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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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GB/T 34422-2017

Brake disc for automobile

汽车用制动盘

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Issued on: October 14, 2017

Implemented on: May 1, 2018

**Issued by: General Administration of Quality Supervision, Inspection and Quarantine;
Standardization Administration Committee.**

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by Ministry of Industry and Information Technology of the People's Republic of China.

This Standard shall be under the jurisdiction of National Technical Committee on Automobiles of Standardization Administration of China (SAC/TC 114).

The drafting organizations of this Standard: National Motor Vehicle Parts Product Quality Supervision and Inspection Center, Yantai Resort Auto Parts Manufacturing Co., Ltd., Laizhou Sanli Auto Parts Co., Ltd., Yantai Mei Fung Machinery Co., Ltd., Longkou Yu Tung Machinery Factory, Shandong Longji Machinery Co., Ltd.

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Brake disc for automobile

1 Scope

This Standard specifies the terms and definitions, classification, technical requirements, inspection methods of brake disc for automobile (hereinafter referred to as “brake disc”).

This Standard applies to brake disc used for M and N class automobile brakes specified in GB/T 15089-2001 of which the body material is gray cast iron. The brake disc made of other material shall refer to this for implementation.

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 223.3, *Methods for chemical analysis of iron, steel and alloy - The diantipyrylmethane phosphomolybdate gravimetric method for the determination of phosphorus content*

GB/T 223.58, *Methods for chemical analysis of iron, steel and alloy - The extraction-absorption catalytic polarographic method for the determination of manganese content*

GB/T 223.59, *Iron, steel and alloy - Determination of phosphorus content-Bismuth phosphomolybdate blue spectrophotometric method and antimony phosphomolybdate blue spectrophotometric method*

GB/T 223.60, *Methods for chemical analysis of iron, steel and alloy - The perchloric acid dehydration gravimetric method for the determination of silicon content*

GB/T 223.62, *Methods for chemical analysis of iron, steel and alloy; The butyl acetate extraction photometric method for the determination of phosphorus content*

GB/T 223.63, *Methods for chemical analysis of iron, steel and alloy - The sodium (potassium) periodate photometric method for the determination of manganese content*

GB/T 231.1, *Metallic materials - Brinell hardness test - Part 1: Test method*

GB/T 1031, *Geometrical product specifications(GPS) - Surface texture: Profile method - Surface roughness parameters and their values*

GB/T 1958, *Geometrical product Specifications (GPS) - Geometrical tolerance - Verification prescription*

GB/T 3177, *Inspection of plain workpiece sizes*

GB/T 7216, *Hygienic requirements for peacetime utilization of civil air defence works*

GB/T 9239 (all parts), *Balance quality of rigid rotors - Determination of permissible residual unbalance*

GB/T 9439, *Grey iron castings*

GB/T 15089-2001, *Classification of power-driven vehicles and trailers*

GB/T 20123, *Steel and iron - Determination of total carbon and sulfur content Infrared absorption method after combustion in an induction furnace*

QC/T 556, *Automotive brake temperature measurement and thermocouple mounted*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 ventilated disc

the brake disc with a ventilation duct between two friction surfaces

3.2 solid disc

the brake disc without a ventilation duct between two friction surfaces

3.3 mounting surface

the surface mounted on the hub and fitted with the hub; the mounting reference surface of brake disc

3.4 disc thickness variation; DTV

the variation of the thickness of two friction surfaces on either circumference

3.5 minimum thickness

disc for test; the number of cycles of thermal fatigue test of two samples shall exceed 100.

5.10.1.2 M₂, M₃, N₂ and N₃ vehicle brake disc samples shall be tested according to A.4.1.1. It shall meet the following requirements:

- a) the number of thermal fatigue test cycles at the failure of the brake disc sample is greater than or equal to 15, or
- b) when the number of cycles of thermal fatigue test on the failure of a brake disc sample is more than 10 but less than 15, then use a new sample of the brake disc for test.

5.10.2 High-load test

The brake disc sample shall not be invalid after it completes the high-load test according to A.4.2.

6 Inspection method

6.1 Mechanical properties

6.1.1 Wedge pressure strength

Wedge sample size shall comply with the provisions of Table 6. The inspection methods are in accordance with the provisions of GB/T 9439. Take the average value of three wedge pressure strengths.

Table 6 -- Wedge sample requirements

Thickness mm	Width mm	Length mm	Flatness mm	Roughness Ra μm
6.0±0.1	20	≥20, the same sample can be tested many times	0.1	≤1.6

6.1.2 Friction surface hardness

The test site of brake disc friction surface hardness shall be in the middle of the friction surface. Test at least 3 points evenly along with circumference. The hardness of ventilated disc shall be tested on the friction surface right above the rib. The test method is in accordance with GB/T 231.1.

6.2 Chemical composition

The test method for chemical composition is in accordance with Table 7. It may use other methods. But the test method used shall be indicated in the test report.

n_{front} - number of front axles;

n_{rear} - number of rear axle;

η - partition coefficient, selected according to Table A.1.

Table A.1 -- Partition coefficient

Vehicle type	Front axle	Rear axle
M ₁	0.77	0.32
M ₂	0.69	0.44
N ₁	0.66	0.39
M ₃ , N ₂	0.55	0.55

A.2.2.2 For the vehicle with maximum allowable mass greater than or equal to 7500kg, the test mass shall be selected according to Table A.2.

Table A.2 -- Test mass and dynamic rolling radius of tire

Brake disc outer diameter mm	Test mass kg	Dynamic rolling radius of tire mm	Rim size mm
320~350	3100	386	444.5 (17.5")
350~390	4500	445	495.3 (19.5")
390~440	5300	527	571.5 (22.5")
The test mass of which brake disc outer diameter is greater than 440mm shall be determined by both parties based on negotiation.			

A.2.3 Cooling wind speed

Test without the wheel. During braking, or between two braking, the cooling wind speed shall be limited to $V_{\text{air}} = 0.33V_0$ (V_0 is the vehicle speed at the start of braking). The wind speed in other cases is not limited.

Cool air to room temperature.

A.2.4 Boost rate, buck rate of brake pressure

The boost rate, buck rate of brake line pressure of test equipment shall meet the following requirements.

- a) Air brake is 1.5 MPa/s $\pm$ 0.3 MPa/s;
- b) Hydraulic brake is 25 MPa/s $\pm$ 5 MPa/s.

A.2.5 Sampling rate

The sampling rate of brake line pressure and braking torque shall be greater than 20Hz.

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