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Motor vehicles and trailers - lateral and rear underrun protection requirements

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Foreword

All content of this Standard is mandatory.

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB 11567.1-2001 *Motor vehicles and trailers - Lateral protection requirements* and GB 11567.2-2001 *Motor vehicles and trailers - Rear underrun protection requirements*.

Compared with GB 11567.1-2001 and GB 11567.2-2001. In addition to the editorial modifications, the main technical differences are as follows:

- modified the standard name to "Motor vehicles and trailers - lateral and rear underrun protection requirements";
- modified the definitions for "unprotected road users", "lateral protection device" and "rear underrun protection device" (see 3.1, 3.2, 3.3 of this Edition, 2.1, 2.2 of Edition 2001);
- added the technical requirements for lateral protection device that has different mounting position (see 4.6 and 6.13 of this Edition);
- added the requirements for lateral protection device of center-axis trailer (see 5.2.1 and 6.4.1 of this Edition);
- added the requirements for lateral protection device of dual-steering axle vehicle (see 5.4 and 6.6 of this Edition);
- deleted the requirements for lateral protection device of retractable trailer;
- modified the requirements for sectional height of transverse component (see 7.1 and 9.4 of this Edition, 3.1 and 5.4 of Edition 2001);
- added the requirements for maximum horizontal deformation of rear underrun protection device of tank vehicle for road transport liquid dangerous goods (see 7.3 and 9.6 of this Edition);
- added the technical requirements for vehicle with rear mounting bracket (see 7.4 and 9.8 of this Edition);
- modified the height of rear underrun protection device from lower edge to ground not greater than 500 mm (see 8.1 and 9.1 of this Edition, 4.1.2 and 5.1.2 of Edition 2001);
- added the mounting position requirements for rear underrun protection device of tank vehicle for road transport liquid dangerous goods (see 8.3

Motor vehicles and trailers - lateral and rear underrun protection requirements

1 Scope

This Standard specifies the technical requirements for lateral and rear underrun protection devices of motor vehicles and trailers as well as the technical requirements for vehicles.

This Standard is applicable to N_2, N_3, O_3 and O_4 vehicles.

This Standard is not applicable to semi-trailer tractor or the vehicles that are designed and manufactured particularly, lateral and rear underrun protection devices cannot be mounted due to objected reasons. The requirements for rear underrun protection are not applicable to special purpose vehicles specially designed and manufactured to handle long staples that cannot be segmented (such as vehicle for timber transport).

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.

GB/T 3730.2, *Road vehicle - Masses - Vocabulary and codes*

GB/T 15089, *Classification of power-driven vehicles and trailers*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 3730.2 and GB/T 15089 as well as the followings apply.

3.1 unprotected road users

pedestrians, cyclists or motorcyclists who may fall into the side of a vehicle while using the road and are involved in the wheel

3.2 lateral protection device

face of the vertical component are at least 100 mm rearward, 100 mm inwardly curved, or a minimum radius of 100 mm, at least a quarter arc.

5.2.3 For N_2 and N_3 vehicles, if the 300 mm dimension described in 5.2.1a) falls in the area of the cab, the clearance between the front edge and the cab enclosure shall not exceed 100 mm. If necessary, it shall be bent inwards to an angle no greater than 45°. At this point, the requirements of 5.2.2 do not apply.

5.2.4 For N_2 and N_3 vehicles, if the 300mm dimension described in 5.2.1a) falls behind the cab and the clearance between the front edge and the cab wall is not greater than 100 mm, the requirements of 5.2.3 may be met.

5.3 The trailing edge of the lateral protection device shall be within 300 mm of the tire closest to its tangent plane. This section is a vertical plane perpendicular to the longitudinal plane of the vehicle. The trailing edge may not require the installation of a continuous vertical component.

5.4 The provisions of 5.2 and 5.3 are independent, which cannot be combined. However, for vehicles with double steering shafts, if the wheelbase of the dual steering shaft is not more than 2100 mm, the lateral protection device shall not be required between the two shafts.

5.5 The length of the front and rear flaps of the lateral protection device shall not exceed the distance between the center of the circular pan head and the intersection of the connectors (as shown in Figure 2). When there are several such distances, the maximum of them shall not be exceeded.

5.6 In the no-load state of the vehicle, the ground clearance at any point on the lower edge of the lateral protection device shall not be more than 550 mm.

5.7 The upper edge of the lateral protection device shall be no larger than 350 mm from the vehicle component on the upper side. This component means a part that is delivered or in contact with a vertical plane cut at the outer side of the tire (excluding the part of the tire that is in contact with the ground), except the followings:

a) when the plane indicated in 5.7 does not intersect with the vehicle component, the upper edge of the device shall be at least 950 mm (whichever is less) from the plane of the cargo platform or at a distance of less than 2 mm from the ground;

b) when the vehicle components intersecting with the plane indicated in 5.7 are more than 1300 mm above the ground, the ground clearance at the upper edge of the device shall not be less than 950 mm;

c) for vehicles specifically designed and manufactured for container transport or detachable carriage structure, the upper edge of the lateral protection

b) for vehicles designed with a retractable support for additional stability during loading, unloading or other operations, the lateral protection device is allowed to leave a space for the support device to extend;

c) for vehicles equipped with cable glands and winches, the lateral protection device shall allow the clearance for the cables to pass and be tightened;

d) for vehicles fitted with cranes for loading, unloading or other operations, the lateral protection device that complies with the requirements of Clause 6 shall be fitted to the extent possible; if in practical work, the operation or loading of the crane makes it impossible to install the lateral protection device, then the requirements of Clause 6 may not be required.

6 Technical requirements for vehicle with lateral protection device

6.1 The vehicle with lateral protection device shall be measured according to the test conditions specified in A.2. The lateral protection device shall not increase the total width of vehicle. The outer surface of the main part of the vehicle is located in the outermost edge (maximum width) within the position of not more than 150 mm. At least 250 mm of the last section of the lateral protection device shall not be located on the outermost side of the rear tire (excluding the portion of the tire that contacts the floor surface) greater than 30 mm inward. For N_2 and N_3 vehicles, the front edge of the lateral protection device allows inward flexion according to 6.4.3 and 6.4.4.

6.2 The outer surface of lateral protection device shall be smooth and as continuous as possible before and after. Adjacent parts are allowed to overlap. But lapped exposed edges shall be backward or downward. Adjacent parts shall be left in the longitudinal direction of no more than 25mm gap, but the rear cannot go beyond the front outside. The round head of the bolt and rivet allows a convex outer surface not to exceed 10 mm. Other parts are only allowed smooth and to have similar round head structure. And it can also have a convex outer surface not more than 10 mm. Exposed edges and corners exposed by a sphere of 100 mm diameter shall be rounded off. The fillet radius shall not be less than 2.5 mm. Components that protrude less than 5 mm shall be passivated towards the outer surface edge.

6.3 The lateral protection device may be a continuous plane or consist of one or more crossbars or be a combination of plane and crossbar. When using the crossbar structure, the crossbar spacing shall not exceed 300 mm, and the section height OF:

a) N_2 and O_3 vehicles shall not be less than 50 mm;

to the longitudinal plane of the vehicle. The trailing edge may not require the installation of a continuous vertical component.

6.6 The provisions of 6.4 and 6.5 are independent, which cannot be combined. However, for vehicles with double steering shafts, if the wheelbase of the dual steering shaft is not more than 2100 mm, the lateral protection device shall not be required between the two shafts.

6.7 The length of the front and rear flaps of the lateral protection device shall not exceed the distance between the center of the circular pan head and the intersection of the connectors (as shown in Figure 2) when performing 6.10 test. When there are several such distances, the maximum of them shall not be exceeded.

6.8 In the no-load state of the vehicle, the ground clearance at any point on the lower edge of the lateral protection device shall not be more than 550 mm.

6.9 The upper edge of the lateral protection device shall be no larger than 350 mm from the vehicle component on the upper side. This component means a part that is delivered or in contact with a vertical plane cut at the outer side of the tire (excluding the part of the tire that is in contact with the ground), except the followings:

a) when the plane indicated in 6.9 does not intersect with the vehicle component, the upper edge of the device shall be at least 950 mm (whichever is less) from the plane of the cargo platform or at a distance of less than 2 mm from the ground;

b) when the vehicle components intersecting with the plane indicated in 6.9 are more than 1,300 mm above the ground, the ground clearance at the upper edge of the device shall not be less than 950 mm;

c) for vehicles specifically designed and manufactured for container transport or detachable carriage structure, the upper edge of the lateral protection device shall be determined according to 6.9a) and 6.9b); the container and the detachable carriage shall be considered as vehicle components;

d) on vehicles equipped with cranes for loading, unloading or other operations, with a permanently installed cab or operating platform for crane control, the upper edge of the lateral protection device may be determined according to 6.9a) and 6.9b); the cab or platform is considered a cargo platform.

6.10 The lateral protection device shall have a certain rigidity, fixed firmly (the loosing is not because of vibration). Except the parts described in 4.5, it shall be made of metal or other appropriate material. When a static pressure of 1 kN is applied to a circular pressure head of 220mm ± 10mm in diameter

design total mass of the predicted mounting vehicle indicated by rear underrun protection device tested according to Clause 7, excluding the vehicle of which the maximum design total mass of indicated predicated mounting vehicle is not less than 2×10^4 kg.

NOTE: Clause 8 applies only to vehicles fitted with rear underrun protection device that complies with the provisions of Clause 7.

9 Technical requirements for vehicle with rear underrun protection

9.1 in the no-load condition of the vehicle, the lower edge of the rear underrun protection device of the vehicle over its full width is not more than 500 mm.

9.2 The rear underrun protection device shall be located as close as possible to the rear of the vehicle. The rear underrun protection device tank vehicle for road transport liquid dangerous goods shall be mounted at the rear end of the vehicle.

9.3 The width of the rear underrun protection device shall not be greater than the distance between the outermost points of the wheels on both sides of the rear axle of the vehicle (excluding the deformation of the tire). And the horizontal distance between the outermost edge of either end of the rear underrun protection device and the outermost end of the rear axle wheel of the side vehicle is not more than 100 mm. If the vehicle has more than two rear axles, the widest rear axle shall prevail. When the device belongs to the body or the body is also part of the device, if the body beyond the width of the rear axle, the rear underrun protection is allowed to be beyond the rear axle width.

9.4 Both ends of transverse component of rear underrun protection device shall not bend toward the rear of the vehicle. The lateral end of transverse component shall be rounded with a fillet radius not less than 2.5 mm. The section height of transverse component, for N_2, O_3 vehicles, shall not be less than 100 mm; for N_3, O_4 vehicles, it shall be not less than 120 mm.

9.5 The rear underrun protection device may be designed with different mounting positions at the rear of the vehicle. At this moment, there shall be a reliable way to ensure that it shall not be freely moved in the mounting position after it is mounted. When adjusting its mounting position, it needs to exert a force not greater than 400 N.

9.6 The rear underrun protection device at operation position shall be connected with vehicle frame or other similar components. The rear underrun protection device shall have adequate barrier to rear-end collisions in a direction parallel to the longitudinal axis of the vehicle to prevent a collision.

Annex B

(normative)

Static loading test conditions and procedures for rear underrun protection device

B.1 Test conditions for rear underrun protection device

B.1.1 One of the following methods can be selected for the test:

a) perform on the vehicle that is predicted to mount with rear underrun protection device;

b) perform on the chassis part of the vehicle that is predicted to mount with rear underrun protection device, of which this chassis part shall represent this vehicle type;

c) perform on a rigid test bench.

B.1.2 When performing the tests according to B.1.1b) and B.1.1c), the connector used to connect rear underrun protection device and vehicle chassis part or rigid test bench shall be same with the connector that is actually used to mount rear underrun protection device on vehicle.

B.2 Vehicle test conditions

B.2.1 Vehicle shall be in no-load condition, placed in a horizontal, flat, rigid and smooth plane.

B.2.2 The front wheel shall be in a straight line driving position.

B.2.3 Tires shall be inflated to the pressure recommended by the vehicle manufacturer.

B.2.4 In order to reach the test loads specified in B.3.2, the vehicle shall be fixed in the manner specified by the vehicle manufacturer.

B.2.5 Vehicle equipped with gas-liquid suspension, hydraulic or air suspension, or with automatic load balancing devices shall be in the no-load condition of normal operation specified by the vehicle manufacturer.

B.3 Test procedures

B.3.1 Loading point position

B.3.1.1 General

Annex C

(normative)

Mobile barrier rear collision test conditions and procedures

C.1 General

The test uses a mobile barrier to impact the rear underrun protection device on the vehicle and trailer. Examine the rear underrun protection device's:

a) blocking function -- prevent rear-end collision into the vehicle and the lower part of trailer;

b) buffer energy absorption function -- ease the impact, reduce the damage to occupants in the collision vehicle and improve the collision compatibility.

C.2 Mobile barrier

The mobile barrier mass is 1100kg ± 25kg. The front impact surface is rigid, 1700 mm wide, 400 mm high, and 240 mm from the ground clearance. Cover the front of the impact surface with a layer of 20mm thick plywood.

C.3 Test conditions and test preparation

C.3.1 Test site

The test site shall be large enough to accommodate runways, fixed barriers and the technical equipment required for the test. In front of fixed barrier, there shall be at least 5 m runway that is level, flat and smooth.

C.3.2 Fixed barrier

The fixed barrier is made of reinforced concrete, the front width of not less than 3m, the height of not less than 1.5m. The barrier thickness shall ensure that the mass is not less than 7×10^4 kg. The front surface of the barrier shall be vertical. The normal line forms a 0° angle with the vehicle direction of driving. The front surface of the barrier shall have a suitable structure for mounting the test piece.

C.3.3 test piece preparation

C.3.3.1 Remove a section of the rear section of the truck from the frame of the truck for mounting the rear underrun protection device to be tested.

C.3.3.2 Use the same mounting method as the actual mounting to fix the protection device on the rail structure of the truck.

Annex D

(normative)

Test technique: instruments

D.1 Definitions

D.1.1 data channel

the data path consists of all devices from the sensors (or composite sensors that combine the signals in a particular way) to data analysis instruments that analyze the frequency and amplitude components of the data

D.1.2 transducer

the first part of the data channel, used to convert the measured physical quantity into other quantities (such as voltage), so as to connect the post-processing equipment

D.1.3 channel amplitude class; CAC

representation of data channel conforming to certain amplitude characteristics as specified in this appendix; the CAC value is numerically equal to the upper limit of the measurement range

D.1.4 characteristic frequencies

definitions of F_H, F_L, F_N are as shown in Figure D.1

D.1.5 channels frequency class; CFC

by a value that indicates that the frequency response of the channel is within the limits specified in Figure D.1; the CFC value is numerically equal to the F_H (Hz) value

D.1.6 sensitivity coefficient

in the channel frequency level, use the least square method to fit the calibration value, the slope of the resulting line obtained shall be the sensitivity coefficient

D.1.7 calibration factor of a data channel

on logarithmic scale, between F_L and $F_H/2.5$, it is expressed as the average of the sensitivity coefficients at equally spaced frequency points

D.1.8 linearity error

of the frequency level, shall not exceed 1 ms, excluding the hysteresis due to phase drift.

Two or more data channels where the signals are mixed together shall have the same frequency level and the relative time delay shall not exceed $1/(10F_H)$ s.

This requirement applies to analog signals as well as sync pulses and digital signals.

D.2.5 Transverse sensitivity of sensor

The transverse sensor sensitivity in any direction shall not exceed 5%.

D.2.6 Calibration

D.2.6.1 General

Data channels are calibrated with reference equipment that can be traced to known standards at least once a year. The method of comparison with the baseline equipment shall not result in an error of more than 1% of CAC. The use of reference equipment shall be limited to the calibrated frequency range. The subsystem of data acquisition system can be individually calibrated, and then converted into the total system accuracy. For example, the system can be calibrated by using the sensor output with a known amplitude electrical signal without the need for a sensor.

D.2.6.2 Accuracy of reference equipment used for calibration

D.2.6.2.1 Static calibration

####### D.2.6.2.1.1 Acceleration

The error shall not exceed ±1.5% of the channel amplitude level.

####### D.2.6.2.1.2 Force

The error shall not exceed ±1% of the channel amplitude level.

####### D.2.6.2.1.3 Displacement

The error shall not exceed ±1% of the channel amplitude level.

D.2.6.2.2 Dynamic calibration -- acceleration

The error of the reference acceleration is expressed as a percentage of the channel amplitude level, requiring:

- not exceeding ±1.5% when it is less than 400 Hz;

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