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Levelling Valve for Automobile Air Suspension

汽车空气悬架高度控制阀

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Levelling Valve for Automobile Air Suspension

1 Scope

This document specifies the terms and definitions, product classification, bench test requirements and test methods of levelling valve for automobile air suspension (hereinafter referred to as levelling valve).

This document is applicable to levelling valve for the air suspension of commercial vehicles. The levelling valve for the driving cab and the air suspension of passenger cars may take this as a reference.

2 Normative References

The content of the following documents constitutes indispensable clauses of this document through normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 4208-2017 Degrees of Protection Provided by Enclosure (IP code)

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

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 neutral position

The oscillating bar is at zero point (horizontal position).

3.2 open angle

The oscillating bar swings from the neutral position to the angle where the air inlet begins to take in air.

NOTE: expressed in (°).

3.3 exhaust angle

The oscillating bar swings from the neutral position to the angle where the air outlet begins to exhaust.

NOTE: expressed in (°).

3.4 idle stroke angle

The sum of the open angle and the exhaust angle.

NOTE: expressed in (°).

3.5 flow characteristic

The curve of the flow rate at the air outlet of the levelling valve changing with the angle of the oscillating bar.

3.6 intake point

The oscillating bar is at any position between the open angle and the intake limit angle.

3.7 exhaust point

The oscillating bar is at any position between the exhaust angle and the exhaust limit angle.

3.8 maximum working angle

The maximum air intake (exhaust) angle of the product specified in the technical documents.

NOTE: intake is "+", exhaust is "–", and the unit is (°).

3.9 rated working pressure

p_E

The product working pressure specified in the technical documents.

NOTE: expressed in (kPa).

3.10 delay time

The entire time it takes for the oscillating bar to move from the neutral position in the direction of air intake (exhaust) to the start of air intake (exhaust).

NOTE: expressed in (s).

4 Product Classification

4.1 Non-delay Type

Levelling valve with a delay time less than 2 s.

4.2 Delay Type

Levelling valve with a delay time not less than 2 s.

5.2.1 Air-tightness

Input the test working pressure $p_E{}^{+50}_{0}$, and respectively test the sealing performance of the following three positions:

a) When the oscillating bar is at the air exhaust position, the air pressure drop within 5 minutes shall not be greater than 10 kPa;

b) When the oscillating bar is at the air intake position, the air pressure drop within 5 minutes shall not be greater than 10 kPa;

c) When the oscillating bar is at the neutral position, the air pressure drop within 5 minutes shall not be greater than 10 kPa.

5.2.2 Flow characteristic

The flow characteristic curve shall be within the range of −10% ~ +10% of the theoretical characteristic curve, and there shall be no sudden changes or abnormalities.

5.2.3 Low-temperature performance

The air pressure drop of low-temperature sealing performance shall not be greater than 3 times the value specified in 5.2.1. The flow characteristic shall be within the range of −12% ~ +12% of the theoretical characteristic curve, and there shall be no sudden changes or abnormalities.

5.2.4 High-temperature performance

The high-temperature sealing performance shall comply with the requirements of 5.2.1. The flow characteristic shall comply with the requirements of 5.2.2.

5.2.5 Working durability

5.2.5.1 During and after the working durability test, the various moving parts shall not be blocked or stuck, the various connectors shall not be loose, and the various parts shall not be deformed or damaged in a way that may endanger the functions.

5.2.5.2 After the working durability test, the air pressure drop during the sealing performance test shall not be greater than 3 times the value specified in 5.2.1. The flow characteristic shall be within the range of −12% ~ +12% of the theoretical characteristic curve, and there shall be no sudden changes or abnormalities.

5.2.6 Pressure resistance

After the pressure resistance test, the various parts shall not be deformed or damaged.

5.2.7 Vibration resistance

After the vibration resistance test, the various parts shall not be deformed or damaged in a way that may endanger the functions, the various connectors shall not be loose, the sealing

performance shall comply with the requirements of 5.2.1, and the flow characteristic shall comply with the requirements of 5.2.2.

5.2.8 Dust resistance

After the dust resistance test, it shall comply with the requirements of IP5X, and the sealing performance shall comply with the requirements of 5.2.1.

5.2.9 Corrosion resistance

After the corrosion resistance test, the outer surface of the test piece shall not generate corrosion spots with a diameter greater than 2 mm, and small and scattered corrosion spots are allowed.

5.2.10 Delay time

The delay time shall comply with the requirements of the drawings.

6 Test-related Requirements

6.1 Test Equipment

6.1.1 The instruments and equipment used in the tests shall comply with the requirements of test conditions of relevant items and shall not have an adverse impact on the functions of the test piece.

6.1.2 The accuracy level of all instruments and meters used to record parameters during the test shall not be lower than Level 0.5.

6.1.3 The total volume of the auxiliary pipeline in a single test loop shall not be greater than 0.15 L, and the inner diameter of the pipeline shall not be less than 8 mm.

6.2 Test Conditions

6.2.1 Unless otherwise specified, before testing, the test piece shall be flushed and exhausted five times within the maximum working angle range.

6.2.2 Unless otherwise specified, the ambient temperature during the tests is 8 °C ~ 38 °C.

6.2.3 During the low-temperature test, the dew point temperature of the compressed air under the test pressure shall be lower than –40 °C, and the absolute humidity shall be ≤ 0.119 g/m^3.

6.3 Requirements for Test Sequence and Test Pieces

6.3.1 The test pieces used for the working durability test shall follow the sequence of sealing performance, flow characteristic, low-temperature performance, high-temperature performance and working durability, and the same test piece shall be used to complete the test of all the above-mentioned items.

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