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Performance requirements and bench test methods for automobile hydraulic brake caliper assembly

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Table of Contents

Foreword	III
1 Scope	1
2 Normative References	1
3 Terms and Definitions	1
4 Performance Requirements	2
4.1 Vacuum Tightness	2
4.2 Low-pressure Tightness	2
4.3 High-pressure Tightness	2
4.4 Vent Port Tightness	2
4.5 Fluid Inlet Port Tightness	2
4.6 Required Fluid Volume	2
4.7 Drag Torque	2
4.8 Caliper Body Rigidity	2
4.9 Piston Return Stroke	2
4.10 Piston Sliding Resistance	2
4.11 Piston Activation Pressure	2
4.12 Caliper Body Sliding Resistance	2
4.13 Brake Pad Sliding Resistance	2
4.14 Strength	3
4.15 Durability	3
4.16 Waterproof Performance	3
4.17 Corrosion Resistance	3
5 Test-related Requirements	3
5.1 Test Equipment Requirements	3
5.2 Test Sample Requirements	4
6 Test Methods	4
6.1 Vacuum Tightness	4
6.2 Low-pressure Tightness	5
6.3 High-pressure Tightness	5
6.4 Vent Port Tightness	5

6.5 Fluid Inlet Port Tightness6

6.6 Required Fluid Volume 6

6.7 Drag Torque 7

6.8 Caliper Body Rigidity7

6.9 Piston Return Stroke 8

6.10 Piston Sliding Resistance 10

6.11 Piston Activation Pressure10

6.12 Caliper Body Sliding Resistance 10

6.13 Brake Pad Sliding Resistance 11

6.14 Strength 11

6.15 Durability 11

6.16 Waterproof Performance12

6.17 Corrosion Resistance 13

Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 Directives for Standardization—Part 1: Rules for the Structure and Drafting of Standard Documents.

This document replaces QC/T 592-2013 Performance Requirements and Bench Test Methods for Hydraulic Brake Caliper Assemblies. Compared with QC/T 592-2013, in addition to structural adjustments and editorial revisions, the main technical changes are as follows:

a) Revised the terms and definitions of Required Fluid Volume, Drag Torque, Full Wear State of Brake Pads, Partial Wear State of Brake Pads, Piston Sliding Resistance and Caliper Body Sliding Resistance; added the terms and definitions of Brake Pad Sliding Resistance (see Clause 3, Clause 3 of the 2013 edition).

Revised the performance requirements for Low-pressure Tightness (see Clause 4.2, Clause 4.1.2 of the 2013 edition);

Revised the performance requirements and test methods for Drag Torque (see Clauses 4.7 and 6.7, Clauses 4.3 and 5.3 of the 2013 edition);

Revised the performance requirements and test methods for Caliper Body Rigidity (see Clauses 4.8 and 6.8, Clauses 4.4 and 5.4 of the 2013 edition);

Revised the performance requirements and test methods for Piston Return Stroke (see Clauses 4.9 and 6.9, Clauses 4.5 and 5.5 of the 2013 edition);

Revised the performance requirements and test methods for Piston Sliding Resistance (see Clauses 4.10 and 6.10, Clauses 4.6 and 5.6 of the 2013 edition);

Revised the test method for Piston Activation Pressure (see Clause 6.11, Clause 5.7 of the 2013 edition);

Added the performance requirements and test methods for Brake Pad Sliding Resistance (see Clauses 4.13 and 6.13);

Revised the performance requirements and test methods for Strength (see Clauses 4.14 and 6.14, Clauses 4.9 and 5.9 of the 2013 edition);

Revised the performance requirements and test methods for Durability (see Clauses 4.15 and 6.15, Clauses 4.10 and 5.10 of the 2013 edition);

Revised the performance requirements for Waterproof Performance (see Clause 4.16, Clause 4.11 of the 2013 edition);

Added Test-related Requirements (see Chapter 5);

Revised the test method for Vent Port Tightness (see Clause 6.4, Clause 5.1.4 of the 2013 edition);

Revised the test method for Fluid Inlet Port Tightness (see Clause 6.5, Clause 5.1.5 of the 2013 edition);

Revised the test method for Required Fluid Volume (see Clause 6.6, Clause 5.2 of the 2013 edition).

Please note that certain contents of this document may involve patents. The issuing authority of this document shall not be liable for identifying any such patents.

This document was proposed and administered by National Technical Committee of Automobile Standardization of China (SAC/TC 114).

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The release history of this document and the document it replaces is as follows:

— First issued as QC/T 592-1999 in 1999, and first revised in 2013;

— This is the second revision.

Electronic locks device for motor vehicles

1 Scope

This document standardizes the performance requirements and test-related requirements for hydraulic brake caliper assemblies used in service brakes of automobiles (hereinafter referred to as "brake caliper assemblies"), and specifies the bench test methods.

This document applies to hydraulic brake caliper assemblies for service brakes of N1 category vehicles as specified in GB/T 15089 and M category vehicles with a maximum design total mass not exceeding 3500 kg. Hydraulic brake caliper assemblies of other categories may refer to this document for implementation.

2 Normative References

The contents of the following documents are indispensable provisions of this document through normative reference in the text. For dated referenced documents, only the edition corresponding to the date applies to this document; for undated referenced documents, the latest edition (including all amendments) applies to this document.

GB/T 5620 Road Vehicles—Brake Terms and Definitions for Automobiles and Trailers

GB/T 10125 Corrosion Tests in Artificial Atmospheres—Salt Spray Tests

GB/T 15089 Classification of Motor Vehicles and Trailers

QC/T 316 Automotive Service Brakes—Bench Test Methods for Fatigue Strength

QC/T 564 Passenger Car Service Brakes—Performance Requirements and Bench Test Methods

3 Terms and Definitions

The terms and definitions specified in GB/T 5620 and the following apply to this document.

3.1 required fluid amount

The volume of brake fluid required for the brake caliper assembly to build up the specified hydraulic pressure.

3.2 drag torque

The rotational torque exerted by the brake caliper assembly on the brake disc after the brake is released.

3.3 full-wear brake pads

Brake pads whose friction material is worn down to a remaining thickness of 2 mm or when the wear indicator triggers an alarm.

3.4 half-wear brake pads

Brake pads whose friction material is worn down to half of its original thickness.

3.5 piston sliding resistance

The resistance encountered when the piston moves in the retraction direction.

3.6 caliper sliding resistance

The resistance encountered when the caliper body of a floating brake caliper assembly moves on the guide pins.

3.7 brake pad sliding resistance

The resistance encountered when the brake pads move within the guide rods or guide grooves.

4 Performance Requirements

4.1 Vacuum Tightness

For brake caliper assemblies used in vehicles with vacuum filling systems, when tested in accordance with Clause 6.1, the pressure rise shall not exceed 0.2 kPa.

4.2 Low-pressure Tightness

When tested in accordance with Clause 6.2, the pressure drop shall not exceed 3 kPa.

4.3 High-pressure Tightness

When tested in accordance with Clause 6.3, the pressure drop shall not exceed 0.2 MPa.

4.4 Vent Port Tightness

When tested in accordance with Clause 6.4, no brake fluid leakage shall occur at the bleeder screw.

4.5 Fluid Inlet Port Tightness

When tested in accordance with Clause 6.5, no brake fluid leakage shall occur at the bolt connection points.

4.6 Required Fluid Volume

When tested in accordance with Clause 6.6, the required fluid volume shall meet the requirements specified in the product technical documents.

4.7 Drag Torque

When tested in accordance with Clause 6.7, the drag torque during the first rotation of the brake disc shall not exceed 3.5 N·m; the drag torque during the tenth rotation shall not exceed 2 N·m, or meet the requirements specified in the product technical documents.

4.8 Caliper Body Rigidity

When tested in accordance with Clause 6.8, the deformation of the caliper body along the axis of the hydraulic cylinder shall meet the requirements specified in Table 1 or the product technical documents.

Table 1 Caliper Body Rigidity Performance Requirements

Product Type	Pressure (MPa)	Deformation (mm)
Floating Brake Caliper	7	≤0.2
Fixed Brake Caliper	10	≤0.3 per side, total deformation ≤0.4

4.9 Piston Return Stroke

When tested in accordance with Clause 6.9, the piston return stroke of a floating brake caliper assembly shall not exceed 0.6 mm; the piston return stroke per side of a fixed brake caliper assembly shall not exceed 0.3 mm, or meet the requirements specified in the product technical documents.

4.10 Piston Sliding Resistance

When tested in accordance with Clause 6.9, the sliding resistance of a single piston shall be within the range of 98 N to 700 N, or meet the requirements specified in the product technical documents.

4.11 Piston Activation Pressure

When tested in accordance with Clause 6.11, the input hydraulic pressure required to initiate piston movement shall not exceed 0.1 MPa, or meet the requirements specified in the product technical documents.

4.12 Caliper Body Sliding Resistance

When tested in accordance with Clause 6.12, the sliding resistance of the caliper body of a floating brake caliper assembly shall not exceed 100 N, or meet the requirements specified in the product technical documents.

4.13 Brake Pad Sliding Resistance

When tested in accordance with Clause 6.13, the sliding resistance of the brake pads shall meet the requirements specified in the product technical documents.