International Standard

ISO 2958

Road vehicles — Exterior protection for passenger cars

Véhicules routiers — Protection extérieure des voitures particulières

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

This second edition cancels and replaces the first edition (ISO 2958:1973), which has been technically revised.

The main changes are as follows:

— added the definition of protective devices;

— modified the definition of the vehicle corner and added Figure 2;

— added requirements for front and rear protective devices and their covered structures;

— added requirements for cameras and sensors installed on the front and rear protective device.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document was developed to define a general test for exterior protection for passenger cars. This document mainly revises ISO 2958:1973. With the advancement of technology, emerging components such as sensors, radars and cameras have been equipped with front- and rear-end protection devices for automobiles, which have caused significant changes in the car body structure and have put forward higher technical requirements for the front- and rear-end protection devices. At present, the concept and structure of the bumper device is significantly different to 1973. Therefore, this document extends the definition of the bumper and related technical requirements.

Road vehicles — Exterior protection for passenger cars

1 Scope

This document specifies the requirements and test methods for exterior protection for passenger cars. This document applies to passenger cars.

The aim is to provide protection at the front and rear of the vehicle, of certain mechanical elements and, above all, for lighting, signals, charging ports and sensors (arranged at the front and rear of the vehicle and including but not limited to those used for automatic driving system, e.g. LiDAR, radar, camera) in cases of collision at low speed.

Exterior protection is assured by protective devices, which are elements located at the front and rear ends of vehicles and designed in such a way as to allow contacts and small shocks to occur without causing any serious damage.

2 Normative references

The following documents are referred in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1176 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
protective device
element located at the front or rear end of vehicles and designed to allow collision at low speed where the vehicle is not heavily damaged

EXAMPLE Bumper cover and its fixings, foam parts, beams and connections, tail end plate, longitudinal beams and energy-absorbing components as well as other components installed on the bumper cover.

3.2
unladen weight
weight of the vehicle in running order, unoccupied and unladen but complete with fuel, coolant, lubricant, tools and a spare wheel (if provided as standard equipment by the vehicle manufacturer)

3.3
laden test weight
vehicle *unladen weight* (3.2) plus the weight of the occupants specified in Table 1 (each occupant is calculated at 75 kg)

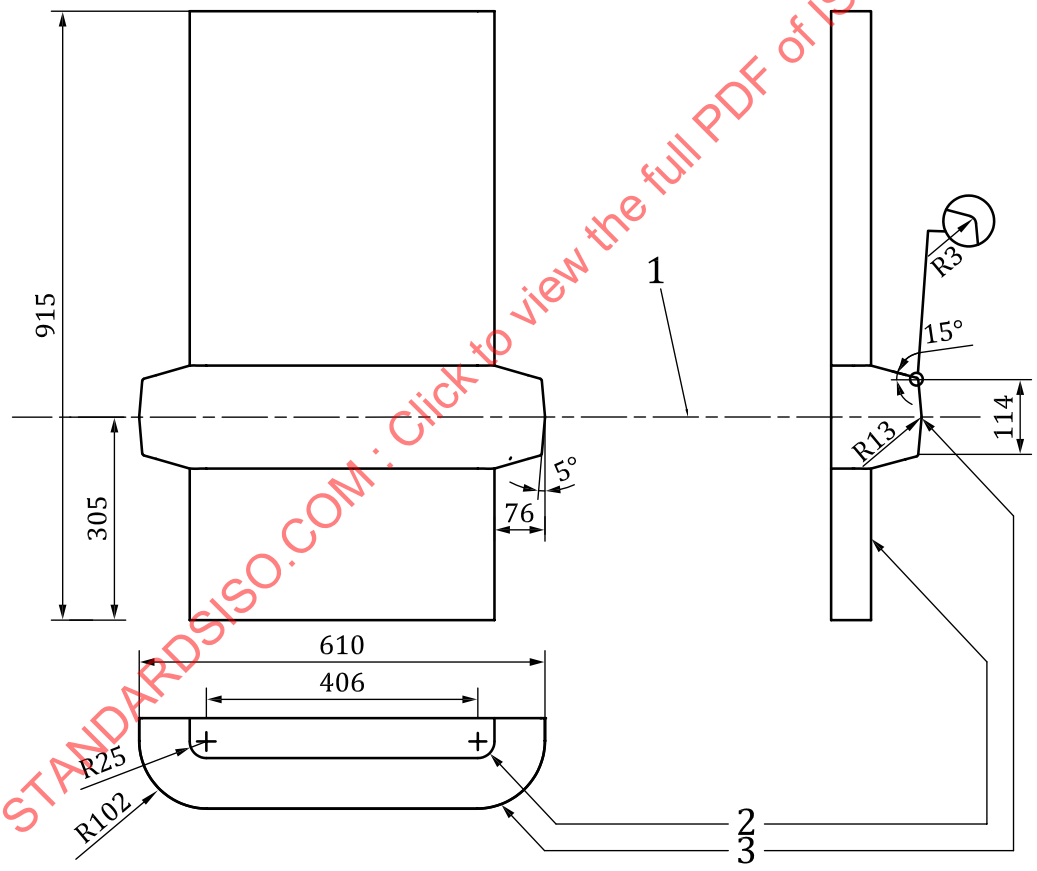
Table 1 — Allocation of occupant

Seat number	Occupant number	Mode of allocation
2 and 3	2	2 seated in front row outside
4 and 5	3	2 seated in front row outside 1 seated in rear row outside
6 and 7	4	2 seated in front row outside 2 seated in 2nd row outside
8 and 9	5	2 seated in front row outside 2 seated in 2nd row outside 1 seated in rearmost row outside

3.4
reference line
intersection line between the horizontal symmetrical plane of the impactor head and the profile of the impactor head itself when plane A of the impactor is perpendicular to the floor

Note 1 to entry: See Figure 1.

Units in millimetres



Key
1 reference line
2 plane A
3 impact profile

Figure 1 — Impactor

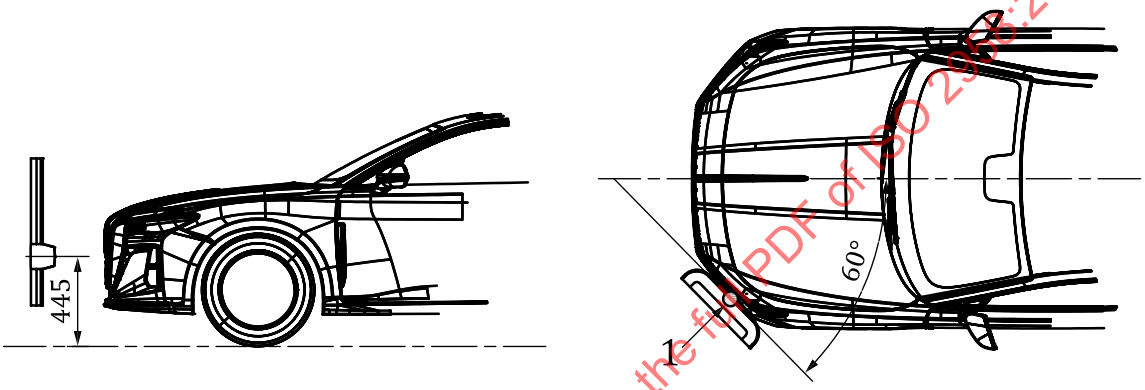
3.5
reference height
vertical distance between the horizontal plane passing through the impactor *reference line* (3.4) and the horizontal ground

3.6
corner of bumper
vehicle contact point where the impactor is at a *reference height* (3.5) of 445 mm, the profile of the impactor is at an angle of 60° to the vertical plane of the vehicle's longitudinal centre when the vehicle suspension is in the design state specified by the manufacturer

Note 1 to entry: If there are multiple contact points, the point with the farthest distance from the vertical plane of the vehicle's longitudinal centre is taken as the contact point.

Note 2 to entry: See Figure 2.

Units in millimetres



Key
1 contact point

Figure 2 — Corner of bumper

4 Test condition

4.1 Test site

The test site shall be large enough for the setup of the impactor's driving system, skidding of the vehicle after being impacted and the mounting of test equipment. The ground to place the test vehicle shall be level, firm, smooth and horizontal.

4.2 Vehicle status

4.2.1 The vehicle shall stand still.

4.2.2 The front wheels shall be in the straight-facing position.

4.2.3 The tires shall be inflated to the pressure specified by the manufacturer.

4.2.4 The brakes shall be released with the gearbox in the neutral position.

4.2.5 As for the vehicles fitted with oil-pneumatic suspension, hydraulic or air suspension, or automatic levelling suspension (intended for automatically levelling the vehicle according to actual loading status), the

test shall be carried out while the suspension is adjusted to the normal driving conditions as specified by the manufacturer.

4.3 Impactor

4.3.1 The impactor shall be firmly constructed, with the impactor head made of hardened steel.

4.3.2 The surface shape of impactor shall be as shown in Figure 1.

4.3.3 The equivalent weight of the impactor shall be equal to the unladen weight of the test vehicle.

4.3.4 Plane A of the impactor shall be kept vertical, while the reference line shall be kept horizontal.

4.3.5 The reference height is 445 mm.

4.3.6 The first point of contact between the impactor and the test vehicle shall be the point of contact between the profile of the impactor and the front and rear protective devices. When the vehicle is in the state of unladen weight and laden test weight respectively, the front and rear protective devices between the bumper corners should intersect the horizontal plane passing the reference line of the impactor.

4.4 Propulsion of the impactor

The impactor may either be secured to a carriage (moving barrier) or form part of a pendulum.

4.5 Special provisions applicable where a pendulum used

4.5.1 The distance between the rotating axis and impacting centre of the pendulum shall be no less than 3,3 m. The reference line of the impactor and the impacting centre of the pendulum shall be at the same height.

4.5.2 Plane A of the pendulum shall remain parallel with its axis of rotation throughout the test.

4.5.3 If the pendulum is hung with a parallelogram, the moving orbit of any point on the reference line shall be no less than 3,3 m.

4.6 Special provisions applicable where a moving barrier used

If the impactor is secured to a moving barrier by a restraining element, the moving barrier shall be rigid and be incapable of being deformed by the impact. At the moment of impact, the moving barrier shall be capable of moving freely and no longer be subject to the action of the propelling device.

5 Test method

5.1 Longitudinal-impact test

5.1.1 This test consists of two impacts on the front protective device and two impacts on the rear protective device of the vehicle. On each surface, one impact is conducted with the vehicle under unladen weight. The other is conducted with the vehicle under laden test weight.

5.1.2 For the impacts on the front and rear protective devices, the first is conducted without restriction on the impactor's position. As for the second impact, the central vertical plane of the impactor shall be no less than 300 mm from the position in the first impact. In addition, during the two impacts, the profile of the impactor shall not be out of the area defined by two planes parallel to the longitudinal symmetrical plane of the vehicle passing through the corner of the bumper.

5.1.3 The impactor shown in Figure 1 should keep plane A perpendicular to the ground, the reference line horizontal and the reference height 445 mm.

5.1.4 The vehicle should be aligned so that the vehicle touches the impactor without moving it, the longitudinal median plane of the vehicle being perpendicular to plane A of the impactor.

5.1.5 The vehicle should be impacted at a speed of $4_{0}^{+0,25}$ km/h, with a test accuracy of not less than 1 %.

5.2 Corner-impact test

5.2.1 This test consists of an impact at one front corner and an impact at one rear corner of the vehicle, which is at unladen kerb weight, and an impact at the other front corner and the other rear corner with the vehicle under laden test weight.

5.2.2 The impactor shown in Figure 1 should keep plane A perpendicular to the ground, the reference line horizontal and the reference height 445 mm.

5.2.3 The vehicle should be aligned so that the vehicle touches the impactor without moving it. In addition, the following conditions shall be met:

a) Plane A of the impactor shall make an angle of 60° ± 2° with the longitudinal median plane of the vehicle;

b) The first contact point during the impact shall be in the central vertical plane of the impactor (within a tolerance of ±25 mm).

5.2.4 The vehicle should be impacted at a speed of $2,5_{0}^{+0,1}$ km/h, with a test accuracy of not less than 1 %.

6 Conditions of repair and replacement

6.1 The repairs and replacements of front and rear protective device and their mounting attachments are permitted in between tests.

6.2 If automatic restoration materials are contained in the protective devices, the automatic restoration time shall be provided, as specified by the manufacturer, between two successive tests.

6.3 A vehicle of the same type may be replaced for each test.

6.4 Upon request by the manufacturer, it is permitted to use vehicles previously experiencing various tests as required by other standards (including any test potentially damaging vehicle construction) for the tests specified in this document.

6.5 If the collision velocity and weight, upon test, is higher than that specified in this document, and the vehicle, at the end of test, meets the specified requirements, the test results shall be regarded as satisfactory.

7 Requirements

7.1 The impact test shall be carried out in accordance with the test methods specified in Clause 5. The vehicle shall meet the requirements of 7.2 to 7.8.

7.2 The lighting, light signalling devices and retro-reflective devices shall work properly, except the registrations plate lights, decorative or redundant lights and reflectors. Bulbs may be replaced in the event of filament failure.