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Performance requirements and test methods for vehicle air brake unit exhaust muffler

汽车气压制动部件用排气消音器性能要求及台架试验方法

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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		2022-10-01
190	QC/T 792-2022	Motors and controllers for electric motorcycles and electric mopeds		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		2022-10-01
195	QC/T 1016-2022	Door trim panel assembly for passenger cars		2022-10-01
196	QC/T 768-2022	Toilet of passenger car		2022-10-01
197	QC/T 580-2022	Mounting dimensions of automobile transmission assembly		2022-10-01
198	QC/T 1172-2022	Performance requirements and test methods of exhaust muffler for vehicles air brake equipments		2022-10-01
199	QC/T 237-2022	Bench test methods for the performance of automobile parking brake		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		2022-10-01
206	QC/T 80-2022	Road vehicles - Polyamide (PA) tubing for air braking systems		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		2022-10-01
210	QC/T 870-2022	Double end studs bm = 1.25d		2022-10-01
211	QC/T 871-2022	Double end studs bm = 2d		2022-10-01
212	QC/T 598-2022	Bolt-for projection welding on the bearing face		2022-10-01
213	QC/T 599-2022	Overhead projection weld bolts		2022-10-01
214	QC/T 624-2022	Rubber plugs		2022-10-01
215	QC/T 603-2022	Clips - Type A		2022-10-01
216	QC/T 604-2022	Clips - Type B		2022-10-01
217	QC/T 605-2022	Clips - Type C		2022-10-01
218	QC/T 606-2022	Clips - Type H		2022-10-01
219	QC/T 618-2022	Specification for plastic expansion nut		2022-10-01
220	QC/T 928-2022	Plastic cable and tubing clips with inter-fix hole		2022-10-01
221	QC/T 929-2022	Plastic cable and tubing clips with side-fix hole		2022-10-01

Performance requirements and test methods for vehicle air brake unit exhaust muffler

1 Scope

This document specifies the terms and definitions, performance requirements, test-related requirements, test methods, of the exhaust muffler (hereinafter referred to as muffler), which is used on the vehicle air brake unit.

This document is applicable to the use of automobile air brake components (such as: relay valve, brake valve, trailer control valve, air dryer, etc.), which are used on the vehicle air brake unit.

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 applies to this document; for undated references, the latest version (including all amendments) applies to this document.

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

QC/T 35-2015 Automobile and trailer - Specifications and bench test methods of pressure control equipment

QC/T 996-2015 Specifications and bench test methods of automobile air dryer

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

Exhaust noise

L_P

4.3 Working durability

After the test according to 6.3, the muffler shall not be damaged; the insertion loss shall meet the requirements in Table 1.

4.4 Waterproof performance (only applicable to mufflers with waterproof function)

4.4.1 Carry out the test according to 6.4.1. There shall be no water infiltration at the exhaust port of the valve body.

4.4.2 Carry out the test according to 6.4.2. There shall be no water infiltration at the exhaust port of the valve body.

5 Test requirements

5.1 Test device

5.1.1 The equipment used in the test shall meet the requirements of the test conditions of the relevant items. It shall not adversely affect the function of the test sample. The accuracy grade of the instruments or meters, which are used to record various parameters in the performance test, shall not be lower than 0.5. The accuracy grade of the instruments or meters, which are used to measure and record the parameters in the durability test, shall not be lower than 1.5.

5.1.2 Unless otherwise specified, all tests shall be carried out, by installing the muffler sample on the exhaust port of the matching valve, according to the requirements of the product technical documents. The total volume of the auxiliary pipeline, in a single test circuit, shall not exceed 0.15 L.

5.1.3 The sound level meter or other equivalent measuring system, which is used for measurement, shall not be lower than the requirements of Type I sound level meter, which is specified in GB/T 3785.1-2010.

5.2 Test sample

Unless otherwise specified, all samples shall complete all corresponding tests, according to Table 2. For mufflers, that can be installed on a variety of valve bodies, the device needs to be matched with each valve body, for testing.

6.1.4.3 Open the pressure regulating valve 2. Fill the air cylinder 3 with compressed air, which is 200 kPa higher than the unloading pressure. Stabilize the pressure for 3 minutes.

6.1.4.4 Open the speed regulating valve 4. Feed compressed air into the air dryer, at a flow rate of 455 L/min ~ 510 L/min. When the pressure on the pressure gauge 6 reaches unloading and begins to drop, until the air dryer recovers pressure, record the peak noise value, which is measured by the sound level meter.

6.1.4.5 Take the arithmetic mean L_{P2} of the three position measurement values.

6.1.4.6 Remove the muffler from the air dryer. Keep the other devices in the same position. Carry out the test according to 6.1.4.3 ~ 6.1.4.5. Record L_{P1}.

6.2 Exhaust time hysteresis ratio

6.2.1 Muffler matching the relay valve

6.2.1.1 Carry out the test according to 6.1.1.1 ~ 6.1.1.4. Record the relationship curve of the pressure gauge 7 with time. Calculate the exhaust time t_{E1}.

6.2.1.2 Remove the muffler from the relay valve. Carry out the test, according to 6.1.1.1 ~ 6.1.1.4. Record the relationship curve of the air pressure value, which is displayed on the pressure gauge 7 with time. Calculate the exhaust time t_{E2}, according to the curve.

6.2.1.3 Calculate the exhaust time hysteresis ratio, according to formula (2).

6.2.2 Muffler matching the brake valve

6.2.2.1 Carry out the test according to 6.1.2.1 ~ 6.1.2.4. Record the relationship curve of change of pressure gauge 9's indication value with time. Calculate the exhaust time t_{E1}.

6.2.2.2 Remove the muffler from the brake valve. Carry out the test according to 6.1.2.1 ~ 6.1.2.4. Record the relationship curve of the change of pressure gauge 9's indication value with time. Calculate the exhaust time t_{E2}.

6.2.2.3 Calculate the exhaust time hysteresis ratio, according to formula (2).

6.2.3 Muffler matching the trailer control valve

6.2.3.1 Carry out the test according to 6.1.3.1 ~ 6.1.3.4. Record the relationship curve of change of pressure gauge 6's indication value with time. Calculate the exhaust time t_{E1}.

6.2.3.2 Remove the muffler from the trailer control valve. Carry out the test according to 6.1.3.1 ~ 6.1.3.4. Record the relationship curve of the change of pressure gauge 6's indication value with time. Calculate the exhaust time t_{E2}.

6.2.3.3 Calculate the exhaust time hysteresis ratio, according to formula (2).

6.3 Working durability

6.3.1 For the muffler matching with the relay valve, install the muffler to the relay valve. Conduct the test according to 6.2.7, which is specified in QC/T 35-2015. After the test, check whether the muffler is damaged. Retest the insertion loss, according to 6.1.1.

6.3.2 For the muffler matching the brake valve, install the muffler to the brake valve. Conduct the test according to 6.1.7, which is specified in QC/T 35-2015. After the test, check whether the muffler is damaged. Retest the insertion loss, according to 6.1.2.

6.3.3 For the muffler matching with the trailer control valve, install the muffler on the trailer control valve. Conduct the test according to 6.4.7, which is specified in QC/T 35-2015. After the test, check whether the muffler is damaged. Retest the insertion loss, according to 6.1.3.

6.3.4 For the muffler matching with the air dryer, install the muffler on the air dryer. Carry out the test according to 7.12, which is specified in QC/T 996-2015. After the test, check whether the muffler is damaged. Retest the insertion loss according to 6.1.4.

6.4 Waterproof performance

6.4.1 Static waterproof performance

6.4.1.1 See Figure 6 for the schematic diagram of the test device.

6.4.1.2 Install the muffler on the matching valve body. Seal all the ports of the valve body. Then immerse it in a container, which is filled with water as shown in Figure 6. The lowest point of the muffler is 1.2 m away from the water surface. The included angle between axis and vertical direction is 15°.

6.4.1.3 After standing still for 15 minutes, take the sample to be tested out of the container. Then remove the muffler. Check whether there is water infiltration, at the exhaust port of the valve body.

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