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Test Method for Measuring Electrical Resistance of Tyres

轮胎电阻测量方法

(ISO 16392:2017, Tyres – Electrical Resistance – Test Method for Measuring Electrical Resistance of Tyres on a Test Rig, MOD)

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1 Scope

This Document specifies a method for measuring the electrical resistance of pneumatic and solid tyres under load on a special measuring device. Static electricity on a vehicle usually needs to be discharged through the tyres, and the resistance of the tyres in turn measures the ability of the tyres to discharge the static charge of the vehicle.

This Document specifies the measuring apparatus, measuring conditions, and measuring methods so that the tyre resistance of no more than 10^{12} Ω can be accurately determined.

This Document applies to the measurement of electrical resistance of pneumatic and solid tyres.

2 Normative References

The provisions in following documents become the provisions of this Document through reference in 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) is applicable to this Document.

GB/T 6326 Tyre Terms and Definitions (GB/T 6326-2014, ISO 4223-1:2002, NEQ)

HG/T 2177 Appearance Quality of Tyres

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 6326 and the following apply.

3.1 Connecting point

Any point on the rim or metal carrier plate that the leads of the resistance meter are connected to.

3.2 Test load

The force that is applied to the tyre by the rim, which is perpendicular to the metal

4.2 Resistance measuring meter

The resistance measuring meter shall bear at least 1000V power supply voltage; the range shall be at least 10^{12} Ω; the input impedance shall be at least 10^{14} Ω; and the accuracy shall be ±5% of the range. The power loss on the tyre to be tested shall be no greater than 3W. When the resistance of the tyre to be tested is lower than 10^{10} Ω, the test current shall be no lower than 10^{-7} A, and the measurement voltage shall be no higher than 1000V.

4.3 Metal carrier plate

The metal carrier plate shall be flat and shall be of sufficient size to fully contain the full contact surface of the tyre to be tested under the test load, and of sufficient thickness to withstand the test load specified in 5.8 without producing a visible deformation. The metal carrier plate shall be made of conductive and corrosion-resistant metal materials (such as brass or stainless steel), and shall not use materials that are easily oxidized on the surface (such as aluminium, etc.); and the surface has no coating and no obvious oxidation or corrosion contamination. So as not to affect the accuracy of the test results.

4.4 Insulation plate

The insulating plate shall be made of polyethylene, polytetrafluoroethylene (PTFE) or an equivalent insulating material and shall have sufficient strength to support the test loads specified in 5.8 without visible deformation. Each edge of the insulating plate should preferably be at least 50mm wide relative to the metal carrier plate. The insulating plate shall be placed between the metal carrier plate and the bearing base. The resistance between the metal carrier plate and the bearing base should not be lower than 10^{14} Ω; and in any case, it shall be at least 2 magnitudes greater than the resistance range of the tyre to be tested.

5 Measurement Conditions and Measurement Preparation

5.1 The test tyre shall be parked for more than 24h after vulcanization, and its appearance quality shall meet the requirements of HG/T 2177.

5.2 The test rim should be a steel measuring rim.

5.3 The test environment temperature shall be 25 $^{+5}_{-10}$°C, and the relative humidity shall be no more than 60%.

5.4 For pneumatic tyres, the test air pressure shall be (80±5) % of the inflation pressure corresponding to the maximum rated load indicated on the tyre sidewall.

to the metal carrier plate and the rim; and measure point by point.

6.3 Apply the test load specified in 5.8 to the tyre and rim assembly at the first measurement point; and unload after 1min. The loading and unloading process described above shall be then repeated once.

6.4 Apply the test load to the tyre to be tested for the third time. After the load stabilizes to the test load, immediately apply the measurement voltage specified in Table 1. If the resistance range of the tyre to be tested is unknown in advance, first apply a voltage of 1V and measure the resistance value. If the measured resistance value at this time is greater than 10^4 Ω, measure the tyre resistance by increasing the voltage according to Table 1. Record the measured tyre resistance value after applying the measuring voltage for 3min±10s. During the measurement, the measurement voltage and the test load shall be continuously applied until the final tyre resistance value is recorded. If the applied voltage and the measured tyre resistance are not within the corresponding range, then take the higher resistance value measured among them as the resistance value of the measurement point; and record the corresponding voltage. Unload the tyre after the measurement is completed.

6.5 Repeat the operations of 6.3 and 6.4; and measure the resistance of the remaining measurement points in turn.

6.6 Record the resistance values measured at all measuring points, the maximum value of which is taken as the tyre resistance value. Appendix C presents reference specifications for tyre resistance limits.

NOTE: Appendix D specifies the direct measurement method of tyre resistance on vehicles. Appendix E specifies a simplified measurement method for tyre resistance suitable for production quality monitoring.

7 Test Report

The test report shall include the following:

a) the name, trademark, specification and production number of the tyre manufacturer;

b) load index or grade, load capacity, speed symbol of the tyre;

c) rim specification, rim material;

d) test ambient temperature (°C) and relative humidity (%);

e) test method standard number, test date;

f) test air pressure, and test load;

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