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Performance testing method for cycle tyres

力车轮胎性能试验方法

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Performance testing method for cycle tyres

1 Scope

This Standard specifies the terms and definitions, test equipment and accuracy, test methods, determination rules and test report for testing the performance of cycle tyres. This Standard includes the strength performance test method, durability performance test method (drum method), and bead unseating hydraulic pressure performance test method of cycle tyres.

This Standard applies to pneumatic cycle tyres and their inner tubes.

This Standard does not apply to tubular racing tyres and non-pneumatic tyres.

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 1702 Cycle tyres (GB/T 1702-2008, JIS K 6302-1994, MOD)

GB/T 1703 Cycle inner tubes (GB/T 1703-2008, JIS K 6304-1994, MOD)

GB/T 6326 Tyre terms and definitions (GB/T 6326-2005, ISO 4223-1:2002, Definitions of some terms used in tyre industry - Part 1: Pneumatic tyres, NEQ)

GB/T 7377 Series of cycle tyres (GB/T 7377-2008, ISO 5775-1:1997, Bicycle tyres and rims - Part 1: Tyre designations and dimensions, MOD)

3 Terms and definitions

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

4 Test equipment and accuracy

4.1 Test drum

4.1.1 The diameter of the test drum is 790 mm ± 10 mm; the width shall be greater than the total width of the inflated section of the test tyre.

4.1.2 The test drum shall have a smooth steel surface, with a surface roughness *R*a value not greater than 6.3 μm.

4.1.3 The loading capacity of the loading device shall meet the test requirements, and its accuracy is ±2 % of the full scale.

4.1.4 The speed capability of the test drum shall meet the test requirements, and its accuracy is ±2 km/h.

4.1.5 Obstacles: rectangular iron blocks with a surface roughness *R*a value not greater than 6.3 μm, width 10 mm ± 0.1 mm, height 5 mm ± 0.1 mm, angular curvature radius 1.0 mm ± 0.05 mm, quantity 2.

4.1.6 The obstacles are installed on the outer circumference of the drum at equidistant and symmetrical intervals, parallel to the axis of the drum, and the length is equal to the width of the drum.

4.2 Strength testing machine

4.2.1 The testing machine shall be equipped with a cylindrical steel rod of sufficient length, one end of which is a hemispherical indenter with a diameter of 8.0 mm ± 0.1 mm.

4.2.2 The loading capacity of the loading device of the testing machine shall not be greater than 2000 kg.

4.2.3 The display accuracy of displacement and pressure of the indenter is ±1 % of the full scale. The speed accuracy of movement of the indenter is ±2.5 mm/min.

4.3 Pressure gauge

The pressure gauge display accuracy is ±2 % of the full scale.

4.4 Conduit and hydraulic pressure source

4.4.1 The conduit is a pressure-resistant pipe with an inner diameter of more than 3 mm and a length of less than 4 m.

4.4.2 The system hydraulic pressure shall remain stable.

4.5 Test rim

4.5.1 The test rim adopts the measurement rim specified in GB/T 7377.

4.5.2 Hydraulic pressure test rims may also use designated rims according to the agreement between the supply and demand parties.

$$W = \frac{F \times P}{2\ 000} \qquad \cdots\cdots(1)$$

where:

W - the damage energy, in Joule (J);

F - the pressure, in Newton (N);

P - the press-in depth (stroke), in millimeters (mm).

5.1.2.2 If the indenter touches the rim, the tyre is not punctured through, and the minimum damage energy value is not reached, this point shall be regarded as reaching the minimum damage energy.

5.1.2.3 The damage energy of a tyre is the arithmetic mean of the damage energy measured at each test point.

5.2 Durability test

5.2.1 Test conditions

5.2.1.1 The appearance quality of the test tyre shall comply with the provisions of GB/T 1702 and GB/T 1703.

5.2.1.2 Install the test tyre on the measurement rim specified in GB/T 7377, and inflate it with the air pressure specified in GB/T 7377.

5.2.1.3 Park the test tyre and rim assembly at a laboratory temperature of 25 ℃ ± 10 ℃ for at least 3 hours.

5.2.1.4 The test load shall be kept stable throughout the test process.

5.2.1.5 During the entire test process, the test temperature shall be maintained at 25 ℃ ± 10 ℃, and the temperature measurement shall be performed at a position approximately 1 m away from the test tyre.

5.2.2 Test procedures

5.2.2.1 Adjust the tyre pressure after parking to the air pressure specified in GB/T 7377.

5.2.2.2 Install the test tyre and rim assembly prepared according to the above conditions on the test shaft so that it is perpendicular to the outer surface of the test drum, and apply the load specified in GB/T 7377.

5.2.2.3 Start the drum to drive the tyre to rotate, and reach the test speed of 40 km/h ± 2 km/h within 5 minutes.

5.2.2.4 After the test, measure the tyre pressure immediately and check the appearance of the tyre.

5.3 Bead unseating hydraulic pressure test

5.3.1 Test conditions

5.3.1.1 The appearance quality of the test tyre shall comply with the provisions of GB/T 1702 and GB/T 1703.

5.3.1.2 Install the test tyre on the test rim specified in 4.5, inflate it with the air pressure specified in GB/T 7377, and park it for at least 3 hours at a laboratory temperature of 25 °C ± 10 °C.

5.3.2 Test procedures

5.3.2.1 Install the inflated and parked test tyre and rim assembly with the water inlet for the hydraulic test.

5.3.2.2 Connect the water inlet to the water pump with a conduit, start the water pump, inflate the inner tube with 100 kPa water pressure, then stop the machine and release the pressure, eliminate the air in the inner tube, and calibrate the test device.

5.3.2.3 Start the water pump, slowly fill the inner tube with water, adjust the bead position, and make the water pressure reach the air pressure value specified in GB/T 7377. After that, pressurize at a pressure increase rate not exceeding 100 kPa/min.

5.3.2.4 After the water pressure reaches the specified standard value, it shall be left standing for at least 2 minutes.

5.3.2.5 The internal pressure when a certain part of the bead comes out or the tyre blows out is the internal pressure of the tyre bead unseating (or blowing out).

6 Determination rules

6.1 Strength test

When the damage energy of the test tyre is greater than or equal to the minimum damage energy value specified in GB/T 1702, it will be determined to have “passed the test”; when the damage energy of the test tyre is lower than the minimum damage value specified in GB/T 1702, it will be determined to have “failed the test”.

6.2 Durability test

After the test reaches the mileage specified in GB/T 1702 or GB/T 1703, if the test tyre does not have bead unseating, blowing out, separation, cord break, etc., it will be

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