

ICS 83.160.10

CCS G41



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 30195-2023

**Test method for measuring impact resistance of passenger car
tyres - Pendulum striker method**

轿车轮胎耐撞击性能试验方法 摆锤法

Issued on: May 23, 2023

Implemented on: December 1, 2023

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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Foreword

This document was issued on 23 May 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 December 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 30195-2023 covers the pendulum method for measuring how a passenger car tyre stands up to being struck - the impact equipment and the accuracy it has to hold, the test conditions and the preparation of the sample, the procedure, the processing of the data, and the report. Preparation belongs to the method rather than to housekeeping: the tyre rests indoors after vulcanisation before it may be tested, it goes on a steel measuring rim matched to its size, and its pressure is reset after that rest. In the procedure the striker is set to a fixed camber and slip angle and released from a defined drop height onto the tyre, and the tyre is then examined for what the blow left behind. Annex B is normative and fixes the geometry of the striker together with the calculation of its radius of rotation about the axis through its centre of gravity, so that the energy arriving at the tread is the same in every laboratory; Annex C describes the bulge gauge that finds the separation a kerb strike leaves in a sidewall which still looks intact from outside. Written for tyre developers, vehicle

manufacturers who set impact targets for an approval, and test laboratories.

This document describes the test equipment and accuracy, test conditions and test preparation, test procedures, data processing, and test reports for testing tire impact resistance using the pendulum method.

This document is applicable to testing the impact resistance of pneumatic tires of new passenger car.

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 3487, Rims for passenger car

GB/T 6326, Tyre terms and definitions

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 6326 as well as the followings apply.

3.1 drop height

The height at which the center of gravity of the pendulum drops.

3.2 drop angle

When the striker is at drop height, the angle of the pendulum relative to when it is freely hanging.

3.3 striker mass center

When the pendulum is freely suspended, the intersection of the vertical line passing through the fulcrum of the pendulum and the horizontal line passing through the center of the front end of the striker.

The height to which a tire bulges after impact.

3.10 robustness factor; f

An evaluation index of tire impact resistance.

3.11 impact bulge energy; E_{bu}

The impact energy when a striker hits a tire causing a tire bulge or air leak.

4 Test equipment and accuracy

4.1 Impact test equipment (see Figure A.1 of Annex A) includes:

a) A pendulum: with a fulcrum at one end and a swing arm equipped with a striker at the other end, with a length of (1830.0 ± 18.3) mm and an impact mass of (62.0 ± 3.0) kg (see Figure A.2 and Figure A.3);

NOTE: The impact mass is the mass acting on the tire through the striker.

b) Frame: a solid component used to support the fulcrum of the pendulum;

c) A mechanism for lifting and releasing the pendulum;

d) Locking device: a clutch device that can lock the pendulum after a single impact to prevent a second impact;

e) Pivot with very small friction (self-aligning ball bearing);

f) Striker: a raised impactor fixed to the pendulum by bolts and used to impact the tire rim assembly (see Figure A.4; the technical requirements shall comply with the provisions of Annex B);

g) Striker bracket (see Figure A.5);

h) Striker assembly (see Figure A.6);

i) Base: a solid part used to secure the tire rim assembly fastening device;

j) Angle sensor: the error is not greater than $\pm 0.1^\circ$.

4.2 Inflatable pressure gauge: the accuracy is ± 5 kPa.

4.3 Bulge measuring instrument (see Annex C): the accuracy is ± 0.02 mm.

4.4 Image recording equipment: be able to use colorful, clear, and storable images to record bulges or air leaks that occur during the test.

5 Test conditions and test preparation

5.1 The tires used in the test shall be parked indoors for at least 24 h after vulcanization.

The test rim shall be a steel rim. The rim specification model shall be the measurement rim corresponding to the tire specification. Its contour curve shall comply with the provisions of GB/T 3487. Tires used on vehicles equipped with flexible rims shall be

tested using flexible rims consistent with the requirements of the vehicle. Explain this in the test report.

NOTE: Steel rim refers to a rim that is machined and used only for indoor testing.

5.2 The test air pressure is 200 kPa.

5.3 The test environment temperature is 5 degrees C~40 degrees C.

5.4 The test samples are 2 tires. Determine test points equally spaced at approximately 30° intervals in the circumferential direction on the sidewall of each test tire. Mark and number them one by one.

5.5 Mount the test tire on the test rim. Fill with the air pressure specified in 5.2. Park at test ambient temperature for at least 3 h.

5.6 The tire rim assembly shall be mounted on the fastening device of the testing machine. Tighten the rim. The torque shall be 115 Nm +/- 7 Nm. Make sure there is no rotation or looseness during impact.

6 Test procedures

6.1 A tire test procedure in the test sample

6.1.1 Readjust the tire pressure after parking to the pressure specified in 5.2.

6.1.2 Set the striker angle. The camber angle of the striker shall be fixed at 6°. The slip angle 0°. The deviation is +/-0.5°.

6.1.3 Install the tire rim assembly on the tire rim fastening device. Tighten according to the torque specified in 5.6. Make sure the rim does not rotate circumferentially. When installing, adjust the pendulum to a free hanging state. Keep the tire's center of rotation on the same level as the center of the top of the striker. Adjust tires and their tightening devices. Allow the tire shoulder to touch the middle of the striker. The resulting angular displacement of the pendulum shall not exceed 0.1°.

6.1.4 Adjust the impact energy to 380 J or other suitable empirical values. Let the pendulum fall freely from the locked position. After an impact is made on the test tire (any test point away from the valve), check whether the tire has one of the conditions specified in 6.1.9. If it does not occur, impact the same test point of the tire with an