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Evaluating the impact resistance of passenger car tyres

轿车轮胎耐撞击性能评价

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1 Scope

China's national standard for evaluating the impact resistance of passenger car tyres. It specifies the terms and definitions, the evaluation requirements and the test methods. Impact resistance is what determines whether a tyre survives a pothole, and it has become more consequential as wheels have grown larger and tyre sidewalls shorter. A low profile tyre on a large rim has very little air between the road and the rim flange, so a sharp-edged pothole struck at speed pinches the sidewall between the two and cuts it from the inside - the classic pinch shock failure, which may burst immediately or leave a bulge that fails days later. The test reproduces that: a plunger or a cleat is driven into the loaded, inflated tyre and the energy required to break it is measured. It matters for vehicle manufacturers choosing original equipment tyres, and for consumers in a country with a great deal of new road and a great deal of old road.

This Standard specifies the evaluation requirements, test methods, judgment rules and test reports of the impact resistance performance of pendulum method car tires. This Standard is applicable to the new 30 series to 65 series pneumatic tubeless car tires; and is not applicable to run-flat tires and spare tires for temporary use only.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 2978 Size Designation, Dimensions, Inflation Pressure and Load Capacity for Passenger Car Tyres

GB/T 3487 Rims for Passenger Car

GB/T 6326 Tyre Terms and Definitions

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

GB/T 30195 Test Method for Measuring Impact Performance of Motor Vehicle Tyres

HG/T 2177 Appearance Quality of Tyres

3 Terms and Definitions

For the purpose of this document, the terms and definitions given in GB/T 6326 and GB/T 30195 and the following apply.

3.1 Striker angle The angle BETWEEN the intersection of the center plane of the striker and the front

5.2 Test conditions and test preparation

5.2.1 The test tire shall be placed for more than 24h after vulcanization; and its appearance quality shall meet the requirements of HG/T 2177.

5.2.2 The test ambient temperature is 20°C ~ 30°C.

5.2.3 The test rim shall be a special machined steel rim that is used for the impact resistance test of car tires; and its specifications and models shall be consistent with the measurement rim specified in GB/T 2978. The tires that are used for vehicles equipped with flexible rims shall use the same flexible rims as required by the vehicle for testing; and explain in the test report.

5.2.4 Install the test tire on the test rim specified in

5.2.3 and fill it with 200kPa air pressure. Lubricants may be used when installing tires.

5.2.5 The inflated tire rim assembly shall be placed at the test environment temperature for more than 3h.

5.2.6 Determine 5 test points that are approximately equally spaced along the tire circumferential direction; and mark and number them one by one.

5.2.7 The striker angle of the tire impact resistance testing machine is fixed at a camber angle of 6°, a slip angle of 0°, and a deviation of ± 0.5°.

5.3 Test procedures

5.3.1 Re-adjust the air pressure of the test tire after placement to the air pressure specified in 5.2.4, the deviation shall not exceed ± 2kPa. If there is abnormal loss of the air pressure of the test tire after placement, observe the condition of the test tire and rim and the re-prepare the test tire.

5.3.2 Install the test tire rim assembly with calibrated air pressure on the test device according to the provisions of GB/T 30195; and lock the rim so that it cannot rotate in the circumferential direction. Perform the test point by point according to the marked serial number.

5.3.3 Adjust the swing lever to the free hanging state; make the rotation center of the tire and the top of the striker on the same horizontal line; and adjust the position of the tire laterally in the horizontal direction, so that the shoulder of the tire touches the middle of the striker. The angular displacement of the swing lever due to the tire touching the striker shall not exceed 0.1°.

5.3.4 Raise the striker so that its impact energy is equal to the minimum impact bulge energy specified in 4.2; and then lock the swing lever.

5.3.5 Let the striker fall freely from the locked position and hit the test tire. When the cracking, or cord fabric exposure in the appearance inspection during or after the test process;

c) At any impact point, the rim leaks due to impact damage during the test, the tire continues to leak during inflation after replacing the rim according to 5.3.10; or 15min after inflation, check that the pressure loss exceeds 5% of that specified in 5.2.4; or there is a crack or impact bulge greater than or equal to 1mm;

d) At any impact point, the height of the impact bulge is greater than or equal to 1mm;

e) The impact bulge height at each impact point is less than 1mm, but after standing for 30min according to the provisions of 5.3.9, any one with the impact bulge height greater than or equal to 1mm.

7 Test Report

The test report shall include the following:

a) The name, trademark, specification and production number of the manufacturer of the test tire;

b) The load index, load capacity, speed symbol, material structure, etc. of the test tire;

c) The specification of the test rim;

d) Laboratory ambient temperature;

e) Test standard number and test date;

f) Test air pressure;

g) Impact bulge height (including 0mm), robustness factor f, and impact energy of each test point of the impact-resistant test tire;

h) The air pressure after the impact on each test point of the tire, photos of abnormal appearance, impact bulge, and air leakage;

i) Other unexpected conditions during the test;