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Evaluation of the self-sealing performance of tyres coated with self-sealing material

涂覆式刺扎自密封轮胎自密封性能评价

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1 Scope

China's national standard for evaluating the self-sealing performance of tyres with a self-sealing coating. It specifies the terms and definitions, the evaluation requirements and the procedure. A self-sealing tyre carries a layer of viscous compound on the inside of its tread: when a nail penetrates, the compound flows around the shank and seals against it, and when the nail is pulled out it flows into the hole. The tyre loses little or no pressure and the driver may never know. The reason it matters commercially is the spare wheel - a vehicle whose tyres seal themselves does not need to carry one, which saves weight and frees space, and that is why the technology arrived with electric vehicles where both are at a premium. What an evaluation standard must establish is the boundary of the claim: what size of penetration, in what part of the tread, at what temperature and speed, and for how long the seal holds.

This Standard specifies the evaluation requirements and test methods for self- sealing performance of tyres coated with self-sealing material. This Standard applies to pneumatic tubeless passenger car radial tyres with a coating inside the crown and with anti-leakage function after puncturing.

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 4502 Laboratory test methods for passenger car tyres capabilities

GB/T 6326 Tyre terms and definitions

GB 9743 Passenger car tyres

3 Terms and definitions

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

3.1 tyres coated with self-sealing material Tyres of which the inner side of the crown is coated with self-sealing material. After the crown is punctured by foreign matters (diameter not greater than 5 mm), whether the foreign matters are pulled out or remain in the crown, the tyres still have a good sealing performance.

5.1 Static airtightness

5.1.1 Static airtightness test at indoor normal temperature INSTALL the test tyre on the measuring rim; FILL it with 250 kPa air pressure. After placing at the test ambient temperature of 23 °C ± 2 °C for 3 h, the air pressure of the test tyre is re-calibrated to 250 kPa. PUNCTURE with nails according to the requirements of Annex B. After placing for 24 h, PULL OUT all the nails. After 24 h, MEASURE and RECORD the air pressure again.

5.1.2 Static airtightness test at indoor low temperature INSTALL the test tyre on the measuring rim; FILL it with 250 kPa air pressure. After placing at room temperature for 3 h, MEASURE and RECORD the air pressure value of the tyre. SET the temperature of the low temperature refrigeration device (temperature control range -40 °C ~ 0 °C) to -25 °C. After the temperature is constant, PUT the tyre in and continue to freeze for not less than 12 h. REMOVE the tyre, PUNCTURE it with the nails that have been frozen at the same low temperature for more than 12 h as soon as possible according to the requirements of Annex B, and PULL OUT all the test nails within 3 min. Then PUT the tyre into the same low temperature environment as above and continue to freeze for more than 12 h. REMOVE the tyre and leave it at room temperature for 24 h. MEASURE and RECORD the air pressure value of the tyre again.

5.2 Endurance test

5.2.1 Nail-pull-out endurance test The test tyre is punctured with nails according to the requirements of Annex B, and then immediately pull out all the nails. After placing for 3 h, carry out the endurance test according to GB/T 4502.

5.2.2 Nail-not-pull-out endurance test The test tyre is punctured with nails according to the requirements of Annex B. After placing for 3 h, carry out the endurance test according to GB/T 4502.

5.3 High-speed performance test The test tyre is punctured with nails according to the

requirements of Annex B, and then immediately pull out all the nails. After placing for 3 h, carry out the high-speed performance test according to GB/T 4502.

5.4 Outdoor low-temperature road endurance performance test

5.4.1 Test requirements This test is only carried out when the coating formulation, production process changes or when it is re-produced. Test tyres shall be snow tyres or icy tyres.

5.4.2 Test procedure

5.4.2.1 INSTALL four test tyres on the rim used by the test vehicle; FILL them with 250 kPa air pressure.

5.4.2.2 The inflated test tyre rim assembly is placed at an ambient temperature of -35 °C ~ -20 °C for more than 3 h.

5.4.2.3 According to the requirements of Annex B, the four tyres are punctured with nails. The nails of two tyres are pulled out, and the nails of the other two tyres are not pulled out.

5.4.2.4 INSTALL the two nail-not-pull-out tyres on the front axle of the test vehicle, and the two nail-pull-out tyres on the rear axle of the test vehicle. The test load carried by the test tyres on both sides of each axle shall be 60 % to 80 % of the load capacity corresponding to its load index.

5.4.2.5 RECALIBRATE the air pressure of the test tyres to 250 kPa.