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Automobiles and Trailer - Specifications and Test Methods of Brake Part

汽车和挂车

制动器用零部件技术要求及试验方法

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Automobiles and Trailer - Specifications and Test Methods of Brake Part

1 Scope

This Standard specifies the terms and definitions, test-related requirements, technical requirements, test methods, packaging, marking and product consistency of brake replacement parts, such as: brake linings, brake shoe assembly, pad assembly, brake drums and brake discs for automobiles and trailer braking systems.

This Standard is applicable to the following brake parts:

a) Used for the replacement brake shoe assembly and replacement pad assembly of the friction-type brake of the braking system components of Category-M, Category N and Category-O vehicles that have completed type certification in accordance with GB 12676-2014 or GB 21670-2008;

b) Used for the replacement brake linings of Category-M_3, Category-N_2, Category-N_3, Category-O_3 or Category-O_4 vehicles that have completed type certification in accordance with GB 12676-2014, and designed to be riveted to the brake shoe before assembly and use;

c) Used for the replacement brake shoe assembly and pad assembly of the parking braking system for exclusive uses;

d) Used for the replacement brake drums and replacement brake discs of the friction-type brake of the braking system components of Category-M, Category-N and Category-O vehicles that have completed type certification in accordance with GB 12676-2014 or GB 21670-2008.

This Standard is not applicable to original brake drums, brake discs, brake shoe assembly, pad assembly and brake linings (already installed on the vehicle at the time of type certification), as well as original replacement brake drums, brake discs, brake shoe assembly, pad assembly and brake linings used for vehicle after-sales maintenance service.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

Minimum thickness refers to the limit thickness allowed by the brake disc.

NOTE: when the brake disc is worn to this thickness, use a new brake disc to replace it.

3.3 Maximum Inside Diameter

Maximum inside diameter refers to the inside diameter of the limit friction surface allowed by the brake drum.

NOTE: when the inside diameter of the friction surface of brake drum is worn to this value, use a new brake drum to replace it.

4 Product Classification

4.1 In accordance with the standards implemented for product type certification, brake parts are divided into:

a) Original parts: brake parts that have completed type certification in accordance with GB 12676-2014 or GB 21670-2008, and comply with relevant technical requirements;

b) Replacement parts: brake parts that have completed type certification in accordance with this Standard and serve as suitable substitutes for the original parts.

4.2 In accordance with the structures, dimensions and materials, the replacement brake drums and replacement brake discs are subdivided into:

a) Equal brake drums / brake discs: compared with the original brake drums / brake discs, except for the manufacturer's markings, the chemical composition and physical properties are the same;

b) Equivalent brake drums / brake discs: the same as the original brake drums / brake discs in dimensions, geometric characteristics and basic structures; the materials are in the same subgroup as the original brake drums / brake discs;

c) Interchangeable brake drums / brake discs: the same mounting surface as the original brake drums / brake discs, but differs from the original brake drums / brake discs in the structures, material composition and mechanical properties, etc.

5.1.2.5 If type certification is performed on the interchangeable brake discs or brake drums, 2 samples of the original brake discs or brake drums shall be provided for a comparison of dimensions.

5.2 Test Equipment

5.2.1 Bench test equipment is a single-station inertial brake test bench, whose performance indicators shall satisfy the requirements of the various tests in this Standard.

5.2.2 The test equipment shall be equipped with a device for continuously recording the main-shaft velocity, braking torque, braking line pressure, number of turns completed during one braking, braking time, and temperature of brake disc or brake drum.

5.2.3 The braking line pressure supply system of the test equipment shall satisfy the requirements of various brake conditions on the braking line pressure and maintain stable. The pressure rise and fall rate of the braking line pressure shall satisfy the following requirements:

a) Pneumatic brake: 1.5 MPa/s ± 0.3 MPa/s;

b) Hydraulic brake: 25 MPa/s ± 5 MPa/s.

5.2.4 The device and thermocouple for the measurement of the temperature of the brake discs or brake drums, brake linings (pads) shall comply with the relevant stipulations of QC/T 556.

5.3 Moment of Inertia of Bench Test

5.3.1 Category-M_1 vehicles

The moment of inertia shall be calculated in accordance with 6.3 in QC/T 564-2018.

The vehicle mass and tyre rolling radius shall be the full-load mass and tyre rolling radius corresponding to the vehicle with the largest kinetic energy among the certified vehicle models.

5.3.2 Category-M_2, M_3 and N vehicles

The moment of inertia shall be calculated in accordance with 6.3 in QC/T 239-2015.

The vehicle mass and tyre rolling radius shall be the full-load mass and tyre rolling radius corresponding to the vehicle with the largest kinetic energy among the certified vehicle models.

6.1.2 The replacement brake linings, or replacement brake shoe assemblies, or replacement pad assemblies that comply with the stipulations of type certification in GB 12676-2014 or GB 21670-2008 are considered to be compliant with the requirements of this Standard.

6.1.3 The replacement brake drums and replacement brake discs that comply with the stipulations of type certification in GB 12676-2014 or GB 21670-2008 are considered to be compliant with the requirements of this Standard.

6.2 Replacement Brake Linings, Replacement Brake Shoe Assemblies and Replacement Pad Assemblies

6.2.1 Brake performance

6.2.1.1 Replacement brake shoe assemblies and replacement pad assemblies for Category-M_1, M_2 and N_1 vehicles

6.2.1.1.1 Consistency with GB 12676-2014 or GB 21670-2008

Use at least one set of replacement brake shoe assembly or replacement pad assembly to be installed on the approved vehicle representative of the vehicle model; in accordance with A.1 of Appendix A, conduct the test. The service brake performance, emergency brake performance and parking brake performance shall satisfy the relevant requirements of the corresponding vehicle categories specified in Chapter 5 of GB 12676-2014 or Chapter 5 of GB 21670-2008.

6.2.1.1.2 Cold-state performance and velocity stability

In accordance with one of the two test methods of complete-vehicle test or bench test specified in A.2, conduct the test, which shall satisfy the following requirements:

a) In the cold-state performance test, within the upper two-thirds of the obtained test curve, the difference of the fully released average deceleration between the replacement parts and the original parts under the same brake pedal force or braking line pressure shall not exceed ± 15%;

b) In the velocity stability test, the difference of the fully released average deceleration between the higher initial braking velocity and the lowest initial braking velocity shall not exceed ± 15%.

6.2.1.2 Replacement brake linings, replacement brake shoe assemblies and replacement pad assemblies for Category-M_3, N_2 and N_3 vehicles

6.2.1.2.1 Overall requirements

Use at least one set of replacement brake shoe assembly, or replacement pad assembly, or brake lining to be installed on the approved representative vehicle or brake; in accordance with B.1 (vehicle test) or B.2 (bench test) of Appendix B, conduct

under the same braking line pressure shall not exceed ± 15%.

6.2.1.2.3.3 Velocity stability

The difference of the fully released average deceleration between the higher initial braking velocity and the lowest initial braking velocity shall not exceed ± 25%.

6.2.1.3 Replacement brake shoe assemblies for Category-O_1 and O_2 vehicles

In accordance with Appendix C, conduct the test. The replacement brake shoe assemblies shall satisfy the following requirements:

a) In the cold-state performance test, within the upper two-thirds of the obtained test curve, the difference of the fully released average deceleration between the replacement brake shoe assemblies and the original brake shoe assemblies under the same braking line pressure or control force shall not exceed ± 15%;

b) The average deceleration fully released during the thermal performance test of Type-I test shall be not lower than 60% of the cold-state performance test or 3.5 m/s^2.

6.2.1.4 Replacement brake linings and replacement brake shoe assemblies for Category-O_3 and O_4 vehicles

6.2.1.4.1 Consistency with GB 12676-2014

In accordance with D.2.1 of Appendix D, conduct Type-I or Type-III test. The thermal performance of the replacement brake shoe assemblies or replacement brake linings under the same input shall satisfy one of the following requirements:

a) Not lower than the thermal performance of the original brake shoe assemblies or original brake linings;

b) At least reach 90% of the cold-state performance of the replacement brake shoe assemblies or replacement brake linings.

The corresponding stroke of the actuating mechanism shall be less than 110% of the original brake shoe assemblies or original brake linings; shall not exceed the S_P value defined in K.2 of GB 12676-2014. If the original brake shoe assemblies or original brake linings have been tested for the Type-II test requirements, the minimum requirements in 5.1.7.2 (Type-III test) of GB 12676-2014 are applicable to the replacement brake shoe assemblies or replacement brake linings.

6.2.1.4.2 Cold-state performance

In accordance with D.2.2, conduct the test. Within the upper two-thirds of the obtained test curve, the difference of the fully released average deceleration between the

In accordance with E.3.1.1 of Appendix E, conduct the test. The sample of the replacement brake discs shall satisfy one of the following requirements:

a) The number of braking cycles shall be not less than 150;

b) The number of braking cycles shall be less than 150, but greater than 100, then, use a new replacement brake disc for the test, and the number of cycles shall be greater than 100.

6.3.2.3.1.2 Replacement brake discs for Category-M_2 and N_2 vehicles

In accordance with E.3.1.2 of Appendix E, conduct the test. The sample of the replacement brake discs shall satisfy one of the following requirements:

a) The number of braking cycles shall be not less than 30;

b) The number of braking cycles shall be less than 30, but greater than 20, then, use a new replacement brake disc for the test, and the number of cycles shall be greater than 20.

6.3.2.3.1.3 Replacement brake discs for Category-M_3 and N_3 vehicles

In accordance with E.3.1.3 of Appendix E, conduct the test. The sample of the replacement brake discs shall satisfy one of the following requirements:

a) The number of braking cycles shall be not less than 250;

b) The number of braking cycles shall be less than 250, but greater than 200, then, use a new replacement brake disc for the test, and the number of cycles shall be greater than 200.

6.3.2.3.1.4 Replacement brake discs for Category-O_1 and O_2 vehicles

In accordance with F.3.1.1 of Appendix F, conduct the test. The sample of the replacement brake discs shall satisfy one of the following requirements:

a) The number of braking cycles shall be not less than 150;

b) The number of braking cycles shall be less than 150, but greater than 100, then, use a new replacement brake disc for the test, and the number of cycles shall be greater than 100.

6.3.2.3.1.5 Replacement brake discs for Category-O_3 and O_4 vehicles

In accordance with F.3.1.2 of Appendix F, conduct the test, which shall satisfy the requirements of a) or b) in 6.3.2.3.1.2.

6.3.2.3.1.6 Replacement brake drums for Category-M_2 and N_2 vehicles

In accordance with F.4.1.1, conduct the test; the number of braking cycles of the sample of the replacement brake discs shall not be less than 70.

6.3.2.3.2.6 Replacement brake discs for Category-O_3 and O_4 vehicles

In accordance with F.4.1.2, conduct the test; the sample of the replacement brake discs shall not become invalid.

6.3.2.3.2.7 Replacement brake drums for Category-O vehicles

In accordance with F.4.2, conduct the test; the sample of the replacement brake drums shall not become invalid.

6.3.3 Interchangeable brake discs and brake drums

6.3.3.1 Geometric characteristics

Except for the installation dimensions, the remaining shall comply with the stipulations of 6.3.2.1.2.

In terms of the interchangeable brake discs or brake drums, the following structural differences with the original brake discs or brake drums are allowed:

a) The form and structure of the air duct (for the ventilating disc);

b) Integral or combined brake discs or brake drums;

c) Surface structures (such as: holes and slots, etc.).

6.3.3.2 Brake performance

6.3.3.2.1 Basic brake performance and dynamic friction characteristics

6.3.3.2.1.1 Brake discs and brake drums for Category-M and N vehicles

In accordance with E.2, conduct the test. The requirements for the various performances of the sample of the replacement brake discs and the sample of the replacement brake drums are as follows:

a) Dynamic friction characteristics

   Within the upper two-thirds of the obtained test curve, the difference of the fully released average deceleration between the sample of the replacement brake discs or the sample of the replacement brake drums and the original parts under the same braking line pressure shall not exceed ± 8% or ± 0.4 m/s^2;

b) Type-I test

For the brake discs and brake drums for Category-O_4 vehicles, the average deceleration or average braking torque fully released during the thermal performance test shall not be lower than 60% of the Type-0 test (F.2.6), and the average deceleration fully released shall not be lower than 4.0 m/s^2.

d) Inspection after thermal performance test

Conduct the test in accordance with the stipulations of 6.3.3.2.1.1 d).

6.3.3.2.2 Thermal fatigue test

Conduct the test in accordance with the stipulations of 6.3.2.3.1.

6.3.3.2.3 Braking strength test

Conduct the test in accordance with the stipulations of 6.3.2.3.2.

6.3.4 Same model

The brake discs or brake drums that do not differ in the following main characteristics shall be considered as the same model:

a) Brake discs:

1) Basic structure:

- Whether there is a ventilating slot (i.e. solid disc or ventilating disc);
- Ventilating structure;
- Surface (whether there are slots or holes);
- Wheel hub structure (whether there is an integrated parking brake drum);
- Installation type (rigid, semi-floating and floating, etc.);
- Cap structure (whether there is an integrated parking brake drum).

2) Materials.

b) Brake drums:

1) Materials;

2) Wheel hub (with or without);

3) Composite structure.

replacement pad assemblies of the same model that comply with this Standard shall be packed and sold in pairs in accordance with the vehicle axles (bridges).

7.1.2 Each pair of products shall be packed in a sealed package with a pre-opening.

7.1.3 The following information shall be marked on each package:

a) The number of replacement brake linings, or replacement brake shoe assemblies or replacement pad assemblies in the package;

b) Manufacturer's name or trademark;

c) The brand and model of replacement brake linings, or replacement brake shoe assemblies or replacement pad assemblies;

d) Replaceable vehicle models / axles (bridges) / brakes;

e) Certification mark.

7.1.4 Each package shall be attached with an installation manual, which shall include the following information:

a) Special instructions for auxiliary parts.

b) Replaceable vehicle axles (bridges) of replacement brake linings, or replacement brake shoe assemblies or replacement pad assemblies.

c) For replacement brake linings, the following information shall also be included:

1) Structural characteristics of brake shoes, fulcrums and pin holes;

2) Brake shoes' resistance to distortion, deformation and corrosion;

3) Type and size of rivets used;

4) Required riveting tools and riveting force.

7.1.5 Each replacement brake lining, or replacement brake shoe assembly or replacement pad assembly shall be permanently provided with information like certification marks in accordance with Appendix H.

7.2 Replacement Brake Discs and Brake Drums

7.2.1 Each replacement brake disc or brake drum for sale shall be separately packaged, and at least the following information shall be provided on the package:

a) Part No.;

b) Related vehicle information:

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