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National Standards of the People's Republic of China

GB 5763 – XXXX
Replaces GB 5763 - 1998

Brake Linings for Automobiles

Issuing Date: 200X – XX -XX   Implementation Date: 200X –XX -XX

Issued by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China and the Standardisation Administration of the People's Republic of China

Preface

The entire contents of this standard are mandatory.

This standard has non-equivalently adopted JIS D44ll-1993 (2006 Verification) of Japan and the Friction Technical Requirement and Friction Test Method is the same as in JIS D44ll-1993 (2006 Verification).

The main modifications to this standard in comparison with GB 5763-1998 are as follows:

- Terms, definitions and symbols have been added;
- Requirements and corresponding test methods for braking performance, shear strength, impact strength, swell and compression ratio have been added;
- Testing rules have been re-compiled, adding test content and test items;
- Appendix B "Disk temperature test device and test position" has been amended from an information appendix to a normative appendix;
- A normative appendix - Appendix C "Mutual relations of pendulum, test sample and support" has been added.

Appendices B and C to this standard are normative appendixes and Appendix A is an information appendix.

This standard is proposed by the China Federation of Building Materials.

This standard is under the jurisdiction of National Non-metallic Minerals and Products Standardisation Technical Committee.

Organisation in charge of drafting this standard:

Organisations that parcitipated in the drafting of this standard:

The main drafters of this standard:

This standard was first issued in 1986; the first revision was made in 1998; this version is the second revision of this standard.

Brake Linings for Automobiles

1   Scope

This standard specifies the classification, technical requirements, test methods, inspection rules, marks, packaging, transportation and storage etc. for brake linings of automobiles.

This standard applies to brake linings for automobiles (hereafter referred to as linings).

2   Normative References

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this Part; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB / T 2828	Sampling procedures and tables for lot by lot inspection by attributes (Apply to inspection of successive lots or batches
GB / T 9439	Gray iron castings
GB / T xxxx	Road vehicles - Brake linings - Shear strength test method of disk brake pad and drum brake shoe assembly
GB / T xxxx	Road vehicles - Brake linings - Swell test method of disk brake pads
GB / T xxxx	Road vehicles - Brake linings - Compressibility test method
JB / T 7498	Sand paper
QC / T 479-1997	Goods vehicles, buses brake bench test methods
QC / T 564-1999	Car brake bench test methods

3   Terms, Definitions and Symbols

The following terms, definitions and symbols apply to this standard.

3.1   Terms and Definitions

3.1.1   Coefficient of friction ((•)

The ratio of the friction force (N) and the normal force (F) applied to the test plate

3.1.2   Coefficient pointed (• •)

The friction coefficient agreed by the supply and demand sides according to a specific vehicle model

3.1.3 Wear (V)

The rate of the lining wearing volume and the torque under the specified condition

3.1.4 Shear strength

The ratio of the force parallel to the back plate of the disk braking pads or the edge of the drum brake shoes, which completely shears off the lining materials from the back plate or shoes to the shearing geometry area

3.1.5 Swell

The difference between the lining thickness increase under heat and the initial lining thickness

3.1.6 Impact strength

The ratio of the impact energy consumed to break the test sample and the cross section at which the sample breaks

3.1.7 Compressibility

The ratio of the lining thickness decrease volume (tested in the direction of the force and the surface of friction) and the initial lining thickness

3.2 Symbol

G_a - total vehicle mass, kg;
V - initial braking speed, km/h;
V_{max} - rated maximum speed, km/h;
P - brake pipe pressure, MPa;
P_{max} - maximum brake pipe pressure, MPa;
M_B - braking torque, N•m;
M_e - rated braking torque, N•m;
j - braking deceleration, m/s^2.
K - stability coefficient of braking torque i.e. the ratio of the minimum braking torque and the maximum braking torque in the same test;
K_{front} - stability coefficient of front-wheel brake torque;
K_{back} - stability coefficient of rear brake torque;
$V_{at\ (m-n)}$ - speed stability - under the rated pipe pressure the ratio of the difference between the braking torque at the initial braking speed of m km/h and the braking torque at the initial braking speed of n km/h to the braking torque at the initial braking speed m km/h, %.

4 Classification

The linings are classified into 4 categories according to their applications (see Table 1).

Table 1 – Lining Category

Category	Application	Category	Application
Category 1	Vehicle parking brake	Category 3	Medium and heavy vehicle drum brake
Category 2	Micro and light vehicle drum brake	Category 4	Disk brake

5 Technical requirements

5.1 Appearance quality

Linings should not be cracked, blistered, nor have rugged surfaces or warping which may affect their application.

5.2 Dimension deviation

The customer defines the basic dimensions of the linings; the dimension tolerances of width and thickness should conform to the requirements set out in Table 2.

Table 2 - Dimension Deviation

Linings		Basic dimension, mm	Tolerance, mm
Category 1 Category 2 Category 3	Width	•30	±0.30
		• 30• 60	±0.50
		• 60• 100	±0.70
		• 100	±1.00
	Thickness	•6.5	±0.15
		• 6.5• 10	±0.20
		• 10	±0.25
Category 4	Thickness	•10	±0.30
		• 10• 20	±0.40
		• 20• 30	±0.50
		• 30	±0.60
Note: In the case of special requirements these tolerances may be ignored.			

5.3 Friction performance

5.3.1 The lining friction coefficient, its tolerance and wear should conform to the requirements set out in Tables 3 to 6.

5.3.2 After the test, no cracks, bulging etc. affecting the application should be emitted from the sample plate; the test plate should not leave any obvious scratches on the disk friction surface.

Table 3 – Category 1 Friction Performance

Item	Test temperature[1]		
	100 °C	150 °C	200 °C

Friction coefficient[2] (•)	0.30• 0.70	0.25• 0.70	0.20• 0.70
Friction coefficient appointed tolerance (•)	±0.10	±0.12	±0.12
Wear (V), $10^{•7} cm^3/(N·m)$ •	1.00	2.00	3.00
1) The test temperature refers to the temperature on the disk friction surface of the test machine. 2) The friction coefficient range covers the tolerance.			

Table 4 – Category 2 Friction Performance

Item	Test temperature[1]			
	100 °C	150 °C	200 °C	250 °C
Friction coefficient[2] (•)	0.25• 0.65	0.25• 0.70	0.20• 0.70	0.15• 0.70
Friction coefficient appointed tolerance (•)	±0.08	±0.10	±0.12	±0.12
Wear (V), $10^{•7} cm^3/(N·m)$ •	0.50	0.70	1.00	2.00
1) The test temperature refers to the temperature on the disk friction surface of the test equipment. 2) The friction coefficient range covers the tolerance.				

Table 5 – Category 3 Friction Performance

Item	Test temperature[1]				
	100 °C	150 °C	200 °C	250 °C	300 °C
Friction coefficient[2] (•)	0.25• 0.65	0.25• 0.70	0.25• 0.70	0.20• 0.70	0.15• 0.70
Friction coefficient appointed tolerance (•)	±0.08	±0.10	±0.12	±0.12	±0.14
Wear (V), $10^{•7} cm^3/(N•m)$ •	0.50	0.70	1.00	1.50	3.00
1) The test temperature refers to the temperature on the disk friction surface of the test equipment. 2) The friction coefficient range covers the tolerance.					

Table 6 – Category 4 Friction Performance

Item	Test temperature[1]					
	100 °C	150 °C	200 °C	250 °C	300 °C	350 °C
Friction coefficient[2] (•)	0.25• 0.65	0.25• 0.70	0.25• 0.70	0.25• 0.70	0.25• 0.70	0.20• 0.70
Friction coefficient appointed tolerance (•)	±0.08	±0.10	±0.12	±0.12	±0.14	±0.14
Wear (V), $10^{•7} cm^3/(N·m)$ •	0.50	0.70	1.00	1.50	2.50	3.50
1) The test temperature refers to the temperature on the disk friction surface of the test machine. 2) The friction coefficient range covers the tolerance.						

5.4 Braking performance

5.4.1 Category 2 and Category 4 linings used in cars should conform to the braking performance requirements set out in Table 7.

Table 7 – Braking Performance of Brake Linings for Cars

Serial Number	Test Item	Performance Requirement	
1	First time efficiency (before running-in)	V = 50km/h, P = P_{max}	j • 6.1m/s^2
			K • 0.75
		V = 80km/h, P = P_{max}	j • 5.8m/s^2
			K • 0.65

		V = 100km/h, P = P_{max}	$j \geq 5.2\text{m/s}^2$
			$K \geq 0.55$
2	Second time efficiency (after running-in)	V = 50km/h, P = P_{max}	$j \geq 7.8\text{m/s}^2$
			$K_{front} \geq 0.75$
			$K_{back} \geq 0.75$
		V = 80km/h, P = P_{max}	$j \geq 7.3\text{m/s}^2$
			$K_{front} \geq 0.65$
			$K_{back} \geq 0.55$
		V = 100km/h, P = P_{max}	$j \geq 6.8\text{m/s}^2$
			$K_{front} \geq 0.65$
			$K_{back} \geq 0.55$
		V = 130km/h, P = P_{max}	$j \geq 6.1\text{m/s}^2$
			$K_{front} \geq 0.60$
			$K_{back} \geq 0.45$
		at 50km/h under pipe pressure of 7.8m/s^2	V = 80km/h• $j \geq 7.1\text{m/s}^2$
			V = 100km/h• $j \geq 6.4\text{m/s}^2$
			V = 130km/h• $j \geq 5.5\text{m/s}^2$
3	First heat fade and recovery	Braking at V = 100km/h and pipe pressure to decelerate the vehicle to 4.5m/s^2, the braking cycle = 35s, the fourth braking torque fading rate (ratio of the difference between the first braking torque and the fourth braking torque to the first braking torque) is not higher than 40%.	
		The first braking deceleration of the recovery test is not lower than 1.5m/s^2	
		The difference between the twelfth braking deceleration (braking torque) and the reference deceleration (braking torque) in the recovery test is not higher than 23%.	
4	Second heat fade and recovery	At V = 100km/h the eighth braking torque fading rate is not higher than 40%.	
		The first braking deceleration of the recovery test is not lower than 1.5m/s^2.	
		The difference between the twelfth braking deceleration (braking torque) and the reference deceleration (braking torque) in the recovery test is not higher than 23%.	
5	Third time efficiency	V = 50km/h, P = P_{max}	$j \geq 7.8\text{m/s}^2$
			$K_{front} \geq 0.75$
			$K_{back} \geq 0.75$
		V = 80km/h, P = P_{max}	$j \geq 7.3\text{m/s}^2$
			$K_{front} \geq 0.70$
			$K_{back} \geq 0.65$
		V = 100km/h, P = P_{max}	$j \geq 6.8\text{m/s}^2$
			$K_{front} \geq 0.65$
			$K_{back} \geq 0.55$
		V = 130km/h, P = P_{max}	$j \geq 6.1\text{m/s}^2$
			$K_{front} \geq 0.60$
			$K_{back} \geq 0.45$
6	Appearance check after test	There should no scratches on the brake drum (disk) working surface; the linings are intact and without any obvious cracks.	

5.4.2 Category 3 and Category 4 linings used in goods vehicles and buses should conform to the braking performance requirements set out in Table 8.

Table 8 – Braking Performance of Brake Linings for Goods Vehicles and Buses

Serial Number	Test Item		Performance Requirement
1	First running-in test		At 1800kg $\cdot$ G_a $\cdot$ 6000kg and with 80% contact area the running-in is 200; At $G_a \cdot$ 6000kg and with 80% contact area the running-in is 500.
2	First efficiency test	V = 30km/h, P = P_{max}	$M_e \cdot M_b \cdot$ 1.3M_e
		V = 50km/h, P = P_{max}	
		V = 80%V_{max}, P = P_{max}	
3	Speed stability		$V_{st(50-30)}$ $\cdot$ 10%
			$V_{st(70-30)}$ $\cdot$ 20%
4	First fading recovery test		At 1800kg $\cdot$ Ga $\cdot$ 6000kg the absolute fading rate (ratio of the difference between the first braking torque and the tenth braking torque to the first braking torque) is not higher than 40%; At Ga $\cdot$ 6000kg the absolute fading rate is not higher than 25%.
			The absolute recovery rate (ratio of the difference between the last braking torque and the reference braking torque to the reference braking torque) is not higher than 20%.
5	Second efficiency test	V$\cdot$30km/h, P = P_{max}	$M_e \cdot M_b \cdot$ 1.3M_e
		V$\cdot$50km/h, P = P_{max}	
		V$\cdot$80%V_{max}, P = P_{max}	
6	Speed stability		$V_{st(50-30)}$ $\cdot$ 10%
			$V_{st(70-30)}$ $\cdot$ 20%
7	Second fading recovery test		The absolute fading rate (ratio of the difference between the maximum braking torque and the minimum braking torque to the maximum braking torque of the pipe unit pressure) is not higher than 60%.
8	Third efficiency test	V$\cdot$30km/h, P = P_{max}	$M_e \cdot M_b \cdot$ 1.3M_e
		V$\cdot$50km/h, P = P_{max}	
		V$\cdot$80%, P = P_{max}	
9	Speed stability		$V_{st(50-30)}$ $\cdot$ 10%
			$V_{st(70-30)}$ $\cdot$ 20%
10	Appearance check after test		There should no scratches on the brake drum (disk) working surface; the linings are intact and without any obvious cracks.

5.5   Shear strength

5.5.1   The shear strength of Category 2 (bonding type) lining should not lower than 1.5MPa.

5.5.2   The shear strength of Category 4 (bonding type) lining should not lower than 2.5MPa.

5.6   Impact strength

5.6.1   The impact strength of Category 3 lining should not lower than 0.3 J/cm^2.

5.7   Swell

5.7.1   The swell of Category 4 lining at than 200 ^{o}C should not be higher than 2.5%.

5.8   Compressibility

5.8.1   The compressibility of Category 4 lining at room temperature should not higher than 2% and at 400 ^{o}C should not be higher than 4%.

5.8.2   The compressibility of Category 2 and Category 3 lining at room temperature should not higher than 2% and at 200 ^{o}C should not higher than 4%.

6   Test method

6.1   Appearance quality check

Appearance quality is checked through visual observations and knocking sound.

6.2   Dimension measurement

Width and thickness are measured by vernier calliper with an accuracy of 0.02mm.

6.3   Friction performance test

6.3.1   Test plate

6.3.1.1 Make two test plates from the same lining.

6.3.1.2 The friction surface size of the test plate should be 25mm x 25mm with tolerance of -0.2mm to 0mm.

6.3.1.3 The thickness of the test plate should be 5mm to 7mm and the thickness difference between the two test plates should be lower than 0.2mm. If the thickness of the lining product is less than 5mm, the original thickness should be adopted.

6.3.2   Test equipment

A friction test machine with a fixed speed should be used. See Appendix A.

6.3.2.1 The distance between the centre of the test plate and the centre of rotating shaft should be 0.1mm.

6.3.2.2 The disk material is trademark HT250 grey cast iron of GB/T 9439 with

hardness grade H195 (180HB ~ 220HB); the disk metallography is pearlite. The surface should be processed with sand paper of medium granularity of P240 of JB/T 7498.

6.3.2.3 Friction is measured using an automatic recorder.

6.3.2.4 The disk friction surface temperature (hereinafter abbreviated to 'disk temperature') should be tested by applying a silver plate welded with a thermocouple to the disk friction surface with a force of 0.1N to 0.2N; the test position should be the centre line of the width of the disk friction area and at 50mm to 100mm along the rotating direction from the test plate centre. See Appendix B.

6.3.2.5 The heating and cooling devices should be located inside the disk; the disk temperature can be adjusted from $100\,^{o}C$ to $350\,^{o}C$.

6.3.3   Test condition

6.3.3.1 The test temperature tolerance should be $\pm 10\,^{o}C$

6.3.3.2 The disk constant speed should be set from 480 r/min to 500r/min.

6.3.3.3 The test plate pressure should be 0.98MPa.

6.3.3.4 The friction direction should be the same as the friction direction of the lining.

6.3.4   Test procedure

Fix the two test plates to the plate support arm and carry out the test according to the following sequence:

6.3.4.1 Run in the test plates until the contact area reaches above 95% at $100\,^{o}C$. After the test plates have cooled to room temperature, measure the thickness of the test plates with a calliper with an accuracy of 0.01mm. Make 5 test points for each plate and take the average arithmetic value.

6.3.4.2 At the test temperature of $100\,^{o}C$, measure the friction of 5,000 disk rotations according to 6.3.3; or divide 5000 disk rotations into equal 10 to 20 sections and measure the friction of 250 to 500 rotations. Measure the thickness after the friction test according to 6.3.4.1.

6.3.4.3 At the test temperatures of $150\,^{o}C$, $200\,^{o}C$, $250\,^{o}C$, $300\,^{o}C$ and $350\,^{o}C$ carry out the same test as stipulated in 6.3.4.2. The highest test temperature set out in Tables 3 to 6 should be applied to each category of linings.

Note: 1) During each temperature period the disk temperature should be raised to the defined test temperature within 1,500 rotations.
2) The increasing temperature of the disk depends on the friction. If the defined temperature cannot be reached within 1,500 rotations, an aided heating device can be used.

6.3.4.4 After the highest temperature test and at the temperature decrease of every 50°C, measure the friction of 1,500 rotations of the disk until the temperature reaches 100°C, the temperature decrease from the last phase to the next phase should be completed within 500 rotations.

6.3.4.5 After the test, take a visual examination of the appearance of the test plates and the disk friction surface.

6.3.5 Calculation

6.3.5.1 The friction coefficient at each test temperature is calculated using formula (1).

$$\bullet = \frac{f}{F} \quad\text{.. (1)}$$

In the formula:
f - friction (the average friction value from the second half of stable friction in the total friction distance), N;
F – the normal force applied on the test plate (the pressure on the plate $\times$ the area of the plate), N.

6.3.5.2 The wear at each test temperature is calculated using formula (2).

$$V = \frac{1}{2\pi R} \times \frac{A}{n} \times \frac{d_1 - d_2}{f_m} = 1.06 \times \frac{A}{n} \times \frac{d_1 - d_2}{f_m} \quad\text{.................................... (2)}$$

In the formula:
V - wear, cm^3 / (N•m);
R – distance from the centre of the test plate to the centre of rotating shaft (0.15 m);
n – total rotation number of the disc in the test;
A - entire friction area of the test plate, cm^2;
d_1 - average thickness of the test plate before the test, cm;
d_2 - average thickness of the test plate after the test, cm;
f_m - overall average friction during the test, N.

Note: The result of the wear (V) should not be a negative value.

6.4 Braking performance test

6.4.1.1 The braking performance test for linings used in cars should be carried out according to the provisions of QC / T 564-1999.

6.4.1.2 The braking performance test for linings used in goods vehicles and buses should be carried out according to the provisions of QC / T 479-1999.

6.5 Shear strength performance test

The shear strength test should be carried out according to the provisions of GB / T xxxx Road vehicles - Brake linings - Shear strength test method of disk brake pad and drum brake shoe assembly.

6.6 Impact strength performance test

6.6.1 Test sample

6.6.1.1 Test samples should be taken from the middle of the product, perpendicular to the direction of friction. Take 5 samples for each test.

6.6.1.2 The length of the sample should be 55 mm ± 0.5mm, the width 6 mm ± 0.2mm, and the thickness 10 mm ± 0.2mm. The area of the sample's width direction is the pressure area of the product. The dimension of the sample is shown in Figure 1.
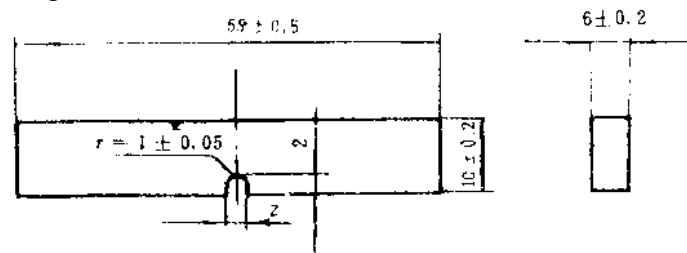
Figure 1 – Dimension of Sample

6.6.1.3 The width and thickness of the test sample should be taken from the arithmetic average of 3 points measured in the middle of the sample. The thickness of the sample should be taken from the arithmetic average of the width measured on the side of two notches.

6.6.2 Test equipment

6.6.2.1 A simple beam support pendulum impact test machine with impact energy grades of 0.9807J and 3.9228J is used.

6.6.2.2 The dimensions and mutual relation of the pendulum, sample and support are shown in Appendix C.

6.6.3 Test procedure

6.6.3.1 Adjust the distance between the pivots to 40 mm ± 0.2mm.

6.6.3.2 Select a suitable pendulum to meet the requirements set out in 6.5.2.3.

6.6.3.3 Calibrate the zero point of the dial of the test machine and place the pendulum onto the hook.

6.6.3.4 The sample should be positioned horizontally on the support with the back of the notches receiving the impact load. The impact knife-edge should strike to the whole width line of the sample facing the centre line of the notches.

6.6.3.5 To begin the test, carefully release the locking hook so as to allow the pendulum to drop down freely. The sample will receive the impact load from the pendulum. Read the dial to find the amount of consumed energy.

6.6.3.6 If the breaking point is not at the notch area the test will be void and the test data will be invalid. In this case, repeat the test with another sample.

6.6.4 Calculation

The impact strength of the sample is calculated using formula (3):

$$\alpha_k = \frac{A_k}{b \cdot d} \quad \text{...} \quad (3)$$

In the formula:
- α_k- impact strength of the sample, J/cm^2;

A_k – consumed energy by the sample, J;

b - width of middle area of the sample, cm;

d – residual thickness at the sample's notch area, cm.

6.7 Swell test

The swell test is carried out according to GB/T xxxx.

6.8 Compressibility test

The compressibility test is carried out according to GB/T xxxx.

7 Inspection rules

7.1 Batching principle

A delivery of linings with the same materials or specification is deemed as one batch. If the amount is too large, it can be divided as several smaller batches.

7.2 Sampling method and determination rules

7.2.1 The appearance and dimension deviations of the linings should be checked through random sampling inspections. Apply the normal single sampling procedure with the special inspection level S-4 and AQL value of 2.5 in accordance with GB/T 2828. The sampling number for different batches, the determinant of qualified or unqualified should conform to the provisions set out in Table 9.

Table 9

Batch quantity	Sampling number	Qualified determinant number	Unqualified determinant number
• 150	8	0	1
151to 500	13	1	2
501to 1200	20	1	2
1201to 10000	32	2	3
• 10000	50	3	4

7.2.2 The friction performance, shear strength (bonding type), swell, compressibility and impact strength should be randomly sampled according to the provisions set out in Table 10. If the friction performance and impact strength of every sample meets the requirement of this standard, the batch of products is deemed to have qualified; if the arithmetic average of the shear strength (bonding type), swell and compressibility of all samples meet the requirements of this standard, the batch of products is deemed to have qualified.

If any one test item fails in the abovementioned test items, further samples should be taken and the test should be repeated. If the test results from the repeated tests meet the requirements of this standard, the item is deemed to have qualified; if there is still one area in which the product fails, the batch of products is deemed to be unqualified.

Table 10

Batch quantity	Friction performance	Shear strength (bonding type)	Impact strength	Swell	Compressibility
• 10000	1	5	1	6	6
• 10000	2	10	2	12	12

7.2.3 To carry out the braking performance test, take any one set of the product containing the same materials and processes and the same product category, and carry out the test. If the test results meet the requirements set out in this standard, the item is deemed to have qualified. If the test does not meet the requirements of this standard, take another two sets and repeat the test. If both sets meet the requirements, the item does qualify; otherwise the item is deemed to be unqualified.

7.2.4 If all of the test items are passed successfully, the product batch is deemed to have qualified. If any one item fails to pass, the product batch is deemed to be unqualified.

7.3 Inspection classification

7.3.1 Final factory inspection

See Table 11 for the final factory inspection items.

Table 11

Product category	Final factory inspection item	Model inspection item
Category 1	Appearance, dimension, friction performance	Appearance, dimension, friction performance
Category 2	Appearance, dimension, friction performance, shear strength (bonding type)	Appearance, dimension, friction performance, shear strength (bonding type), compressibility, braking performance
Category 3	Appearance, dimension, friction performance, impact strength, compressibility	Appearance, dimension, friction performance, impact strength, compressibility, braking performance
Category 4	Appearance, dimension, friction performance, shear strength (bonding type), swell, compressibility	Appearance, dimension, friction performance, shear strength (bonding type), swell, compressibility, braking performance

7.3.2 Model inspection

See Table 11 for the model inspection items.
A model inspection should be carried out:

a) when production is restarted after a long suspension of the product;
b) when materials or processes that could noticeably affect the performance of the product are altered;
c) when considerable differences are found between the final factory inspection and the last model inspection;
d) when the national quality supervision and inspection authorities require an inspection to be carried out;
e) after one year of normal continuous production.

8   Marking, packaging, transportation and storage

8.1   Marking

8.1.1 The manufacturer or trademark, production date or batch number should be printed on the non-working side of linings.

8.1.2 The product name, model specification, name of manufacturer and/or trademark, address, product quantity, friction coefficient appointed, packing inspection date and code number of this standard should be printed on the 4 sides of the packing box (case) of linings.

8.2   Packing

8.2.1 The linings should be packed compactly and orderly in clean, dry, ruggedised boxes (cases).

8.2.2 The product qualification certificate should be enclosed in each packing box (case).

8.3   Transportation

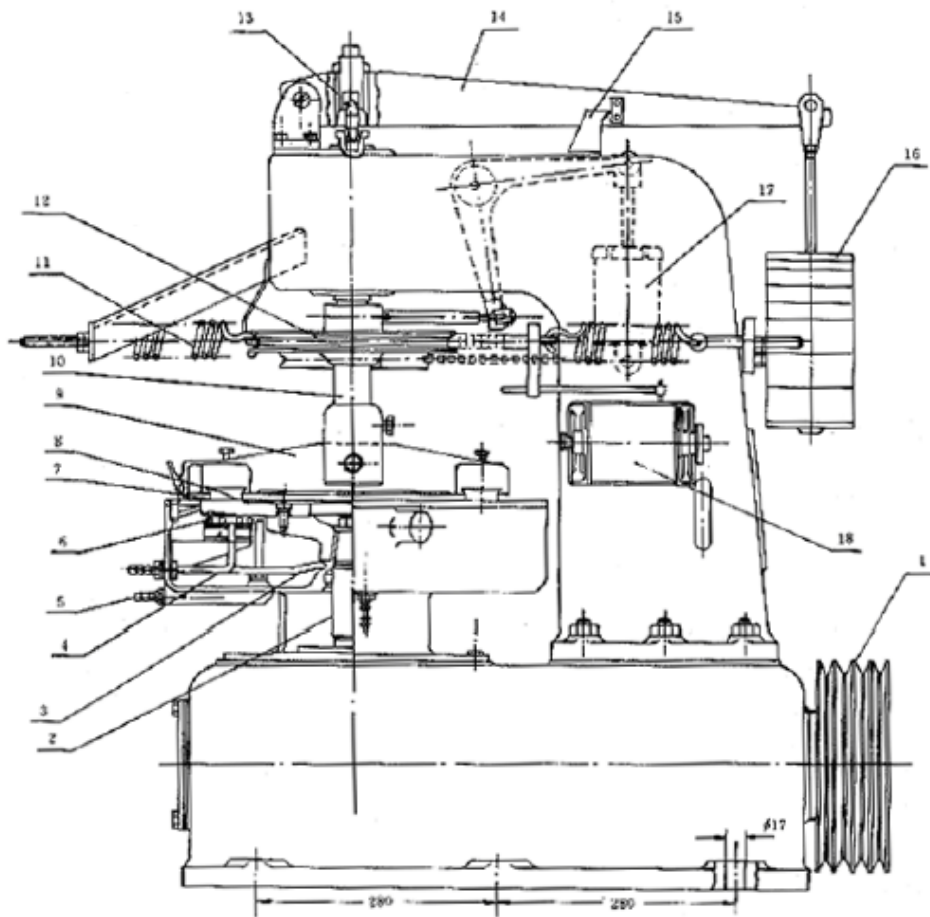The linings should not be damaged or contaminated by oil or water during transportation.

8.4   Storage

The linings should be stored in well-ventilated and dry indoor locations with even flooring.

Appendix A

(Information appendix)

Fixed speed friction test machine

1 – belt pulley; 2 – rotating shaft; 3 – shaft cooling water jet nozzle; 4 – cooling water jet nozzle (fine adjustment); 5 – cooling water jet nozzle (coarse adjustment); 6 – aided heating device; 7 – test plate; 8 – friction disk; 9 – test plate support arm; 10 – pressing shaft; 11 – spring for friction measurement; 12 – chain wheel; 13 – lever horizontal adjustment device; 14 – load lever; 15 – lever horizontal level indicator; 16 – weight; 17 – oil buffer; 18 – friction recording drum

Figure A - Fixed speed friction test machine

Appendix B

(Normative appendix)

Disk temperature test device and test position
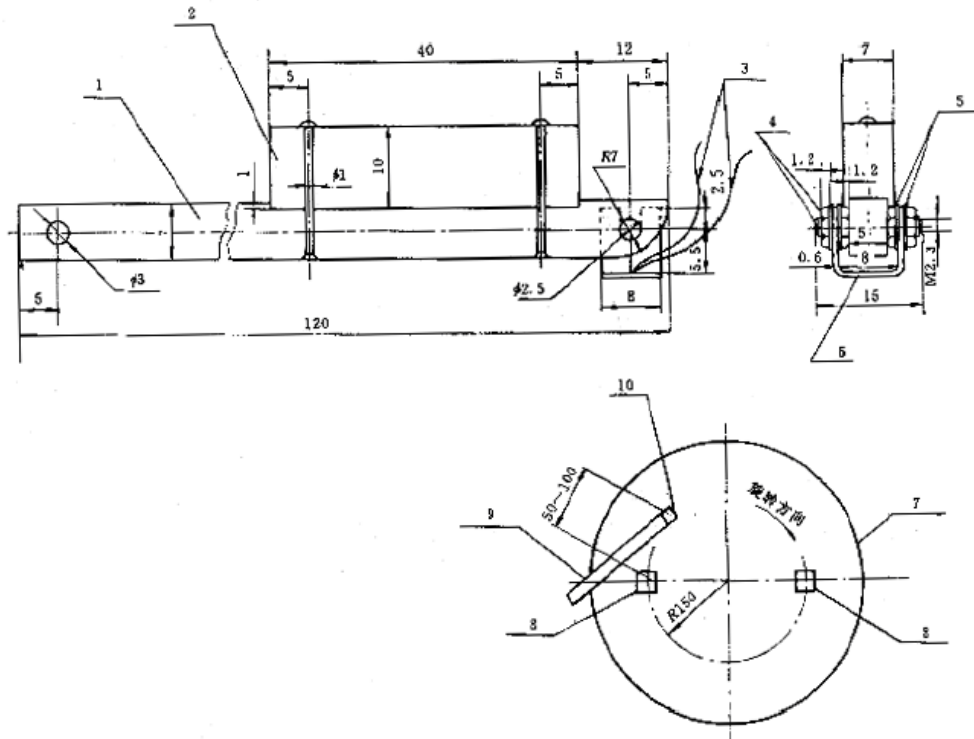
1 – bakelite; 2 – low carbon steel; 3 – thermocouple; 4 – brass; 5 – mica plate; 6 – silver plate; 7 – friction disk; 8 – test plate; 9 – temperature measurement device; 10 – temperature measurement position

Figure B - Disk temperature test device and test position

Appendix C

(Normative appendix)

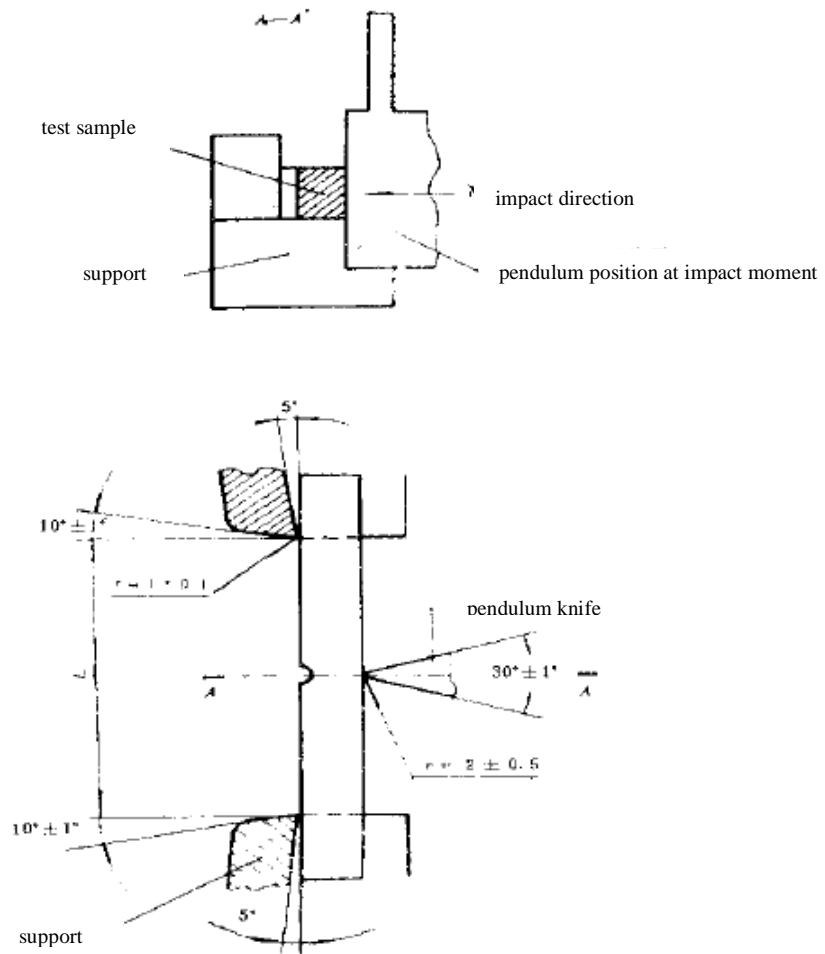## Mutual relation of pendulum, test sample and support

Figure C - Mutual relation of pendulum, test sample and support

L – Distance between support points