INTERNATIONAL STANDARD

ISO 11154-1

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Road vehicles — Roof load carriers —

Part 1: Roof bars

Véhicules routiers — Dispositifs porte-charges de toit —
Partie 1: Barres porte-charges

Reference number
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Contents

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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.

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.

International Standard ISO 11154-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 14, *Exterior fittings*.

ISO 11154 consists of the following parts, under the general title *Road vehicles — Roof load carriers*:

— *Part 1: Roof bars*

— *Part 2: Accessories and attachments to roof bars for special purpose applications*

— *Part 3: Specific purposes roof devices*

— *Part 4: Magnetic and vacuum-fixed devices*

Annexes A and B form an integral part of this part of ISO 11154. Annex C is for information only.

Road vehicles — Roof load carriers —

Part 1:
Roof bars

1 Scope

This part of ISO 11154 specifies the minimum safety requirements for roof bars intended for mounting on or above the roofs of passenger cars or light commercial vehicles with a maximum authorized total mass (ISO-M08) as defined in ISO 1176 up to 3,5 t.

It applies to general-use roof bars suitable for carrying load, excluding magnetic and vacuum-fixed devices (see note 1).

It establishes technical specifications and test methods which offer both the user of roof bars and road users a minimum level of safety when the roof bars are being used in accordance with the manufacturer's instructions.

Moreover, requirements of ISO 11154 complete the provisions of Directive 74/483/EEC[1] concerning these products.

NOTE 1 The other parts of ISO 11154 are as follows:

— part 2 covers additional accessories intended to be fitted on general purpose roof bars;

— part 3 covers specific purpose roof devices;

— part 4 covers magnetic and vacuum-fixed devices.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11154. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11154 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 1176:1990, *Road vehicles — Masses — Vocabulary and codes.*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

European Commission Directive 79/488/EEC *adapting to technical progress Council Directive 74/483/EEC on the approximation of the laws of the Member States relating to the external projections of motor vehicles,* 18 April 1979.

3 Definitions

For the purposes of this part of ISO 11154, the following definitions apply.

3.1 roof bar: Supporting bar with connecting devices which enables a load to be carried on the roof of a vehicle.

1) European Council Directive 74/483/EEC on the *approximation of the laws of the Member States relating to the external projections of motor vehicles,* 17 September 1974.

NOTES

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

3 Roof bars are fixed on the roof or on original-equipment rails of the vehicle.

4 An example of components of a roof bar is given in figure 1.

3.2 connecting device: Set of parts connecting the supporting bar to the vehicle.

NOTE 5 Examples of connecting device components are given in figures 1 and 2.

3.3 specific purpose roof device: Roof device designed for a specific type of load or use.

3.4 additional accessory: Device used in conjunction with the roof bars to carry a specific type of load.

3.5 maximum vehicle roof load, m_d: Maximum load capacity permissible on the roof of the vehicle as defined by the vehicle manufacturer.

3.6 maximum roof bar set load, m_b: Maximum load capacity permissible on roof bar set as defined by the roof bar manufacturer.

3.7 mass of set of roof bars, m_e: Total mass of set of roof bars.

3.8 theoretical maximum load, m_n: Maximum vehicle roof load m_d minus mass of set of roof bars m_e.

3.9 actual maximum load, m_x: Theoretical maximum load, m_n, or maximum roof bar load, m_b, whichever is the lowest.

3.10 deflection, d: Sum of permanent deformations and sliding displacement of a roof bar when fixed to a vehicle roof and under test conditions.

3.11 test box: Load simulation device used during the test.

3.12 lifting force, F_a: Force applied during testing to simulate the vertical component of the aerodynamic effect of load.

3.13 forward longitudinal force, F_l: Force applied during testing to simulate the horizontal forward component of the force caused by the load.

3.14 20° horizontal force, F_{lq}: Force applied during testing to simulate the effect caused by the load during braking when cornering.

4 Symbols and units

For the purposes of this part of ISO 11154, the following symbols and units apply.

Symbol	Designation	Unit
m_d	Maximum vehicle roof load	kg
m_b	Maximum roof bar set load	kg
m_e	Mass of set of roof bars	kg
m_n	Theoretical maximum load	kg
m_x	Actual maximum load	kg
d	Deflection	mm
F_a	Lifting force	N
F_l	Forward longitudinal force	N
F_{lq}	20° horizontal force	N

5 Requirements

5.1 Slide resistance under quasi-static force applied forward in vehicle longitudinal axis

5.1.1 When tested in accordance with 6.2, the deflection d_1 shall not exceed 10 mm under the application of a force $0{,}5F_l$.

5.1.2 When tested in accordance with 6.2, the deflection d_2 shall not exceed 50 mm under the application of a force F_l.

5.2 Slide resistance under quasi-static force applied at 20° to vehicle longitudinal axis

5.2.1 When tested in accordance with 6.3, the deflection d_3 shall not exceed 10 mm under the application of a force $0{,}5F_{lq}$.

5.2.2 When tested in accordance with 6.3, the deflection d_4 shall not exceed 50 mm under the application of a force F_{lq}.

5.3 Resistance to lift

When used in accordance with the manufacturer's instructions, roof bars shall be able to withstand those lifting forces which can be expected to occur.

When tested in accordance with 6.4, under a force F_a, the roof bars shall remain fixed on the roof.

If front and rear connecting devices are different, the rear roof bar shall remain fixed to the roof under a force $0{,}5F_a$ when tested in accordance with 6.4.

5.4 Resistance to corrosion

When tested in accordance with 6.5, no active corrosion which affects the basic function of each part shall appear after the test.

5.5 Resistance of materials

All materials shall allow roof bars to fulfil the requirements specified in 5.1 to 5.3 at outside temperatures between − 20 °C and + 60 °C, taking into account ultraviolet stability and ozone ageing.

This shall be shown by at least one of the following methods

a) materials certification[2] or reports[2] showing that material property concepts are compatible with intended use,

b) tests as in clause 6 under the limiting conditions given above,

c) reference to applicable standards.

5.6 Overhang and external shape

5.6.1 It is recommended that the bar length be limited to the width of the vehicle roof panel (see figure 5). However, the length of the bar shall not exceed the vehicle width as defined in ISO 612:1978, 6.2.

5.6.2 The external radius of all contactable components shall conform to 6.16.2 and 6.16.3 of Directive 79/488/EEC.

6 Test methods

6.1 General

6.1.1 All slide resistance and resistance to lift tests shall be carried out on the vehicle roof in the following sequence:

a) resistance to lift test;

b) slide resistance test under a quasi-static forward force F_l;

c) slide resistance test under a quasi-static force F_{lq} at 20° to the vehicle longitudinal axis.

Three roof bars sets manufactured from current production tools shall be made available as test specimens.

The approval/rejection procedure shall be as specified in annex A.

6.1.2 Roof bars shall be tested in pairs unless they are specifically designed to be used in sets of more than two.

6.1.3 Adjustable roof bars shall be tested at their maximum height above the roof.

6.1.4 Prior to each test each set of bars shall be fitted, released and retightened to the specified instructions.

Fitting and tightening torques shall be in accordance with the manufacturer's instructions or, failing that, in accordance with annex B.

6.1.5 The distance between the roof bars shall be as specified in the instructions for fitting and use.

6.1.6 The test box shall be in accordance with figure 3 and shall not be deformed by the load.

The ballast used to adjust the mass shall be uniformly distributed in the test box.

The test mass m_x shall be adjusted to an accuracy of ± 1 kg.

The test box shall be firmly attached to the roof bars, as shown in figure 4, using straps to preclude any movement between the bars and the test box.

For sets with more than two bars, the test box shall be attached, in turn:

a) from the first to the second, and then

b) from the second to the third bar, etc.

6.1.7 Test forces shall be applied to achieve the maximum value within 15 s to 30 s, to a tolerance of $^{+100}_{0}$ N.

6.1.8 The deflection, d, shall be measured in accordance with figure 5.

2) Reference may be made to the ISO 9000 series of International Standards for these documents.

6.2 Slide resistance test under quasi-static forward force

6.2.1 Nominal value of force

The nominal value of the longitudinal forward force, F_l, is given by the equation:

$$F_l = 40m_x$$

where

$m_x = m_b$ if $m_b < m_n$

$m_x = m_n$ if $m_b > m_n$

6.2.2 Test procedure

Mount the roof bars on the roof of the vehicle.

Tighten the clamps to the required torque or force and record the value.

Install the test box, weighted to the m_x value, and clamp it as indicated in 6.1.6.

Check and, if necessary, readjust the clamps to the specified torque or force value.

Install the measuring equipment as shown in figure 5.

Progressively and continuously apply the longitudinal force F_l as shown in figure 6 up to the required nominal value, checking the instant deflection d_1 at $0{,}5F_l$. Immediately release the force, and measure and record the total deflection d_2.

6.3 Slide resistance test under quasi-static force at 20° to longitudinal axis

6.3.1 Nominal value of force

The nominal value of the 20° force, F_{lq}, is given by the equation:

$$F_{lq} = 40m_x$$

where

$m_x = m_b$ if $m_b < m_n$

$m_x = m_n$ if $m_b > m_n$

6.3.2 Test procedure

Mount the roof bars on the roof of the vehicle.

Tighten the clamps to the required torque or force and record the value.

Install the test box, weighted to the m_x value, and clamp it as indicated in 6.1.6.

Check and, if necessary, readjust the clamps to the specified torque or force value.

Install the measuring equipment as shown in figure 5.

Progressively and continuously apply the 20° force F_{lq} as shown in figure 7 up to the required nominal value, checking the instant deflection d_3 at $0{,}5F_{lq}$. Immediately release the force, and measure and record the total deflection d_4.

6.4 Resistance to lift test

6.4.1 Test force

The force F_a shall be applied to the connecting devices between roof bars and vehicle roof, up to the maximum value determined by the following equation:

$$F_a = 2\,500 + \frac{m_x}{2} \times g$$

where g is the acceleration due to gravity $\left(g = 9{,}81\ \text{m/s}^2\right)$.

6.4.2 Test procedure

Mount the roof bars on the roof of the vehicle.

Tighten the clamps to the required torque or force and record the value.

Install the test box, weighted to the m_x value, and clamp it as indicated in 6.1.6.

Check and, if necessary, readjust the clamps to the specified torque or force value.

Progressively and continuously apply a vertical lifting force F_a across the test box as shown in figure 8, up to the nominal value.

Maintain this force for 10 min.

Release the force.

If front and rear connecting devices are different, apply a vertical lifting force at the rear of the test box equal to $0{,}5F_a$, with the same test method, as shown in figure 8.

6.5 Resistance to corrosion test

Expose the roof bars to the neutral salt spray test (NSS) with 5 % of sodium chloride for 192 h. Expose the functional parts to this salt spray for 400 h. These tests shall be performed in accordance with ISO 9227.

7 Instructions for use and fitting

7.1 Fitting instructions

The roof bar manufacturer shall give the following information in the assembly instructions:

a) detailed fitting instructions with figures or illustrations;

b) the value of the torque or force where it is necessary to apply a specified torque or force to a fastening device in order to fix the roof bars to a vehicle;

c) a recommendation to have approximate spacing between bars of 700 mm or that specified by the vehicle manufacturer;

d) mounting points on the type(s) of vehicle(s) for which the roof bars are intended and a warning that roof bars must not be used on vehicles other than those specified by the manufacturer.

7.2 Instructions for use

The roof bar manufacturer shall provide instructions for use containing the following minimum information:

a) Value of actual maximum load on the roof bars for the vehicle(s) for which it is made and, a warning regarding relevant regulations (an example is given in annex C).

b) the following information:

1) The load shall be as evenly distributed as possible over the area of the carrier system, and the centre of gravity of the load kept as low as possible. Narrow and heavy loads (for example, metal tubes) are to be carried near the feet of the carrier system. Loads which overhang the ends of the carrier system shall conform to any relevant laws or by-laws in force, and shall be adequately secured.

2) Loads shall be adequately secured using suitable straps or similar tightening devices. After loading, recheck the security of the load and roof bars regularly throughout the journey. Elastic straps with securing hooks shall not be used.

3) Where surfboards are carried (or similar items which may produce lifting forces), they shall not be carried side-by-side, but stacked one upon the other. All surfboards and similar items shall be secured independently to the front and rear of the vehicle using straps or other methods which are capable of withstanding the lifting forces.

4) Where specialized accessories are available to carry or secure loads, for example cycle carriers, it is recommended that they are used.

5) The handling characteristics of a vehicle will change when a carrier system is fitted and especially when it is loaded (in particular, crosswind sensitivity, handling on bends, and braking). Driving techniques should be altered to allow for these changes, reducing speed, especially on bends, and allowing for longer braking distances.

6) To reduce fuel consumption, it is recommended that the roof bars be removed after use.

c) a warning explaining:

1) the importance of correctly following the instructions for fitting and use;

2) the need for the fixing devices to be tightened correctly and checked regularly during the journey;

3) that loads are carried within the limitations of 7.2 a) and 7.2 b) 1);

4) that loads are secured correctly and safely;

5) that equipment must be maintained in good working order.

8 Marking

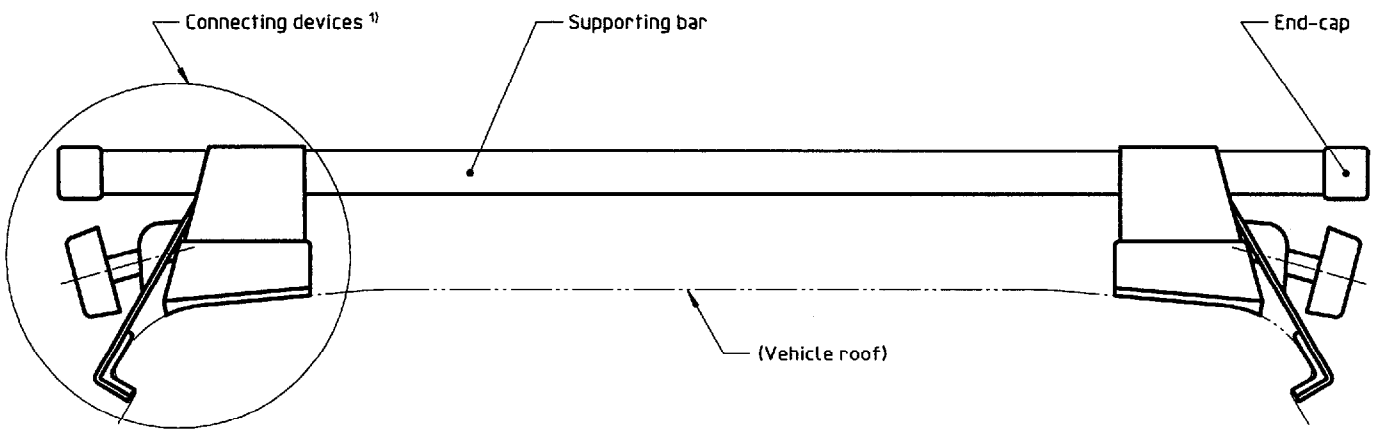
Roof bars shall have the following marking:

a) name or trademark of the manufacturer, importer or distributor;

b) type of bar;

c) maximum roof bar load defined in accordance with this part of ISO 11154;

d) a reference to ensure traceability.



1) See figure 2.

Figure 1 — Components of roof bar

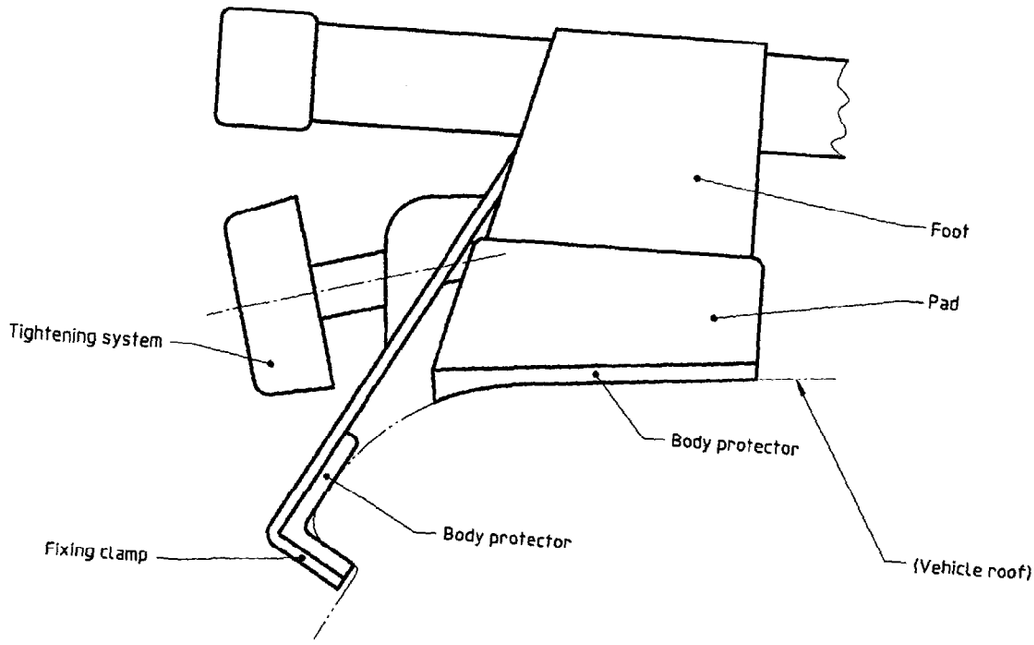
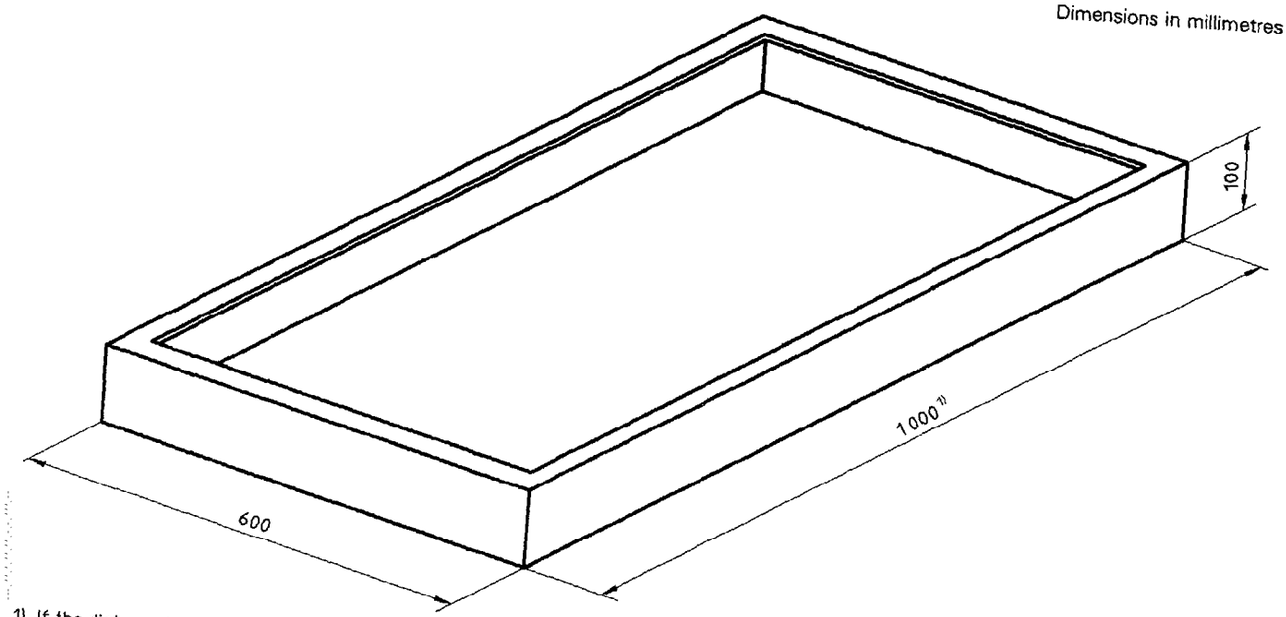


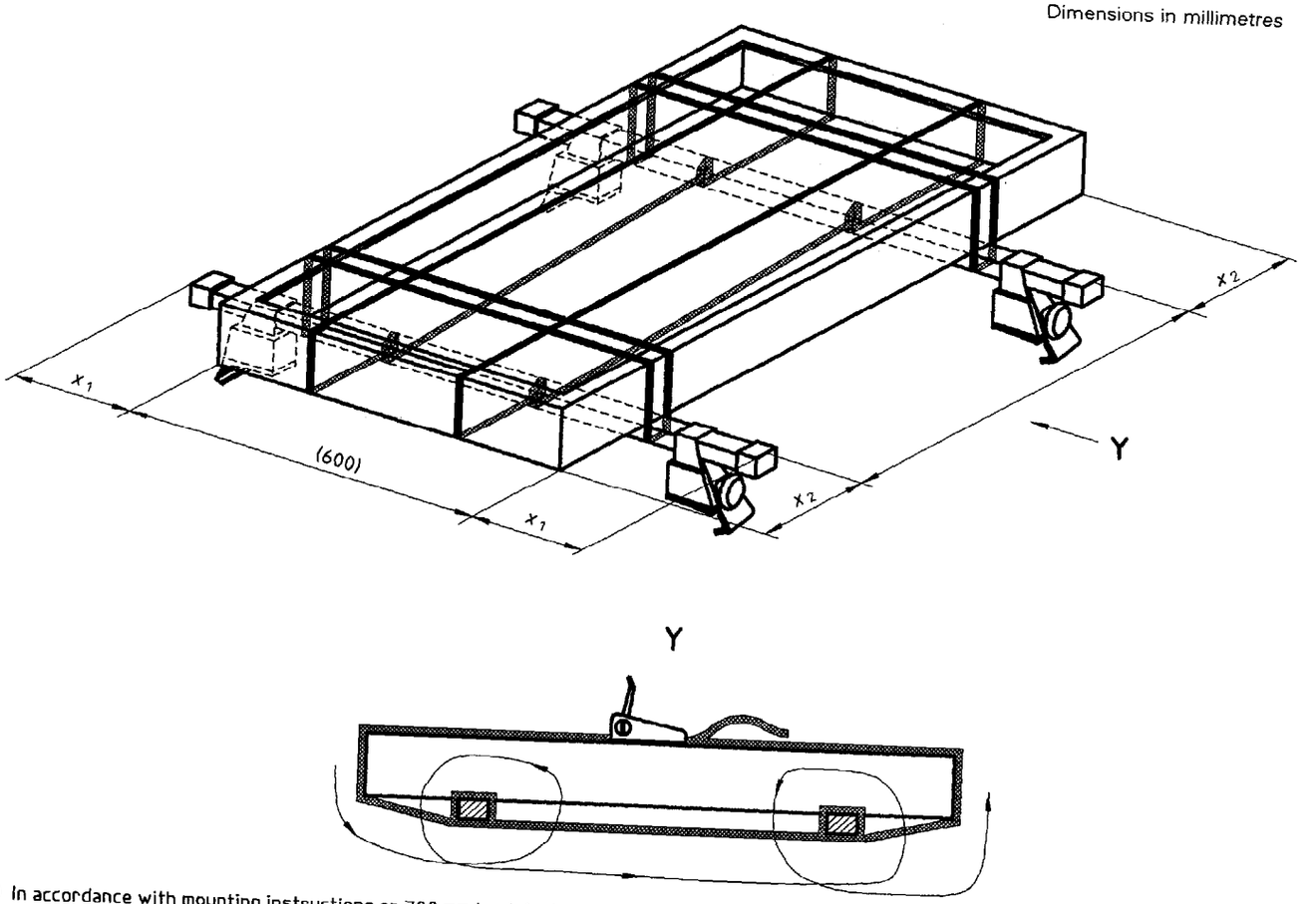
Figure 2 — Components of connecting devices



1) If the distance between outside roof bars is more than 900 mm, the test box length shall be equal to this distance plus 100 mm.

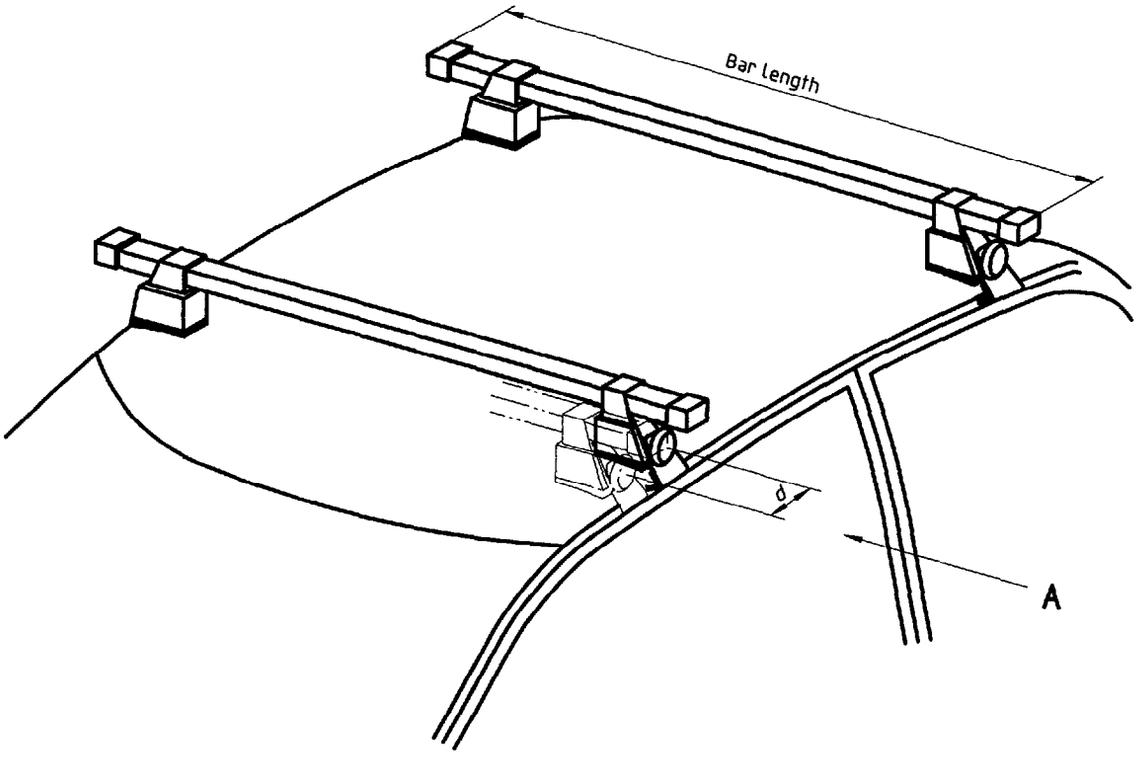
Figure 3 — Test box

Dimensions in millimetres



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

Figure 4 — Test box location and strapping



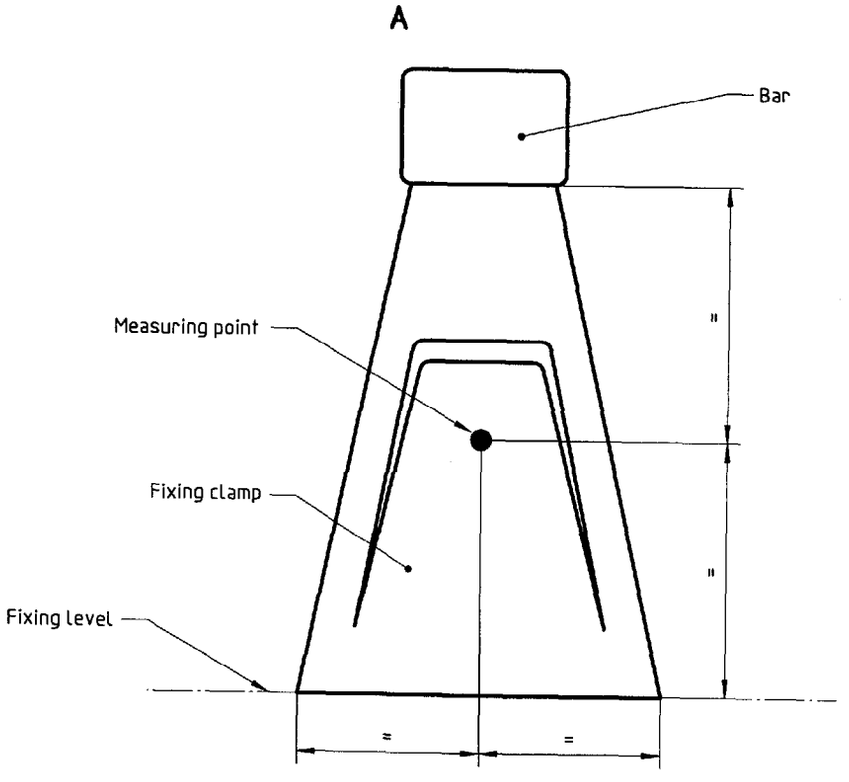
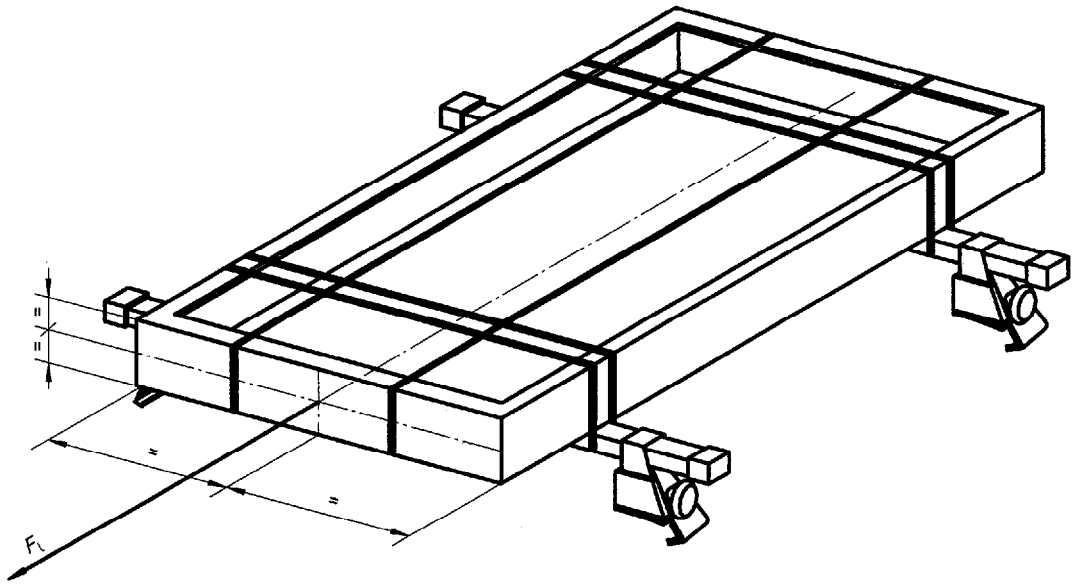


Figure 5 — Deflection measuring point



NOTE — The force is applied in the direction of vehicle movement, at the centre of the test box front face.

Figure 6 — F_l application point

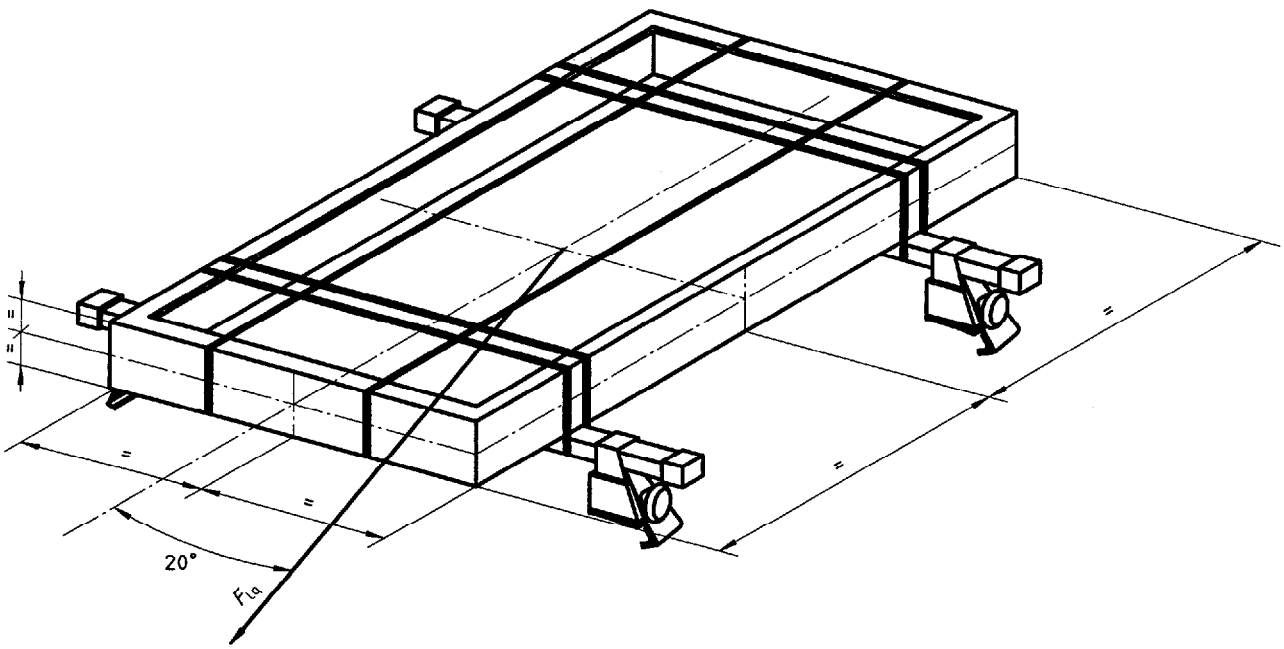


Figure 7 — F_{lq} application point

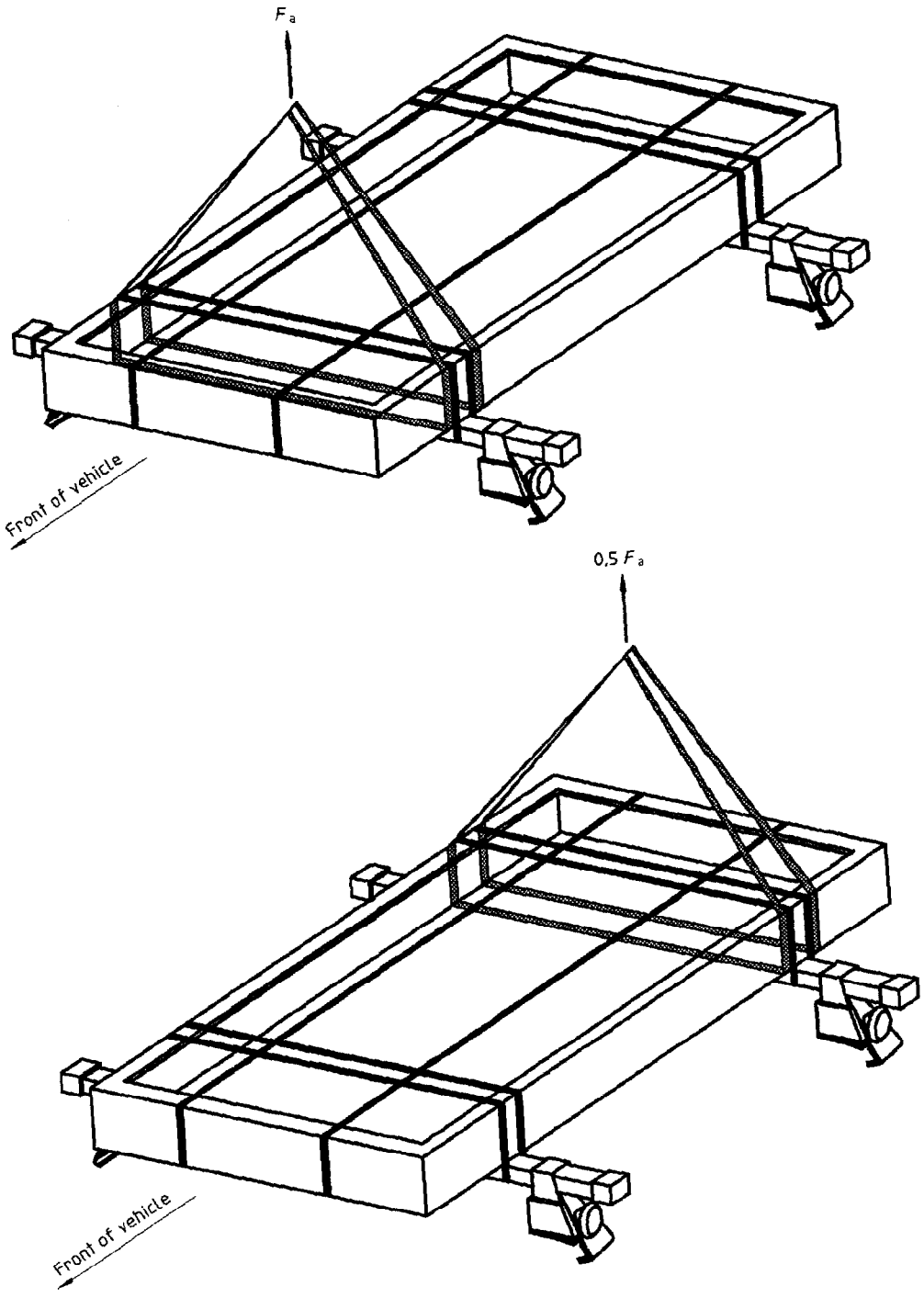
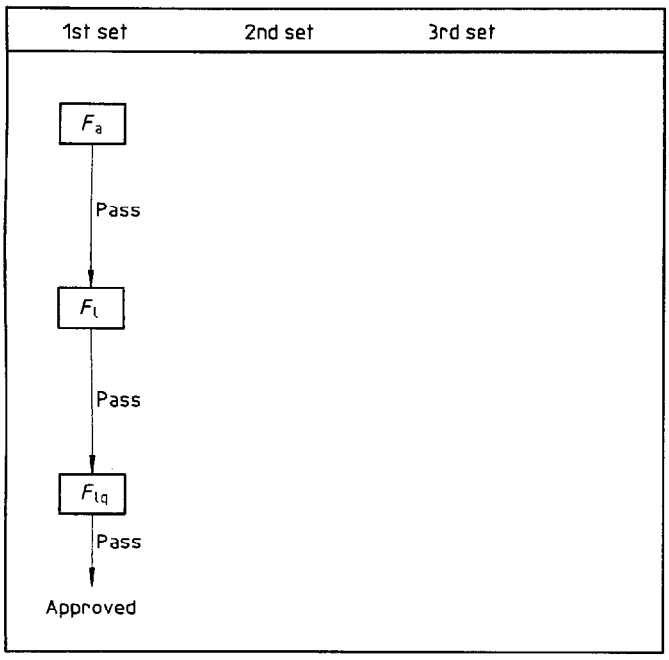


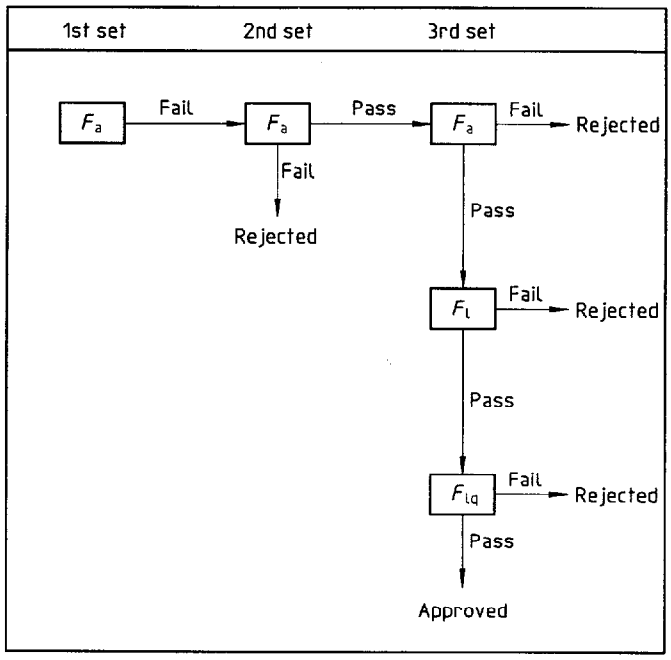
Figure 8 — F_a and $0,5F_a$ application points

Annex A
(normative)

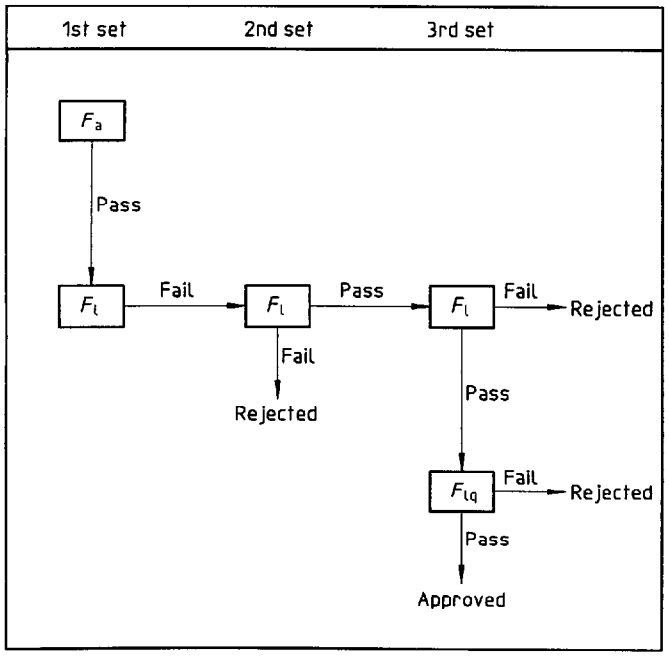
Approval/rejection procedure



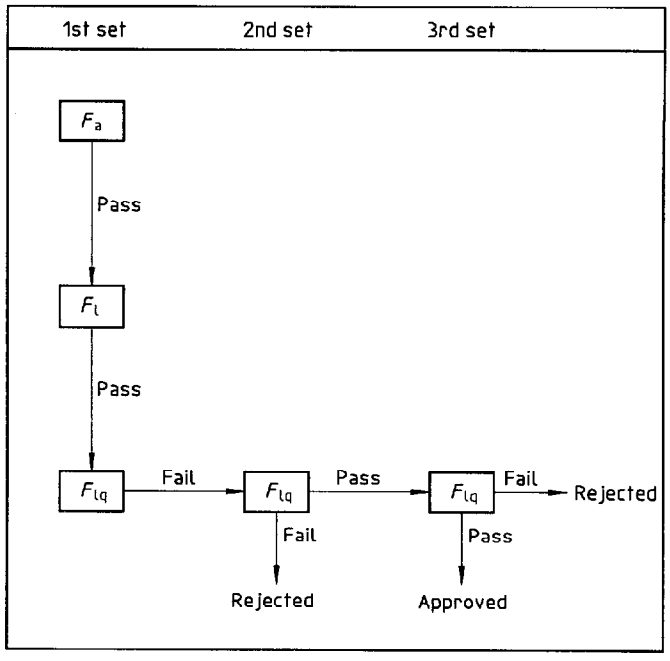
Case 1



Case 2



Case 3



Case 4

Annex B
(normative)

Tightening torques for fixing roof bars

Type of fixing	Torque N·m
Hand nut/screw diameter less than 35 mm	2
Hand nut/screw diameter 35 mm to less than 45 mm	3
Hand nut/screw diameter 45 mm to less than 55 mm	4
Hand nut/screw diameter 55 mm to less than 65 mm	5
Slotted head screw M6	3
Slotted head screw M8	4
CHC, VH, TORX[1)] M6 screw	5
CHC, VH, TORX[1)] M8 screw	6
Hexagon nut M6	5
Hexagon nut M8	6
Butterfly nut M6	2
Buttefly nut M8	3

1) TORX is a trade-name. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

Annex C
(informative)

Determination of allowable additional mass

The maximum load to be carried on roof bars shall be limited such that

— the maximum allowable mass on the vehicle roof,

— the maximum allowable mass on the set of roof bars, and

— the maximum total mass of the vehicle,

are not exceeded.

Calculation examples are given below.

Values in kilograms

Ref.	Items to be considered	Example No. 1	Example No. 2	Example No. 3
a	Maximum allowable mass on the vehicle roof defined by the vehicle manufacturer	60	75	100
b	Payload (as defined by vehicle manufacturer)	350	500	650
c	Maximum load which carrier system can accept	75	50	100
d	Assumed interior load (75 kg /passenger + luggage)	300	380	450
e	Mass of carrier system	10	5	20
f	Maximum allowable load on towing hook	0	50	75
g	Maximum allowable load on roof carrier system — the lowest of the following calculated values:			
	a − e	50	70	80
	c	75	50	100
	b − (d + e + f)	40	65	105
	that is	**40**	**50**	**80**

ICS 43.040.60

Descriptors: road vehicles, vehicle roofs, roof load carriers, bars (materials), specifications, safety requirements, tests, instructions for use, marking.

Price based on 14 pages