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**Service brake dynamometer squeal noise test methods for
passenger cars**

乘用车行车制动器噪声台架试验方法

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Announcement of Ministry of Industry and Information Technology of PRC

No.10 of 2022

The Ministry of Industry and Information Technology approved 555 industry standards, such as the "Regulations on mechanical design of chemical plant pipelines" (see Annex 1). Among them, it includes 4 chemical industry standards, 8 petrochemical industry standards, 5 non-ferrous metal industry standards, 3 building materials industry standards, 156 machinery industry standards (including pharmaceutical equipment), 45 automobile industry standards, 6 shipping industry standards, 48 aviation industry standards, 68 light industry standards, 103 textile industry standards, 6 packaging industry standards, 18 electronics industry standards, 85 communication industry standards. It has approved the amendment of one automobile industry standard of "Tail lifting lifts for vehicles" (see Annex 2). It has approved the foreign language versions of 11 industry standards, such as "Travel luggage and bags" (see Annex 3), including 8 light industry standards, 2 textile industry standards, 1 electronics industry standard. It has approved 79 industry standard samples including "Standard sample of Sorbitite content in high carbon steel wire rod" (see Annex 4), including 78 metallurgical industry standards and 1 non-ferrous metal industry. They are all hereby announced. The industry standard amendment list and industry standard samples will be implemented from the date of release.

The above chemical industry standards (engineering construction) and automobile industry standards are published by Beijing Science and Technology Press. The petrochemical industry standards are published by Sinopec Press. The non-ferrous metal industry standards (engineering construction) are published by China Planning Press. The building material standards are published by China Building Materials Industry Press. The machinery industry standards are published by Machinery Industry Press. The machinery (pharmaceutical equipment) industry standards, textile industry standards (including foreign language versions) and packaging industry standards are published by China Standard Publishing House. The ship industry standards are published under the organization by China Shipbuilding Industry Comprehensive Technical and Economic Research Institute. The aviation industry standards are published under the organization of the China Aviation Comprehensive Technology Research Institute. The light industry standard (including the foreign language version) is published by the China Light Industry Publishing House. The electronics industry standard (including the foreign language version) is published, under the organization of the China Electronics Institute of Technical Standardization. The communication industry standard is published by the People's Posts and Telecommunications Press.

Attachment: Number, standard name and implementation dates of 45 automotive industry standards

Ministry of Industry and Information Technology of the People's Republic of China

April 8, 2022

Annex:

Number, standard name and implementation dates of 45 automotive industry standards

No.	Standard No.	Standard name	Replaced standard No.	Date of implementation
177	QC/T 1157-2022	Method of calculating comprehensive energy consumption for unit output of automobile products		2022-10-01
178	QC/T 1158-2022	Method of calculating comprehensive water consumption for unit output of automobile products		2022-10-01
179	QC/T 1159-2022	Guidelines on evaluation of automobile industry green supply chain management		2022-10-01
180	QC/T 1160-2022	Guidelines on evaluation of whole vehicle manufacturing green factory in automobile industry		2022-10-01
181	QC/T 1161-2022	Technical specifications for green-design product assessment - Automobile		2022-10-01
182	QC/T 1162-2022	Honeycomb sandwich structure product for automobile exterior decoration parts		2022-10-01
183	QC/T 1163-2022	Automotive diesel engines - Reduction agent filter for selective catalytic reduction (SCR) system		2022-10-01
184	QC/T 1164-2022	Natural gas filter for road vehicle		2022-10-01
185	QC/T 1165-2022	Carbon canister air filter for gasoline passenger car		2022-10-01
186	QC/T 1166-2022	Streaming mirror view mirror for vehicle		2022-10-01
187	QC/T 1167-2022	Service brake dynamometer squeal noise test methods for passenger cars		2022-10-01
188	QC/T 1168-2022	Performance requirements and bench test methods for vehicle electric air compressor		2022-10-01
189	QC/T 463-2022	Technical requirements and bench test methods for automotive hydrodynamic torque converter assembly	QC/T 29033-1991 QC/T 557-1999 QC/T463-1999	2022-10-01
190	QC/T 792-2022	Motors and controllers for electric motorcycles and electric mopeds	QC/T 792-2007	2022-10-01
191	QC/T 1169-2022	Liquid crystal instrument for automobile		2022-10-01
192	QC/T 1170-2022	Performance film for automotive glass		2022-10-01
193	QC/T 1171-2022	Automotive paint protection film		2022-10-01
194	QC/T 804-2022	Instrument panel assembly and Console assembly for passenger cars	QC/T 804-2014	2022-10-01
195	QC/T 1016-2022	Door trim panel assembly for passenger cars	QC/T 1016-2015	2022-10-01
196	QC/T 768-2022	Toilet of passenger car	QC/T 768-2006	2022-10-01
197	QC/T 580-2022	Mounting dimensions of automobile transmission assembly	QC/T 580-1999	2022-10-01
198	QC/T 1172-2022	Performance requirements and test methods of exhaust muffler for vehicles air brake equipment		2022-10-01
199	QC/T 237-2022	Bench test methods for the performance of automobile parking brake	QC/T 237-1997	2022-10-01

No.	Standard No.	Standard name	Replaced standard No.	Date of implementation
200	QC/T 1173-2022	Road vehicles - Spark-plugs application test methods		2022-10-01
201	QC/T 1174-2022	High voltage fuse of electric vehicles		2022-10-01
202	QC/T 1175-2022	High voltage contactor for electric vehicles		2022-10-01
203	QC/T 1176-2022	Evaporator for automotive air conditioning		2022-10-01
204	QC/T 1177-2022	Condenser for automotive air conditioning		2022-10-01
205	QC/T 633-2022	The seats of passenger vehicles	QC/T 633-2009	2022-10-01
206	QC/T 80-2022	Road vehicles - Polyamide (PA) tubing for air braking systems	QC/T 80-2011	2022-10-01
207	QC/T 1178-2022	Motor vehicle and towed vehicle Pneumatic braking system - Tapped and male fitting		2022-10-01
208	QC/T 1179-2022	Specification for wheel bolts of automobile		2022-10-01
209	QC/T 869-2022	Short-cycle drawn arc welding stud	QC/T 869-2011	2022-10-01
210	QC/T 870-2022	Double end studs $b_m = 1.25d$	QC/T 870-2011	2022-10-01
211	QC/T 871-2022	Double end studs $b_m = 2d$	QC/T 871-2011	2022-10-01
212	QC/T 598-2022	Bolt-for projection welding on the bearing face	QC/T 598-1999	2022-10-01
213	QC/T 599-2022	Overhead projection weld bolts	QC/T 599-2013	2022-10-01
214	QC/T 624-2022	Rubber plugs	QC/T 624-2013	2022-10-01
215	QC/T 603-2022	Clips - Type A	QC/T 603-1999	2022-10-01
216	QC/T 604-2022	Clips - Type B	QC/T 604-1999	2022-10-01
217	QC/T 605-2022	Clips - Type C	QC/T 605-1999	2022-10-01
218	QC/T 606-2022	Clips - Type H	QC/T 606-1999	2022-10-01
219	QC/T 618-2022	Specification for plastic expansion nut	QC/T 618-2013	2022-10-01
220	QC/T 928-2022	Plastic cable and tubing clips with inter-fix hole	QC/T 928-2013	2022-10-01
221	QC/T 929-2022	Plastic cable and tubing clips with side-fix hole	QC/T 929-2013	2022-10-01

Service brake dynamometer squeal noise test methods for passenger cars

1 Scope

This document specifies the terms and definitions, test equipment, test fixtures, test-related requirements and instructions, test preparation, test methods, test data processing for the service brake dynamometer squeal noise test methods for passenger cars.

This document is applicable to passenger cars, which are specified in GB/T 3730.1-2001. The commercial vehicles, whose maximum design gross mass does not exceed 3 500 kg, can make reference to this standard.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, for dated references, only the version corresponding to the date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 3730.1-2001 Motor vehicles and trailers - Types - Terms and definitions

GB/T 3785.1-2010 Electroacoustics - Sound level meters - Part 1: Specifications

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

GB/T 15173 Electroacoustics - Sound calibrators

3 Terms and definitions

The terms and definitions as defined in GB/T 5620, as well as the following terms and definitions, apply to this document.

3.1

Unladen condition

The state of vehicle at which its curb weight is loaded with 110 kg.

Invariable input mode

During a braking process, the control method which keeps the pressure of the input pipeline constant.

3.10**Invariable output mode**

During a braking process, the control method where the braking torque output by the tested brake is always kept constant.

3.11**Pressure profile mode**

In the drag test, the input control method where the brake pressure is changed with time as specified.

4 Test equipment**4.1 General requirements**

The test bench shall have the test capabilities of invariable input mode, invariable output mode, deceleration brake, parking brake, as well as the drag test capacity of invariable input mode and pressure profile mode; meanwhile the drive motor shall have the ability of forward and reverse rotation.

4.2 Control system

The control system shall be able to realize invariable input mode, pressure profile mode or invariable output mode, etc. Its control shall meet the following requirements:

- The rate of increase and decrease of brake pressure shall not be less than 10 MPa/s; the maximum brake pressure shall not be less than 16 MPa;
- When controlled by pressure profile mode, the deviation -- between the average brake pressure control value and the target value (set value) -- shall not exceed ± 0.025 MPa;
- Except for control by pressure profile mode, the brake pressure overshoot of other tests is less than 0.1 MPa;
- When controlled by invariable output mode, the deviation -- between the braking deceleration and the target value (set value) -- shall not exceed 0.5 m/s;
- During the drag test, the speed of the vehicle shall not be lower than 90% of the

specified speed.

4.3 Brake cooling system

The inner diameter of the cooling air pipe shall be $\Phi 200\text{ mm} \sim 320\text{ mm}$; the outlet shall be $300\text{ mm} \sim 400\text{ mm}$ away from the outer diameter of the brake disc (or brake drum); the cooling air flow rate at the outlet shall be 10 m/s . If necessary, the cooling air speed shall be adjusted, to meet the background noise requirements, which are specified in 4.7. When the above requirements cannot be met, it can be implemented, according to the negotiation between the supplier and the buyer; meanwhile the background noise measurement value shall be recorded in the test report.

4.4 Environmental control system

4.4.1 During the standard test and fading test, the cooling air temperature shall be controlled at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. During the cold state test, the cooling air temperature shall be controlled below $10\text{ }^{\circ}\text{C}$ below the initial braking temperature.

4.4.2 When the cooling air temperature is above $0\text{ }^{\circ}\text{C}$, the relative humidity of the cooling air shall be controlled within the range of $50\% \pm 10\%$. When the cooling air temperature is $0\text{ }^{\circ}\text{C}$ or below, only the cooling air temperature shall be controlled.

4.5 Data acquisition system

4.5.1 The data acquisition system shall have the functions of continuous recording and real-time display.

4.5.2 The sampling frequency of the following parameters shall not be lower than 50 Hz :

- The spindle speed of the test bench;
- The brake pressure;
- The brake output torque.

4.5.3 The sampling frequency of the following parameters shall not be lower than 10 Hz :

- The temperature of the brake disc (or drum);
- Cooling air temperature, relative humidity (or absolute humidity), wind speed (or flow rate).

4.6 Brake noise measurement system

4.6.1 The microphone, which is used for noise measurement, shall comply with the requirements of level 2 and above, as specified in GB/T 3785.1-2010.

5.5 According to the type of test fixture, the following driving methods can be selected:

- a) Drive through the flange;
- b) Drive by wheel hub;
- c) Drive directly by the main shaft.

5.6 The type and driving mode of the test fixture shall be recorded in the test report.

6 Test requirements and instructions

6.1 Brake initial temperature control

6.1.1 Brake temperature rise

6.1.1.1 Except for the fading test, when the brake temperature is lower than the required initial braking temperature before the next braking, the temperature shall be raised by dragging, according to the following conditions, until the brake temperature is more than 5 °C higher than that of the next braking:

- When the difference -- between the actual temperature of the brake and the required initial temperature of the brake -- is greater than 30 °C, the drag speed is the speed corresponding to the vehicle speed of 50 km/h; the braking pressure is 2 MPa (disc brake) or 3 MPa (drum brake);
- When the actual temperature of the brake is below 30 °C less than or equal to the required initial brake temperature, the drag speed is the speed corresponding to the vehicle speed of 25 km/h; the brake pressure is 1 MPa (disc brake) or 1.5 MPa (drum brake).

6.1.1.2 For the fading test, when the brake temperature does not meet the requirements of the initial brake temperature, it shall increase the temperature, by dragging at a speed of 80 km/h and a brake pressure equivalent to a brake deceleration of 1.96 m/s²; the drag time shall not exceed 20 s each time.

6.1.2 Brake cooling

When the brake temperature is 5 °C or higher than the initial braking temperature required for the next braking, rotate the brake disc/brake drum, at a speed of 20 km/h, until the difference -- between the brake temperature and the initial braking temperature is less than 5 °C.

6.2 Fading test temperature

See Table 2 for the initial braking temperature of the fading test. Special circumstances shall be determined, through negotiation between the supplier and the buyer, OR

μ - Friction coefficient;

M - Braking torque, in Newton meter ($\text{N} \cdot \text{m}$);

p - Brake pressure, in megapascals (MPa);

p_0 - The braking pressure required when the braking torque reaches $5 \text{ N} \cdot \text{m}$, in megapascals (MPa), which usually takes zero unless otherwise specified;

A_p - The area of the piston on one side of the caliper, in square millimeters (mm^2);

r - The effective friction radius of the brake disc, in meters (m)

η - The braking efficiency, which takes 1, unless otherwise specified.

6.4 Efficiency factor of drum brake

The efficiency factor of the drum brake is calculated according to formula (3):

$$C^* = \frac{2M}{(p - p_0)A_g d \eta} \dots\dots\dots (3)$$

Where:

C^* - Efficiency factor of drum brake;

p_0 - The braking pressure required when the braking torque reaches $5 \text{ N} \cdot \text{m}$, in megapascal (MPa), which usually takes 0.5 MPa unless otherwise specified;

A_g - Piston area of brake wheel cylinder, in square millimeter (mm^2);

d - Inner diameter of the brake drum, in meters (m).

7 Test preparation

7.1 Determination of test inertia

The test inertia is calculated according to formula (4) OR stipulated through negotiation between the supplier and the buyer:

$$I = k m R^2 / 2 \dots\dots\dots (4)$$

Where:

I - Brake test inertia, in grams square meters ($\text{kg} \cdot \text{m}^2$);

k - Mass distribution coefficient;

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