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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 11834-2023

Replacing GB/T 11834-2011

Friction linings for industrial and agricultural machines

工农业机械用摩擦片

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1 Scope

China's national standard for dry friction linings used in industrial and agricultural machinery - the pads, discs, bands and segments in the clutches and brakes of machine tools, presses, hoists, winches, tractors and harvesters. It specifies the classification and designation, the requirements, the test methods, the inspection rules, and the marking, packaging, transport and storage of dry friction linings for industrial and agricultural machines. A friction material is an unusual product to specify because what is wanted is not the highest friction but the most consistent. A lining with a very high coefficient that falls away as it heats is worse than a lower one that holds steady: on a clutch it means a machine that grabs when cold and slips when hot, and on a brake it means a stopping distance that changes with use. So the requirements centre on the friction coefficient measured across a range of temperatures and on how far it is allowed to fade, together with the wear rate at those same temperatures - the two properties being in permanent tension, since a material that resists fade usually wears the mating surface, and one that is kind to the disc usually fades. Around them sit the mechanical properties the lining needs to survive being clamped and driven: the shear and compressive strength, the hardness, the density, the impact resistance and the dimensional stability, together with the resistance to water and oil, because a lining that loses its friction when contaminated has failed in exactly the situation where it was needed. The classification and designation system is what lets a maintenance department order a replacement that behaves like the original, which on machinery of this kind is the practical use of the whole document. Issued on 28 December 2023 and in force since 1 July 2024, it replaces GB/T 11834-2011.

This document specifies the classification and designation, requirements, test methods, inspection rules, marking, packaging, transportation and storage of dry friction linings for industrial and agricultural machines (hereinafter referred to as "friction linings"). This document applies to dry friction linings for industrial and agricultural machines, as well as to dry friction linings for other types of machines as a reference.

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 2828.1, Sampling procedures for inspection by attribute - Part

1. Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 5620, Road vehicles - Vocabulary and definition for braking of automotive vehicles and their trailers

GB 5763, Brake linings for automobiles

GB/T 5764, Clutch facings for automobiles

GB/T 17469, Characteristics evaluation of brake linings for automobile - Small sample bench test method

GB/T 22309, Road vehicles - Brake linings - Shear test procedure for disc brake pad and drum brake shoe assemblies

GB/T 23263, Determination of asbestos in products

GB/T 34007-2017, Road vehicles - Brake lining friction materials - Drag test method for friction performance
JC/T 685, Test method for density of friction material
JC/T 2268, Measurement of copper and other elements in brake friction materials

QC/T 944, Test method for poly-brominated biphenyls (PBBs) and poly-brominated diphenyl ethers (PBDEs) in automobile materials

3 Terms and definitions

For the purpose of this document, terms and definitions given in GB/T 5620 and GB 5763 apply.

4 Classification and designation

4.1 Classification Friction linings are classified into three categories according to their materials and manufacturing processes. The classification and codes are specified in Table 1.

4.2 Designation The designation of friction linings shall consist of the product's intended use, a reference to this document, classification code, and product dimensions. Example 1.A Class 2 brake band with a width of 100 mm and a thickness of 4 mm shall be designated as. Brake band GB/T 11834-ZD2-100x4. Example 2.A Class 3 clutch plate with an outer diameter of 380 mm, an inner diameter of 202 mm, and a thickness of 10 mm shall be designated as. Clutch plate GB/T 11834- LP3-380x202x10.

5.1 Appearance quality

5.1.1 Whether or not the surface of the friction linings is processed shall be agreed upon by the supplier and the buyer.

5.1.2 The friction linings shall be of uniform material and shall not have defects such as cracks, bubbles, delamination, missing edges, chipped corners, warping, or burrs.

5.3 Friction performance

5.3.1 The small sample bench test results of Class 1 and Class 2 friction linings shall meet the following requirements. -- The coefficient of friction at the normal temperature μ_{normal} shall not be less than

0.25 and shall meet the stated grade; -- The coefficient of friction at the high temperature $\mu_{\text{high temperature}}$ shall not be less than

0.25 and shall meet the stated grade; -- The coefficient of friction at any point in the second decline temperature range of 93°C~288°C and the second recovery temperature range of 149°C~93°C in the five tests shall not be less than 0.15; the difference between the coefficient of friction at each temperature point and the average value of the five tests shall not exceed 20%.

5.3.2 The drag test results of the friction performance of Class 3 friction linings shall meet the following requirements. -- The operational coefficient of friction $\mu_{\text{operation}}$ shall be within $\pm 15\%$ of the appointed coefficient of friction; -- After the test, the friction linings shall show no delamination or chipping.

5.4 Relative density deviation The relative density deviation of friction lining samples manufactured with the same friction material formulation and the same manufacturing process shall be less than 5%.

5.5 Softening property The softening property applies to Class 1 friction linings. This also applies when the buyer requires Class 2 and Class 3 brake bands with a thickness not exceeding

6.5 mm to have softening property. After the softening property test, the surface of the friction lining shall not have any cracks.

5.6 Bending performance The bending strength and maximum strain of the friction linings

used for clutch plates shall conform to the provisions of Table 5.

5.7 Shear strength The shear strength of ZP2 and ZP3 bonded friction linings at the normal temperature of (23 ± 5) °C shall not be less than

2.5 MPa. The shear strength of ZP2 and ZP3 bonded friction linings at the high temperature of (300 ± 10) °C shall not be less than

5.8 Limits of harmful components

5.8.1 The friction linings shall not contain asbestos.

5.8.2 Other harmful elements in the friction linings shall meet the limits specified in Table 6.

6 Test methods

6.1 Appearance quality Check by visual inspection.

6.2 Dimensional deviation The width and thickness of friction linings used for brake pads and brake bands, and the inner and outer diameters of friction linings used for clutch plates shall be measured using a vernier caliper with an accuracy of

0.02 mm. The thickness of friction linings used for clutch plates shall be measured using a micrometer with an accuracy of

0.01 mm. The measuring instruments used for the measurement of other dimensions shall be agreed upon by the supplier and the buyer.

6.3 Friction performance

6.3.1 Small sample bench test The small sample bench test for Class 1 and Class 2 friction linings shall be carried out in accordance with the provisions of GB/T 17469.