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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

GB/T 5764-2011

Replacing GB/T 5764-1998

Clutch facings for automobiles

汽车用离合器面片

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Table of Contents

Foreword.....	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Classification	6
5 Requirements.....	6
6 Test methods.....	8
7 Inspection rules	15
8 Marks, packaging, transportation and storage.....	17
Appendix A (Informative) Recommendation form for the basic dimensions of facings	19
Appendix B (Normative) Fixture for the bending test	20

Foreword

This Standard is drafted according to the rules given in the GB/T 1.1-2009.

This Standard replaces GB/T 5764-1998 *Clutch facings for automobiles*. Compared with GB/T 5764-1998, the major technical changes are as follows:

- ADD the “Terms and definitions” (SEE Chapter 3 of this version);
- ADD the “Classification according to the manufacturing process” (SEE Chapter 4 of this version);
- ADD the “Flatness requirements and test methods” (SEE the Sections 5.3 and 6.3 of this version);
- CONSIDER the friction property requirements specified in the 1998 version as those for the Class I facings. CHANGE the coefficient of friction at 200°C from “0.15~0.60” to “0.20~0.60”. ADD the requirement for the coefficient of friction at 250°C, which is “0.20~0.60”. ADD the requirement for the allowable deviation of the coefficient appointed, which is “ ± 0.14 ”. MODIFY the wear at 150°C and 200°C from “0.75 and 1.00” to “0~0.60 and 0~0.80”. ADD the requirement for the wear at 250°C, which is “0~1.20” (SEE Table 4 in this version and Table 2 in the 1998 version);
- ADD the requirement for the Class II facings’ friction property;
- ADD the requirement for the Class II facings’ flexural property (SEE Table 6 in this version and Table 3 in the 1998 version);
- ADD the requirements and test methods for the rotate bursting test strength (SEE the Sections 5.6 and 6.6 of this version);
- RECOMPILE the inspection rules. ADD the contents and items of the type inspection (SEE Chapter 7 of this version and Chapter 5 of the 1998 version);
- DELETE the Appendixes A and B of the 1998 version. MODIFY the Appendix C of the 1998 version to be Appendix A of this version;
- ADD the Appendix B “Recommendation form for the basic dimensions of facings”.

The consistent degree between this Standard and JIS D4311-1995 (confirmed in 2006) *Clutch facings for automobiles* is not equivalent.

This Standard was proposed by China Building Materials Federation.

Clutch facings for automobiles

1 Scope

This Standard specifies the terms and definitions, classification, requirements, test methods, inspection rules, marks, packaging, transportation and storage of the clutch facings for automobiles.

This Standard applies to the dry friction clutch facings for automobiles (hereinafter referred to as “facings”).

2 Normative references

The following documents are essential to the application of this document. For dated references, only the versions with the dates indicated are applicable to this document. For undated references, only the latest versions (including all the amendments) are applicable to this document.

GB/T 2828.1 *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (GB/T 2828.1-2003, ISO 2859-1: 1999, IDT)*

GB 5763-2008 *Brake linings for automobiles*

JB/T 7498 *Coated abrasives – Abrasive paper*

JC/T 1065 *Constant speed friction test machine*

3 Terms and definitions

The terms and definitions defined in the GB 5763-2008 and the following ones apply to this document.

3.1 Max flexibility (δ)

It refers to the distance of the top or bottom surface of the test specimen's span center deviated from the original position, at the instant when the test specimen fractures in the process of the bending test.

3.2 Max strain (ϵ)

TAKE the complete facing which is defect-free in appearance quality as the test specimen. Carefully CLEAR the projections on both surfaces.

6.3.2 Test equipment

6.3.2.1 Standard flat plate: The accuracy is above Level 3.

6.3.2.2 Pre-pressing fixture (ring): It shall meet the load specified in Table 3. The error shall not be greater than $\pm 1\%$. The flatness shall be less than 0.05mm.

6.3.2.3 Feeler gauge: The division value shall not be greater than 0.01mm.

6.3.3 Test procedures

6.3.3.1 LIE the facing's working surface face-down and flat on the standard flat plate. Any part of the test specimen cannot exceed the outer edge of the standard flat plate.

6.3.3.2 SELECT appropriate pre-pressing fixture (ring) according to the dimensions of the test specimen. LIE the pre-pressing fixture flat on the facing to be tested. ENSURE that any part of the test specimen has been completely covered by the fixture and has been centered with the test specimen. USE a feeler gauge to check the clearance between test specimen's working surface and flat plate. According to the requirements, respectively MEASURE 6 points on the inner hole and excircle along the circumference with the interval of 60° .

6.3.4 Result representation

TAKE the maximum value among 12 measured clearance values as the flatness value of the facing.

6.4 Friction property test

6.4.1 Test specimen

6.4.1.1 PREPARE two test specimens from the same facing.

6.4.1.2 The dimensions of the test specimens are 25mm × 25mm. The allowable deviation is within the range of -0.2mm ~ 0mm.

6.4.1.3 The test specimens are as thick as the facings. The thickness difference between two test specimens shall below 0.2mm.

6.4.2 Test equipment and instruments

6.4.2.1 Constant speed friction test machine: The properties and accuracy shall conform to the provisions specified in the JC/T 1065.

6.4.2.2 Micrometer: The division value shall not be greater than 0.01mm.

6.4.3 Test conditions

6.4.3.1 The pressure applied to the test specimens shall be 0.49MPa.

6.4.3.2 The disk materials shall conform to the provisions specified in the JC/T 1065. USE the abrasive paper with the granularity of P240 specified in the JB/T 7498 to process the disk surfaces, so as to ensure that there are no defects on the disk surfaces, such as obvious scratches, rust, pits, etc.

6.4.3.3 The friction direction shall be the same with that of the facings.

6.4.4 Test procedures

6.4.4.1 PLACE two test specimens in the support arm of the test specimens. RUN in below 100°C, until the contact surface is up to more than 95%. USE a micrometer to measure the thickness of the test specimens. DETERMINE the thickness after the test specimens cool down to room temperature. MEASURE 5 points on each test specimen. TAKE the arithmetic mean value.

6.4.4.2 When the test temperature is at 100°C, DETERMINE the friction when the disk rotates at 5,000rpm according to the requirements specified in the Section 6.4.3 of this Standard. After the friction test, MEASURE the thickness of the test specimens according to the Section 6.4.4.1 of this Standard.

6.4.4.3 At the test temperature of 150°C, 200°C, 250°C and 300°C, respectively CONDUCT the same test according to the Section 6.4.4.2 of this Standard. However, the maximum test temperatures of various facings shall conform to the provisions specified in Tables 4 and 5. When conducting the test at various temperatures, the disk temperature shall rise up to the specified test temperature within 1,500rpm. The increase of the disk temperature mainly relies on the friction heat of the test specimens. When the disk temperature cannot come up to the specified test temperature within 1,500rpm, it is allowed to use an auxiliary heating device.

6.4.4.4 After determining the maximum test temperature, DETERMINE the friction when the disk rotates at 3,000rpm according to the requirements specified in the Section 6.4.3 of this Standard.

6.4.4.5 After the test, USE the visual observation method to inspect the appearance of the test specimens and the disk friction surface.

6.4.5 Calculation

6.4.5.1 CALCULATE the coefficient of friction at various test temperatures according to the Equation (1):

the length of the test specimens is less than 55mm, 40mm $\pm$ 0.5mm can be taken as well. During sampling, AVOID the grooves in the facings.

6.5.2 Test equipment

6.5.2.1 Flexural property test machine: The load line speed is (10 $\pm$ 1) mm/min. The load value is within the range of 10% to 90% of the full range. The minimum division value is 1N.

6.5.2.2 For the details of the test fixture, SEE Appendix B. The dimensions shall conform to the following requirements:

- The distance between fulcrums shall be adjusted to 40mm $\pm$ 0.2mm. If using short test specimens, it can be 30mm $\pm$ 0.2mm.
- The curvature radius at the fulcrum end shall be 1.5mm. The curvature radius at the pressurized end shall be 3mm.

6.5.2.3 Dial gauge or flexibility measuring device: The division value shall not be greater than 0.01mm.

6.5.2.4 Micrometer: The division value shall not be greater than 0.01mm.

6.5.2.5 Vernier caliper: The division value shall not be greater than 0.02mm.

6.5.3 Test procedures

6.5.3.1 USE a micrometer with the minimum division value of 0.01mm to measure the three points in the middle of the test specimen, so as to obtain the thickness of the test specimen. TAKE the arithmetic mean value. USE a vernier caliper with the minimum division value of 0.02mm to measure the three points in the middle of the test specimen, so as to obtain the width of the test specimen. TAKE the arithmetic mean value.

6.5.3.2 ADJUST the distance between fulcrums according to the test specimen.

6.5.3.3 LIE the friction surface of the test specimen face-up. PLACE it on the fulcrum of the test fixture.

6.5.3.4 TURN on the test machine to apply loads. DETERMINE the max load at the instant when the test specimen fractures, and the max flexibility when the test specimen is damaged.

6.5.4 Calculation

6.6.3.1 CONDUCT the empty test run first. USE a tachometer to check whether the speed and angular acceleration settings conform to the test conditions.

6.6.3.2 SELECT appropriate test fixture according to the dimensions of the test specimen.

6.6.3.3 INSTALL the test specimen on the test fixture. CLAMP afterwards. CLOSE and LOCK the test chamber.

6.6.3.4 Room temperature test: ADJUST the angular acceleration to $200 \text{ rpm} \cdot \text{s}^{-1}$. CLOSE the heating device. TURN on the motor to speed up the rotation of the test specimen, until the test specimen bursts. RECORD the rotating speed at this moment.

6.6.3.5 High temperature test: HEAT the test specimen in the test chamber up to $200^{\circ}\text{C} \pm 2^{\circ}\text{C}$ under the condition of 300rpm. KEEP for $15\text{min} \pm 10\text{s}$. Or PLACE the test specimen fixed on the test fixture and the stationary fixture in the drying oven. HEAT up to $200^{\circ}\text{C} \pm 2^{\circ}\text{C}$. KEEP for $15\text{min} \pm 2\text{min}$. Immediately INSTALL them on the test axis of the test machine. ADJUST the angular acceleration to $200 \text{ rpm} \cdot \text{s}^{-1}$. TURN on the motor to speed up the rotation of the test specimen, until the test specimen bursts. RECORD the rotating speed at this moment.

6.6.3.6 After the test (if conducting the high temperature test, it is necessary to cool down to room temperature after the test), OPEN the test chamber. TAKE out the fragments of the test specimen afterwards.

6.6.4 Test report

Under the condition of room temperature or high temperature, the rotational speed limit when the test specimen rotates on the rotation strength test equipment until it fractures is the rotate bursting test strength at room temperature or high temperature. When the test specimen still does not fracture after coming up to the equipment's upper rotating speed limit, RECORD the upper rotating speed limit as test result. GIVE clear indication of "no fracture".

6.6.5 Result representation

Respectively USE the minimum values of the three test specimens' test results obtained in the room temperature or high temperature test for representation.

7 Inspection rules

7.1 Inspection classification

Table 9 Sample Size and Detailed Determination Rules Unit: piece

Batch size	Sample size	Acceptance number	Rejection number
≤ 150	8	1	2
151~500	13	1	2
501~1,200	20	2	3
1,201~10,000	32	3	4
> 10,000	50	5	6

7.3.2 CONDUCT random sampling to the facings according to the provisions specified in Table 10 for property inspection.

Table 10 Sample Size Unit: piece

Batch size	Friction property	Flexural property	Rotate bursting test strength
≤ 10,000	1	1	6
> 10,000	2	2	

7.4 Result determination

7.4.1 DETERMINE the appearance, dimensions and flatness according to the provisions specified in Table 9.

7.4.2 If all the test results of the friction property, flexural property and rotate bursting test strength conform to the requirements of this Standard, DETERMINE the above-mentioned inspection items of this batch of products as qualified. If any one of the above-mentioned inspection items fails to conform to the requirements of this Standard, DOUBLE the samples to re-inspect this item. If the re-inspection results conform to the requirements of this Standard, DETERMINE this item as qualified. If the re-inspection results still fail to conform to the requirements of this Standard, DETERMINE this item of this batch of products as unqualified.

7.4.3 If all the inspection items are qualified, DETERMINE this batch of products as conforming products. If any one of the inspection items is unqualified, DETERMINE this batch of products as non-conforming products.

8 Marks, packaging, transportation and storage

8.1 Marks

8.1.1 The non-working surfaces of the facings shall be painted with the manufacturing plant's name or trademark, manufacturing date or batch number.

8.1.2 The four sides surrounding each packing case for the facings shall be respectively possessed of the product name, this Standard No., model and

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