QC

AUTOMOBILE INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

QC/T 564-2008

Replacing QC/T 564-1999 and QC/T 582-1999

Performance Requirements and Bench Test Methods for Passenger Car Brake

乘用车制动器

性能要求及台架试验方法

Issued on: June 4, 2008 **Implemented on: November 1, 2008**

Issued by: National Development and Reform Commission of the People's Republic of China

Attachment:

Numbers and Names of 8 Automobile Industry Standards

S.N.	Standard no.	Standard name	Standard no. replaced
289	QC/T 79.1-2008	*Road Vehicles – Coiled Pipe Assemblies for Pneumatic Braking Connection between Motor Vehicles and Towed Vehicles – Part 1: Dimensions*	QC/T 79-1993
290	QC/T 79.2-2008	*Road Vehicles – Coiled Pipe Assemblies for Pneumatic Braking Connection between Motor Vehicles and Towed Vehicles – Part 2: Performance Requirements*	QC/T 79-1993
291	QC/T 311-2008	*Performance Requirements and Bench Test Methods for Automobile Brake Master Cylinder*	QC/T 311-1999
292	QC/T 564-2008	*Performance Requirements and Bench Test Methods for Passenger Car Brake*	QC/T 564-1999 QC/T 582-1999
293	QC/T 800-2008	*Method of Bed Test of Continuously Variable Transmission for Motorcycles and Mopeds*	
294	QC/T 235-2008	*Specifications and Test Methods for Exhaust Muffler of Motorcycles and Mopeds*	QC/T 235-1997
295	QC/T 61-2008	*Specifications and Test Methods on Intensifying Test for Engine of Motorcycles and Mopeds*	QC/T 61-1993
296	QC/T 801-2008	*Technical Requirements and Testing Methods of Reed Valve Type Second Air Injectors for Motorcycles and Mopeds*	

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Foreword

This standard revises *QC/T 564-1999, Limousine Brake Bench Test Method, and QC/T 582-1999, Limousine Brake Performance Requirements*; this revision incorporates QC/T 564-1999 and QC/T 582-1999.

Compared with QC/T 564-1999 and QC/T 582-1999, the main changes of this Standard are as follows:

-- it modifies the method for calculation of rotation inertia;

-- it modifies the initial braking speed and performance requirements for efficiency test;

-- it modifies fade test conditions and evaluation method;

-- it adds abrasion test; and

-- it adds the method for taking braking torque value.

From the date of implementation, this Standard replaces QC/T 564-1999 and QC/T 582-1999.

Annex A of this Standard is normative.

The main drafting organizations of this Standard: China FAW Group Corporation R&D Center, Chongqing Automobile Research Institute, Zhejiang Asia-Pacific Mechanical & Electronic Co., Ltd. and Hebei Xingyue Braking Element Co., Ltd.

The main drafters of this Standard: Lin Dahai, Wang Min, Mei Zongxin, Huang Guoxing and Shen Kunrui.

The editions of the standard replaced by this Standard are as follows:

-- JB 3980-1985 and JB 4200-1986;

-- QC/T 564-1999 and QC/T 582-1999.

Performance Requirements and Bench Test Methods for Passenger Car Brake

1 Application Scope

This standard specifies the performance requirements and bench test methods for passenger car brake.

This standard applies to passenger car brake assemblies and friction lining (lining block) assemblies for vehicles of category M_1 specified in GB/T 15089.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 15089, *Classification of Power-driven Vehicles and Trailers*

QC/T 556, *Road Vehicle Brakes – Temperature Measurement and Thermocouple Installation*

3 Terms and Definitions

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

3.1

braking period

the time of a continuous braking process from the start of this braking to the start of the next braking

NOTE Braking period is expressed in s.

the ratio of average braking torque to average braking pressure within a braking process

3.8

final braking temperature

the maximum temperature of braking drum (disc) or friction lining (lining block) during a braking process or after braking

NOTE Final braking temperature is expressed in °C.

3.9

fade rate

the degree of fall and rise of braking torque during fade test, in percentage. And it is calculated in accordance with Equations (1) and (2).

$$F_{ai} = \frac{(M_{Bi}/p_{Bi}) - (M_{Bmin}/p_{Bmin})}{(M_{Bi}/p_{Bi})} \times 100\% \quad \cdots\cdots (1)$$

$$F_{ai} = \frac{(M_{Bi}/p_{Bi}) - (M_{Bmax}/p_{Bmax})}{(M_{Bi}/p_{Bi})} \times 100\% \quad \cdots\cdots (2)$$

where

F_{ai} – fade rate of the i^{th} fade test, in %;

M_{Bi} – average braking torque value of the 1st braking during fade test, in Nm;

P_{Bi} – average braking pressure of the 1st braking during fade test, in MPa;

M_{Bmin} – average braking torque value relative to the braking with the minimum unit average braking torque between the 2nd braking and the last braking, in Nm;

P_{Bmin} – average braking pressure value relative to M_{Bmin} in fade test, in MPa;

M_{Bmax} – average braking torque value relative to the braking with the max unit average braking torque between the 2nd braking and the last braking, in Nm; and

P_{Bmax} – average braking pressure value relative to M_{Bmax} in fade test, in MPa.

3.10

recover rate

The requirements for the abrasion loss of brake friction lining (lining block) and braking drum (disc) shall be as agreed by the supplier and the purchaser.

5 Test Requirements

5.1 Requirements for test apparatus

5.1.1 The test apparatus is an inertial brake test bench (single-wheeled or two-wheeled); its performance indexes shall meet all test requirements of this Standard.

5.1.2 Braking pressure supply system of the test apparatus shall meet the requirements of all kinds of braking conditions for braking pressure and maintain stability. The rate of rise and fall of braking pressure shall be controlled within (25 ± 5) MPa/s.

5.1.3 The cooling equipment of brake of the test apparatus shall make the air speed at brake tested 11 m/s and cover the whole brake assembly.

5.1.4 The control errors of braking pressure and rotation speed of the test bench spindle shall be ± 3%. The relative error of rotation inertia (including the inertia of the test bench rotation part) shall be ± 5%.

5.1.5 The system errors of the device recording the parameters such as braking torque, braking pressure and test bench spindle rotation speed shall be ± 1%; the devices and thermocouples recording the temperature of braking drum (disc) and braking friction lining (lining block) shall be as specified in QC/T 556; when the temperature is lower than 300°C, the error of the measuring system shall be ± 3°C and when the temperature is higher than 300°C, it shall be ± 1°C.

5.1.6 The accuracy grade of the instruments or meters indicating all parameters shall not be lower than grade 2.5.

5.2 Other requirements

5.2.1 All test passenger car speeds shall be rounded off to an integral multiple of 5.

5.2.2 Except fade test and that it is specified otherwise, cooling speed for the test is 11 m/s and temperature of cooling air is room temperature.

5.2.3 Unless specified otherwise, final braking speeds of all tests are zero.

5.2.4 When measuring braking noise, place the sound head of the sound level meter in the rotation plane of brake to be tested, 500 mm right above the rotation axis; mount the sound head in the wind guard.

$$G_m = \frac{G_a(a - 0.45h_g)}{2L}$$

where

G_a – total mass of passenger car under full load, in kg;

L – distance between shafts of passenger car, in m;

h_g – gravity center height of passenger car under full load, in m;

b – distance from gravity center to rear shaft, in m; and

a – distance from gravity center to front shaft, in m.

6.4 Braking deceleration required by the test is converted into the braking torque control value of the test bench in accordance with Equation (8).

$$M_c = J_c I/r \quad \cdots\cdots (8)$$

where

M_c – braking torque control value of the test bench, Nm; and

J_c – braking deceleration required by the test, m/s^2.

7 Test Methods and Conditions

7.1 Performance test for brake

7.1.1 Inspection before running-in

a) initial braking speed: 50 km/h;

b) average braking deceleration: 3 m/s^2;

c) initial braking temperature shall not be greater than 100°C, but braking period shall not be less than 30 s; and

d) number of brakings: 10.

7.1.2 First efficiency test:

a) initial braking temperature [refer to the temperature of friction lining (lining block), the same below]: (80 ± 2) °C;

b) initial braking speed: 30% V_{max} ≤ 80 km/h and 55% V_{max} ≤ 100 km/h;

c) take 5 points within the specified braking pressure range and try to make the intervals between all test points equal. Carry out one test for each braking pressure relative to all initial braking speeds; and

d) record initial braking speed, initial braking temperature, final braking temperature, braking time, braking pressure and output braking torque of each test.

7.1.3 First running-in test

a) initial braking temperature: ≤ 120°C;

b) initial braking speed:

65 km/h, when V_{max} ≤ 140 km/h;

80 km/h, when V_{max} ≥ 140 km/h.

c) braking deceleration: 3.5 m/s^2.

NOTE Constant input mode can be used during the test, but braking pressure shall be adjusted in accordance with the variations of braking torque to ensure that average braking deceleration is close to the required value as much as possible.

d) carry out brake for 200 times or make the contact area of braking friction lining (lining block) and braking drum (disc) achieve more than 80%.

7.1.4 Second efficiency test:

Except the addition of initial braking speed test 80% V_{max} ≤ 160 km/h, the others are the same as 7.1.2.

7.1.5 Second running-in test:

Except that the number of brakings is changed to 20, the others are the same as 7.1.3.

7.1.6 First fade recover test:

7.1.6.1 Benchmark test:

a) initial braking temperature: (80 ± 2) °C;

b) initial braking speed: 50 km/h;

c) braking deceleration: 3 m/s^2;

of measuring points layout). Measure the inner diameter of braking drum or the thickness of braking disc at not less than 3 measuring points, if necessary.

7.2.3 Abrasion test:

7.2.3.1 Disc brake:

a) initial braking speed: 60 km/h;

b) braking deceleration: 3 m/s^2;

NOTE Constant input mode can be used during the test, but braking pressure shall be adjusted in accordance with the variations of braking torque to ensure that average braking deceleration is close to the required value as much as possible.

c) initial braking temperature: 100°C, 200°C, 300°C and 400°C;

d) number of brakings: 100 for each initial braking temperature;

e) after each initial braking temperature test, measure the thickness of friction lining block in accordance with 7.2.2 and calculate average abrasion loss; and

f) when initial braking temperature is 100°C, 200°C or 300°C, carry out temperature rise in accordance with the test conditions specified in 7.2.1; when initial braking temperature is 400°C, carry out temperature rise at initial braking speed 80 km/h and braking deceleration 4.41 m/s^2.

7.2.3.2 Drum brake:

a) initial braking speed: 60 km/h; and

b) braking deceleration: 3 m/s^2.

NOTE Constant input mode can be used during the test, but braking pressure shall be adjusted in accordance with the variations of braking torque to ensure that average braking deceleration is close to the required value as much as possible.

c) initial braking temperature: 100°C, 200°C, 300°C and 400°C;

d) number of brakings: 300 for each initial braking temperature;

e) after each initial braking temperature test, measure the thickness of friction lining block in accordance with 7.2.2 and calculate average abrasion loss; and

f) when initial braking temperature is 100°C, carry out temperature rise in accordance with the test conditions specified in 7.2.1; when initial braking