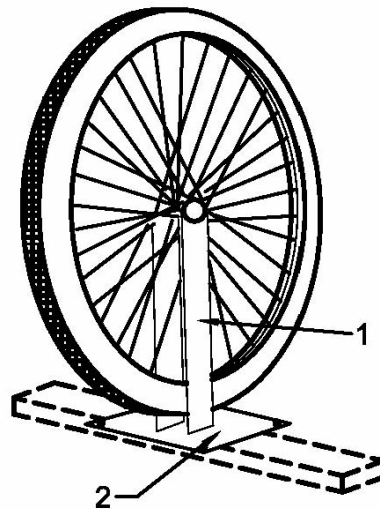


Figure 4 — Bicycle carrier, saddle up

3.6**bicycle-wheel carrier**

any device intended for carrying bicycle wheel(s) on roof bars, roof decks or roof racks

EXAMPLE See Figure 5.

**Key**

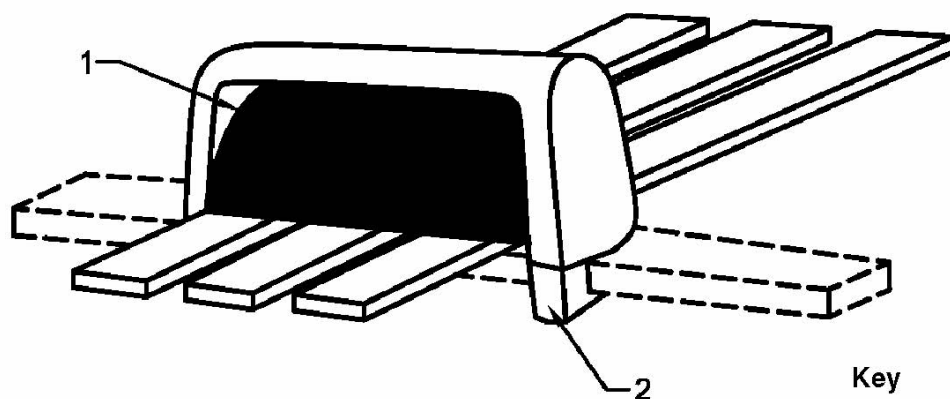
- 1 wheel holder
- 2 connecting devices

Figure 5 — Bicycle-wheel carrier

3.7**ski and/or snow-board carrier**

any device intended for carrying ski(s), snow-board(s) and/or sticks on roof bars , roof decks or roof racks

EXAMPLE See Figure 6.

**Key**

- 1 ski clamping
- 2 connecting devices

Figure 6 — Ski and/or snow-board carrier

3.8

sailboard and/or surfboard carrier

any device intended for carrying sailboard(s) with or without mast and boom and/or surfboard(s) on roof bars, roof decks or roof racks

EXAMPLES See Figure 7.

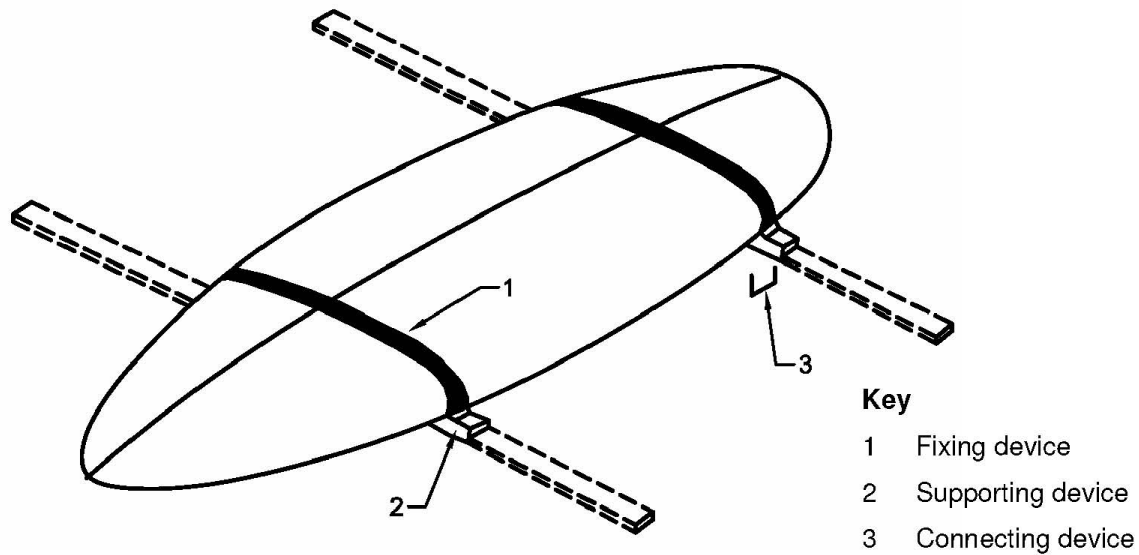


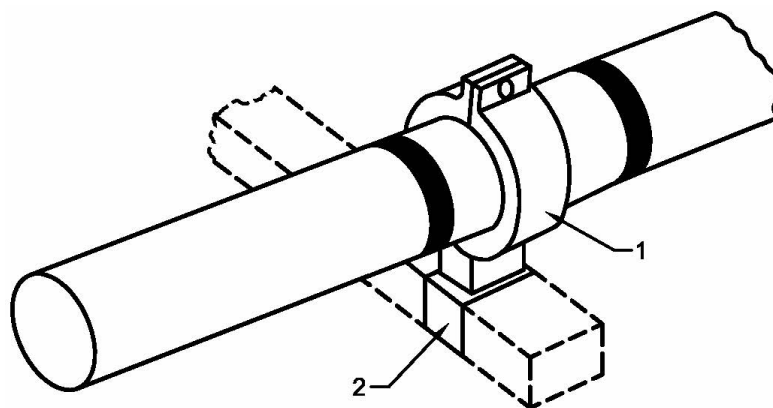
Figure 7 — Sailboard and/or surfboard carrier

3.9

sailboard mast carrier

any device intended for carrying sailboard mast(s) on roof bars, roof decks or roof racks

EXAMPLE See Figure 8.



Key

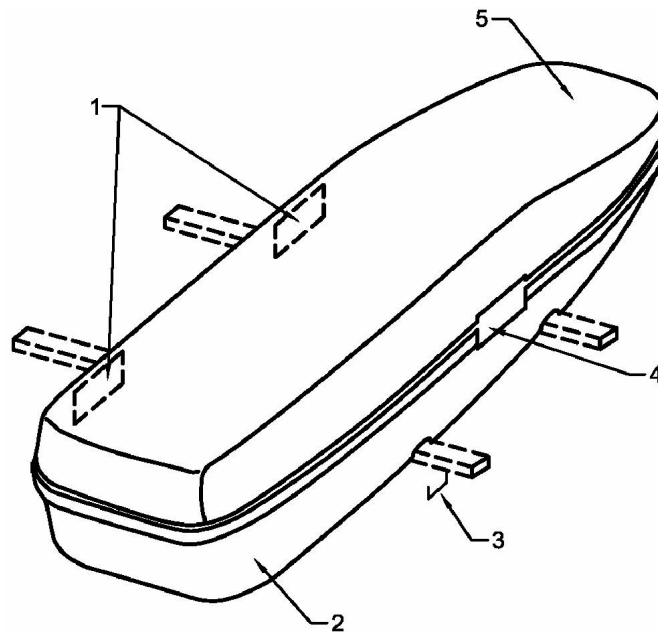
- 1 fixing device
- 2 connecting device

Figure 8 — Sailboard mast carrier

3.10**roof container**

containers intended for the transport of different loads such as suit-cases, bags, skis, etc. on roof bars, roof decks or roof racks

EXAMPLE See Figure 9.

**Key**

- 1 hinge(s)
- 2 bottom section
- 3 connecting device
- 4 closing device
- 5 top section

Figure 9 — Roof container

3.11**wind deflector**

device intended for modifying the aerodynamic drag (e.g. when towing caravan) fixed on roof bars, roof decks or roof racks

EXAMPLE See Figure 10.

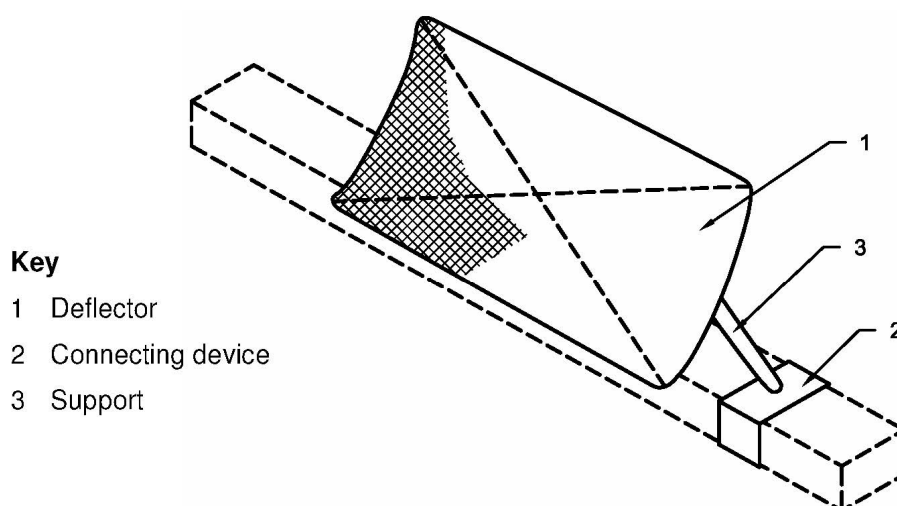


Figure 10 — Wind deflector

3.12

canoe and/or kayak carrier

any device intended for carrying canoe(s) and/or kayak on roof bars , roof decks or roof racks

EXAMPLE See Figure 11.

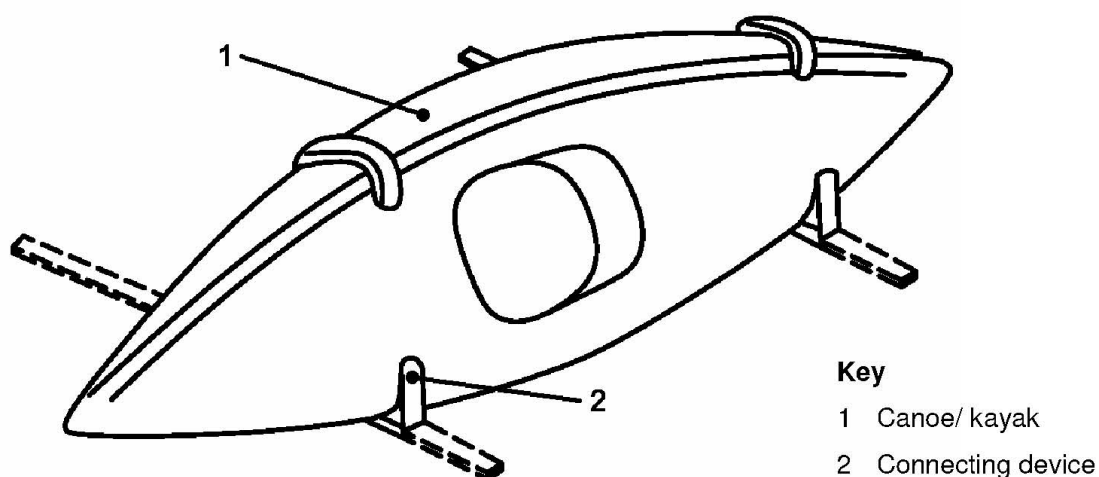


Figure 11 — Canoe and/or kayak carrier

3.13

roof deck (basket)

basket device or platform intended for carrying different loads such as suit-cases, bags, skis and/or roof deck

EXAMPLE See Figure 12.

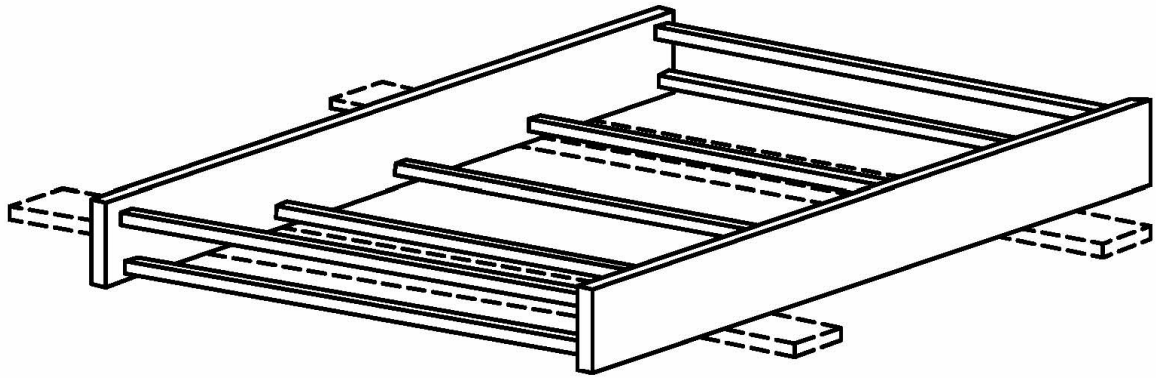


Figure 12 — Roof deck

3.14**adapter for roof bars accessories**

any device intended for fixing accessories defined in 3.5 to 3.13 on roof bars

EXAMPLES See Figure 13 and 14.

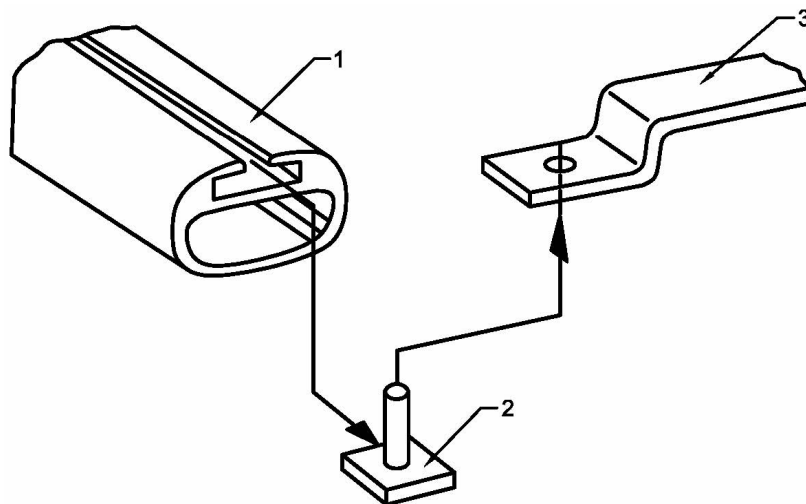


Figure 13 — adapter for roof bars accessories

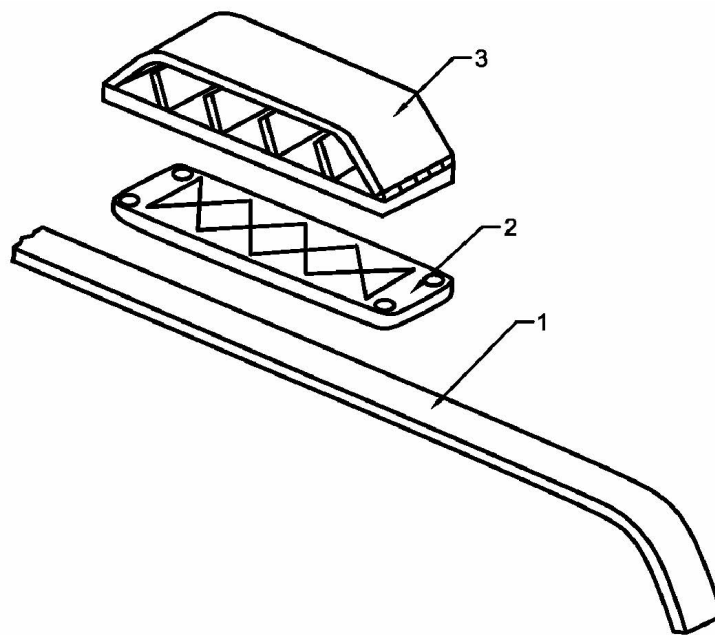


Figure 14 — adapter for roof bars accessories

Key

- 1 roof bar
- 2 adapter
- 3 accessory

3.15

roof rack

specific purpose roof device having its own fixation to the vehicle designed to carry a load on the roof of a vehicle

NOTE In general, they are not compatible with the use of additional specific purpose roof devices.

3.16

ladder holder

specific purpose roof device having its own fixation to the vehicle designed to carry ladder(s) on the roof or on the lateral side of the vehicle

NOTE In general, they are not compatible with the use of additional specific purpose roof devices.

3.17

magnetic roof rack

magnetic fixing device set designed to carry a load on the roof of a vehicle

NOTE In general, they are not compatible with the use of additional accessories.

3.18

magnetic ski/snowboard holder

magnetic fixing device designed to carry ski(s) or snowboard(s) on the roof or on the side of a vehicle

NOTE In general, they are not compatible with the use of additional accessories.

3.19

load fixing device

any device other than those defined in 3.5 to 3.14 intended for fixing load(s) on roof bars and/or roof deck and/or roof rack

EXAMPLES See Figure 15 (textile straps, metallic straps, synthetic material straps, hooks, etc.).

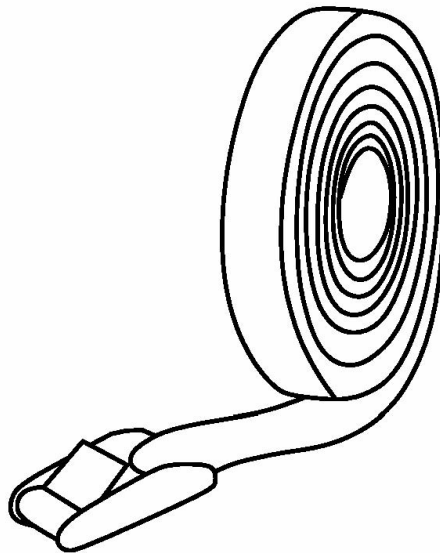


Figure 15 — Load fixing device

3.20

additional devices

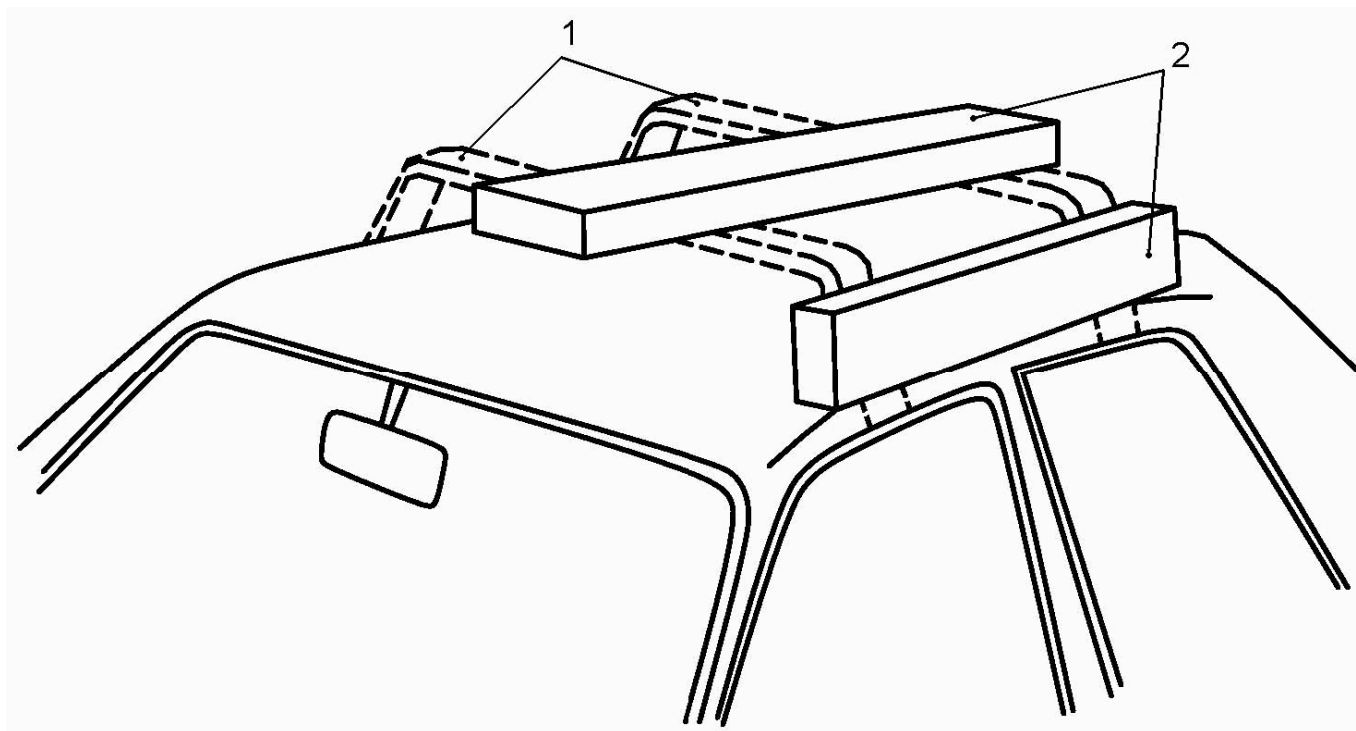
all devices intended for example to limit the movement of the load, fixed the load, etc.

3.21

location of accessory

placement of the accessory on roof bars

EXAMPLE See Figure 16.



Key

- 1 roof bars
- 2 accessory

Figure 16 — Placement of the accessory on roof bars

**3.22
maximum vehicle roof load**

m_d
maximum load capacity, expressed in kilograms, permissible on the vehicle upper structure as defined by the vehicle manufacturer

**3.23
maximum roof carrier load**

m_b
maximum load capacity or number of units, expressed either in kilograms or as a quantity, permissible on a device set as defined by the device set manufacturer

**3.24
mass of the specific roof device set**

$m_{e\ mdev}$
sum, expressed in kilograms, of the component masses of the devices

**3.25
mass of set of roof load carrier device**

m_e
total mass of set of roof carrier device, expressed in kilograms

**3.26
theoretical maximum load**

m_n
maximum vehicle roof load m_d minus mass of set of roof load carrier devices m_e or minus mass of the specific roof device set, $m_{e\ mdev}$, expressed in kilograms

3.27**actual maximum load** m_x

theoretical maximum load m_n or maximum roof carrier load m_b , expressed in kilograms, whichever is lowest

3.28**lifting force** F_a

force, expressed in newtons, applied during testing to simulate the vertical components of the aerodynamic effect and/or vertical effect of the load

3.29**forward longitudinal force** F_l

force, expressed in newtons, applied during testing to simulate the horizontal forward, F_l or the backward, $-F_a$ component of the force caused by the load in the X-plane

NOTE The X plane is defined in ISO 4130.

3.30**20° horizontal force** F_{lq}

force, expressed in newtons, applied during testing to simulate the effect caused by the load during braking when cornering

3.31**lateral force** F_{lat}

force, expressed in newtons, applied during testing to simulate the horizontal component of the force caused by the load parallel to the Y-plane

NOTE The Y plane is defined in ISO 4130.

3.32**ladder lifting force** $F_{a\ lad}$

alternative force, expressed in newtons, applied during testing at the extremity of the ladder to simulate the pitch effect caused by the ladder

3.33**angular position of the device** α

angle between the carrier device and the vertical plane

EXAMPLE See Figure 17.

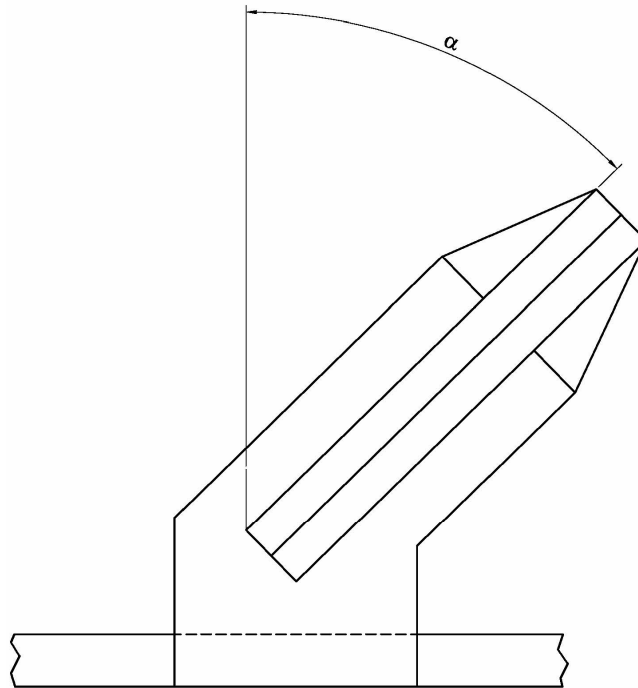


Figure 17 — Angular position of a device, α

3.34 deflection

d

sum, expressed in millimetres, of permanent deformations and sliding displacement of a roof bar, an accessory, a specific purpose device or a magnetic fixing device when fixed to the vehicle roof and under test conditions

3.35 test devices

load simulation devices used during testing

EXAMPLES Examples include test reference ski, test reference ladder, test bicycle

3.36 test box

load simulation device used during testing

3.37 test bench

device up on which the tests are performed

NOTE See Annex A.

3.38 wind deflector area

S

vertical projection of the wind deflector area measured in m^2

3.39 roof load carrier

any device which enables a specific or undefined load to be carried on the roof of a vehicle

4 Classification, designation and coding

The following designation type and coding of roof load carrier given in Table 1 apply throughout this entire document:

Table 1 — Designation type and coding of roof load carrier given

Designation	Definition according to	Type	coding
Roof bar	3.1	A	ISO11154-A
Magnetic roof rack	3.17	B	ISO11154-B
Magnetic Ski / Snow board holder	3.18	C	ISO11154-C
Taxi and advertising magnetic sign	-	D	ISO11154-D
Roof rack	3.15	E	ISO11154-E
Ladder holder	3.16	F	ISO11154-F
Roof (box) container With its fixation on the roof	-	G	ISO11154-G
Bicycle carrier	3.5	H	ISO11154-H
Bicycle-wheel carrier	3.6	I	ISO11154-I
Ski and/or snow-board carrier	3.7	J	ISO11154-J
Sailboard and/or surfboard carrier	3.8	K	ISO11154-K
Sailboard mast carrier	3.9	L	ISO11154-L
Roof (box) container	3.10	M	ISO11154-M
Wind deflector	3.11	N	ISO11154-N
Mechanically fixing taxi and advertising sign	-	O	ISO11154-O
Canoe and/or kayak	3.12	P	ISO11154-P
Roof deck (basket)	3.13	Q	ISO11154-Q
Load fixing device	3.19	R	ISO11154-R

5 Requirements and test methods

5.1 Synthesis of requirements and tests applicable to each types of roof load carriers

Roof load carriers shall:

- meet the requirements given in 5.3 and 5.4 when submitted to the test given in Table 2;
- be delivered with instruction for fitting, use and the customer according to 6;
- be marked according to 7.

The synopsis in Annex B gives an overview of the requirements to meet.

NOTE The requirements described in the following sections shall be considered to be minimum requirements. It is permitted, subject to an agreement between parties, as a substitute, to test to more stringent requirements if they cover all the requirements of this International standard.

Table 2 — Synthesis of tests applicable to each types of roof load carriers

Roof load carrier designation	Tests													
	Type	F_a +/- z/z	F_{alad} +/- z/z	F_{l} +/- x/x	F_{lq}	F_{lat} +/- y/y*	City crash	Dynamic	Corrosion	Material	Impact and opening	traction	Specific magnetic	Overhang and external shape
Roof bar	A	V	NA	V	V	NA	V	V	V/B	V/B	NA	NA	NA	V
Magnetic roof rack	B	V	NA	V	V	NA	V	V	V/B	V/B	NA	NA	V	V
Magnetic Ski / Snow board holder	C	V	NA	V	V	V	V	V	V/B	V/B	NA	NA	V	V
Taxi and advertising magnetic sign	D	V	NA	V	V	NA	V	V	V/B	V/B	NA	NA	V	V
Roof rack	E	V	NA	V	V	NA	V	V	V/B	V/B	NA	NA	NA	V
Ladder holder	F	V	V	V	V	NA	V	V	V/B	V/B	NA	NA	NA	V
Roof (box) container With its fixation on the roof	G	V	NA	V	V	NA	V	V	V/B	V/B	B	NA	NA	V
Bicycle carrier	H	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Bicycle-wheel carrier	I	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B

Ski and/or snow-board carrier	J	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Sailboard and/or surfboard carrier	K	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Sailboard mast carrier	L	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Roof (box) container	M	B	NA	B	NA	B	V/B	V/B	V/B	V/B	B	NA	NA	V/B
Wind deflector Mechanically fixing	N	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Taxi and advertising sign Mechanically fixing	O	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Canoe and/or kayak	P	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Roof deck (basket)	Q	B	NA	B	NA	B	V/B	V/B	V/B	V/B	NA	NA	NA	V/B
Load fixing device	R	NA	NA	NA	NA	NA	NA	NA	B	NA	NA	B	NA	NA
Additional device	Additional device as defined in 3.20 are outside the scope of this standard													
NOTE 1 V means test to be performed on vehicle or on a roof.														
NOTE 2 V/B means test to be performed either on vehicle or on test bench.														
NOTE 3 B means test to be performed on test bench.														
NOTE 4 NA means not applicable.														

5.2 Test methods — Generalities

5.2.1 Test samples

Devices manufactured from current production tools or representatives tools shall be made available as test specimens

One new sample can be used for each test including each static tests. Corrosion and material tests can be done with a sample already used for one test.

5.2.2 Test devices

The test devices used to load the specific purpose roof devices and/or additional accessories and the test box used to load the roof bars, roof racks and roof decks during the tests shall be in accordance with the figures shown in Annex C.

Masses of test devices used for the test are according to Table 3.

Table 3 — Mass of test devices

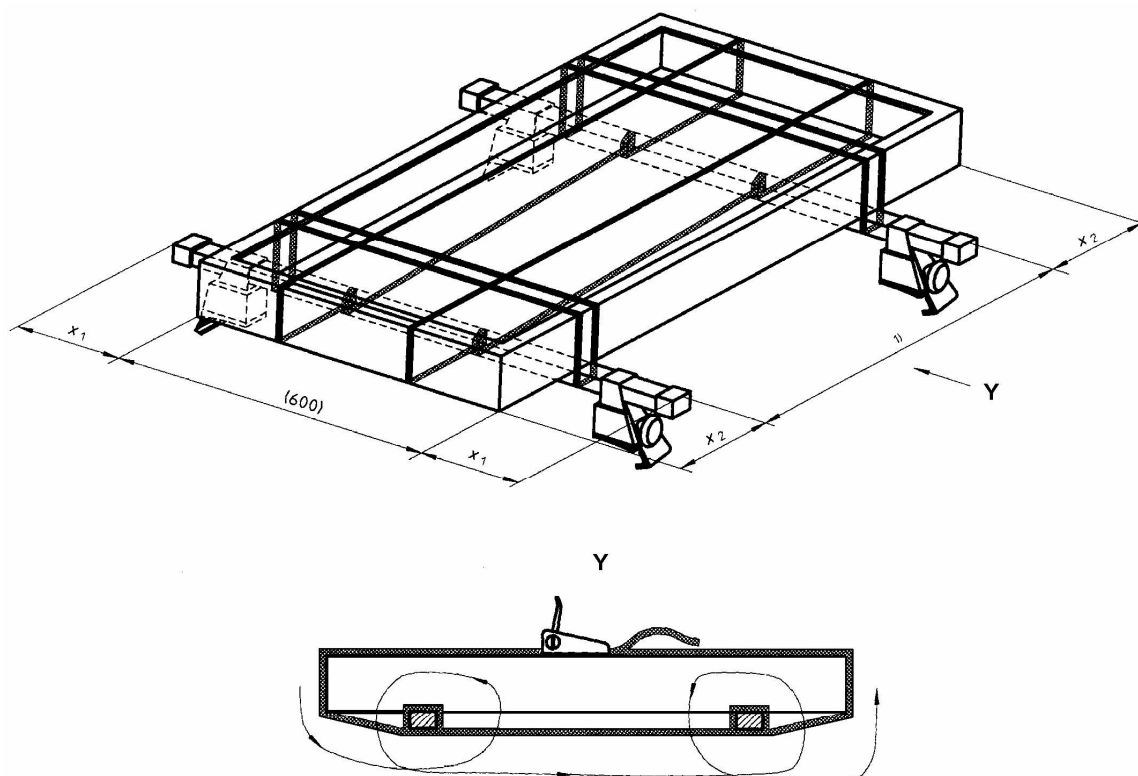
Test devices	Mass Kg
Test box	According to manufacturer's specification
Roof rack, roof deck	According to manufacturer's specification
Bicycle (each)	17
Bicycle wheel (each)	2
Roof container	According to manufacturer's specification
Pair of skis (each pair)	7
Snowboards (each)	7
Surfboard, Sailboard, Canoe	25
Mast	3
Taxi and advertising signs	According to manufacturer's specification
Ladder	According to manufacturer's specification

5.2.3 Fixation of the test device

The test box shall be firmly attached to the roof bars or roof rack or roof deck as shown in Figures 18, 19 and 20 to preclude any movement between the roof load carrier and the test box.

For bars having specific profile and a warning in the instruction for use recommending using it for carrying load, the test box shall be fixed in a rigid way. Load should be fix on a stiff board (board width = 700 mm), the plate is fixed 2 time to each bar, the distance of fixations of the bars is 600 mm in Y, Load and board are fixed symmetrically to the bars. The centre of gravity of the load shall be between 50 to 80 mm over the surface of roof bars. In other cases, the bars shall be tested fixing the load with support bar and straps as described in Figure 20.

For roof load carrier of types C, F, H to L and P, the specified test load (test bicycle, test ski, ...) shall be fixed according as specified in the instruction of use of the roof device.

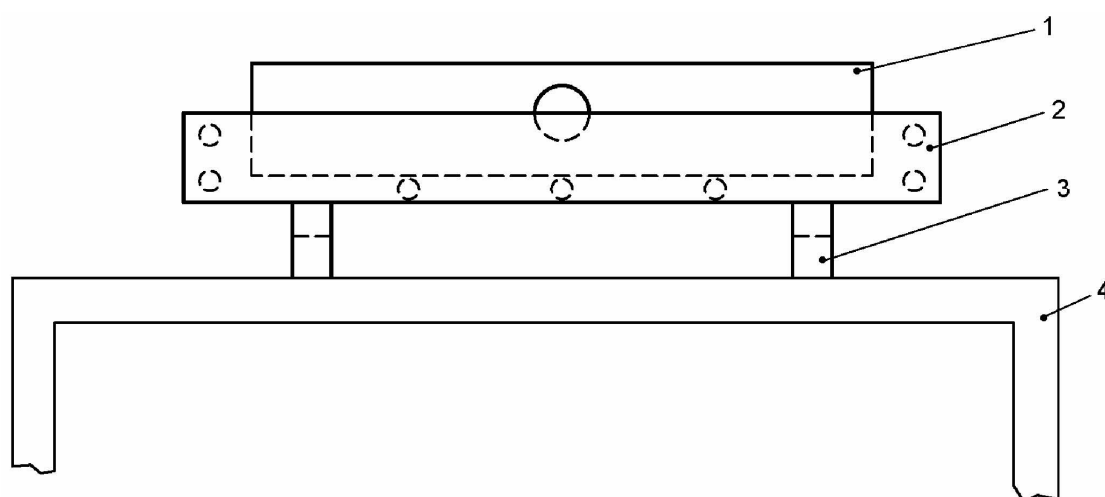


cordance with mounting instructions or 700 mm by default

Figure 18 — Test box location and strapping

Key

- 1) In accordance with mounting instructions or 700 mm by default



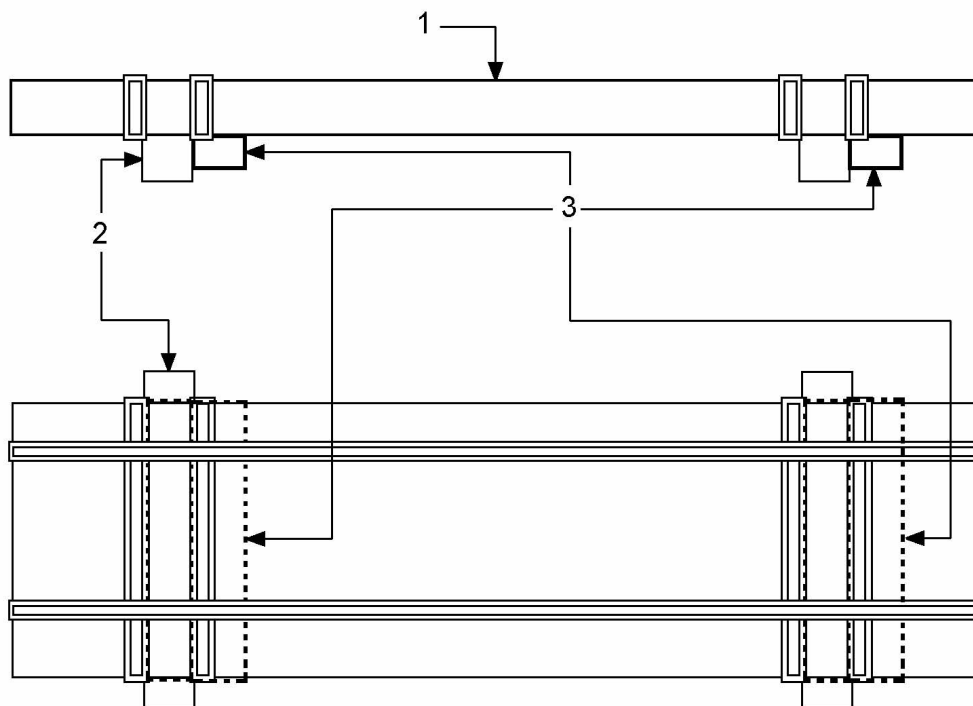
Key

- 1 Test load

Key

- 1 test load
2 roof deck
3 roof bars
4 test bench

Figure 19 — Test box strapping



Key

- 1 test box
- 2 roof bars
- 3 support tubes

NOTE The centre of gravity of the mass is the centre of gravity of the test box.

Figure 20 — Fixation of the test load

If all fixation points specified by the manufacturer of the roof bars or roof racks are not used when fixing an accessory to these devices or if these devices are modified for fixing the accessory, all tests for qualifying the fixations between the roof and the load carrier shall be done (see 5.1).

The distance between the bars of the test bench shall be in accordance with the instructions for the fitting and use of the devices. If it is not defined in the manufacturer's instructions, the distance between the roof bars of the test bench shall be 700 mm. Where special roof bars are required, they shall be permanently attached to the test bench. The accessory shall be mounted at the middle of the test bench

Adjustable roof carrier devices shall be tested in the most unfavourable mounting circumstances authorised by the fitting instruction.

For set of more than two bars, the test box shall be attached in turn:

- a) from the first to second, and then
- b) from the second to the third bar, etc.

5.2.4 Roof load carrier loading

The test devices used to load the devices during the tests are defined in each test method.

The actual maximum load m_x (see 3.27) shall be adjusted to an accuracy of ± 1 kg.

Prior to each test the devices shall be fitted, released and retightened in accordance with the manufacturer's instructions.

The torque or force used shall be in accordance either with the manufacturer's instruction or, in absence of such instruction with Annex D.

5.2.5 Quasi static test, value of the test forces

5.2.5.1 Application time

Test forces shall be applied to achieve the maximum value within 5 s to 10 s to a tolerance of $+^5_0\%$

5.2.5.2 Lifting force, F_a

The lifting force F_a (see 3.28) is function of the projection on the horizontal plan X of the frontal surface of the load carried fitted on the roof of the vehicle. Table 4 gives the value of F_a to apply during static test for each roof load carrier types.

Table 4 — Lifting force corresponding to the different types of roof load carrier

Roof load carrier designation	Type	Lifting force, F_a N
Roof bar	A	3000 if two surfboards can be mounted side by side according to the manufacturer specification 2500 if one surfboard can be mounted, or some ones mounted over the others and 1500 on the rear bar if fixation are not the same
Magnetic roof rack	B	3000 if two surfboards can be mounted side by side according to the manufacturer specification 2500 if one surfboard can be mounted, or some ones mounted over the others and 1500 on the rear fixing point

Magnetic Ski / Snow board holder	C	240 x number skis (side by side) 120 x nb of ski on the rear fixing point 720 x number snowboard (side by side) and 360 x nb of snowboard on the rear fixing point
Taxi and advertising magnetic sign	D	NA
Roof rack	E	3000 and 1500 on the rear bar if fixation are not the same
ladder holder	F	1000 x number of ladder (side by side)
Roof (box) container With its fixation on the roof	G	2000 and 1000 on the rear bar if fixation are not the same
Bicycle carrier	H	600 or 600x number of bicycle in case of multiple bicycles carrier single unit
Bicycle-wheel carrier	I	NA
Ski and/or snow-board carrier	J	240 x number skis (side by side) 720 x number snowboard (side by side)
Sailboard and/or surfboard carrier	K	1500
Sailboard mast carrier	L	NA
Roof (box) container	M	2000
Wind deflector	N	NA
Mechanically fixing taxi and advertising sign	O	NA
Canoe and/or kayak	P	1500
Roof deck (basket)	Q	2500
Load fixing device	R	NA