

Translated English of Chinese Standard: GB/T13061-2017

www.ChineseStandard.net → Buy True-PDF → Auto-delivery.

Sales@ChineseStandard.net

GB

NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

ICS 43.080
T 22

GB/T 13061-2017

Replacing GB/T 13061-1991

**Technical specification of air spring used for air
suspension of commercial vehicle**

商用空气悬架用空气弹簧技术规范

Issued on: October 14, 2017

Implemented on: May 01, 2018

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of PRC;**

Standardization Administration of PRC.

Table of Contents

Foreword	3
1 Scope	5
2 Normative references	5
3 Terms and definitions.....	6
4 Technical requirements.....	8
5 Test methods	9
Appendix A (Informative) Physical-mechanical performance requirements and test methods of rubber compounds of bellows.....	13
Appendix B (Normative) Legend of typical elastic-properties of air springs ...	15

Technical specification of air spring used for air suspension of commercial vehicle

1 Scope

This standard specifies the technical requirements and test methods for air spring products for the air suspensions of commercial vehicles.

This standard applies to the air suspensions of commercial vehicles. The air springs for other non-air suspension, non-commercial vehicles or non-vehicle may make reference to this standard.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 528 Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties

GB/T 531.1 Rubber vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

GB/T 1682 Rubber, vulcanized - Determination of low-temperature brittleness - Single test piece method

GB/T 2941 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

GB/T 3512 Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests

GB/T 7759 Rubber, vulcanized or thermoplastic - Determination of compression set at ambient elevated or low temperatures

GB/T 7762 Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Static strain testing

GB/T 13934 Rubber, vulcanized or thermoplastic - Determination of flex cracking and crack growth (De Mattia)

Maximum outer diameter

In the service life period, including the test process of fatigue life, the maximum outer diameter of the air spring within a certain inflation pressure, including the maximum inflation pressure and the maximum stroke range.

3.12

Air spring volume

The volume of gas that the air spring can hold.

4 Technical requirements

4.1 Technical requirements for air spring assembly

4.1.1 The general use temperature of the air spring is $-30\text{ }^{\circ}\text{C} \sim 57\text{ }^{\circ}\text{C}$. For the air springs which have special use requirements (such as beyond this temperature range, oil resistance, etc.), it is determined by the supplier and the user through negotiation; and it is permanently identified on the air spring.

4.1.2 At the standard height and telescopic process of air spring, the air-tightness requirements are as specified in 5.5.2. The maximum stroke and maximum outer diameter shall meet the design requirements.

4.1.3 The 24-h pressure drop of the air spring shall not exceed 0.05 MPa.

4.1.4 The destructive internal pressure of the air spring is not less than 2.5 times the maximum pressure.

4.1.5 Under the conditions as specified in 5.5.6, the fatigue life of the air spring's frame shall not be less than 3 million times.

4.2 Technical requirements for each component of air spring

4.2.1 The physical-mechanical properties of the rubber compound of air spring's bellow may be found in Appendix A.

4.2.2 The appearance quality of each component of the air spring shall meet the following requirements:

- a) The cord fabric of bellows shall not be exposed.
- b) The inner and outer surfaces of the bellow shall not have cracks, damage or foreign matter included into the rubber layer. The rollover area and sealing surface shall not have lack of rubber or blistering; whilst the diameter of blister in other areas shall not exceed 5 mm. The number of locations of lack of rubber shall not exceed 3; the length of each location

5.4.4 All of the above tests require a gas supply (water) system capable of indicating and regulating the pressure, as well as a special clamp capable of fixing the air spring to the test machine.

5.4.5 The physical-mechanical properties of the rubber compound are tested on the corresponding equipment with reference to Appendix A.

5.5 Test procedure

5.5.1 Physical-mechanical property test of rubber compound

The physical-mechanical properties of the rubber compound used to make the bellow are as shown in Appendix A.

5.5.2 Airtightness test

Adjust the air spring to the standard height. Inflate to 1.3 times the standard pressure. Hold for 30 s. After it stabilizes, reduce the pressure of the air spring to the standard pressure. Close the inflation and exhaust valves. Record the pressure value. Maintain it at stationary status. After 24 hours, measure the pressure drop. If it is not more than 0.05 MPa, it is qualified.

5.5.3 Test of elastic-properties

5.5.3.1 Preparation for test

Before the test, it shall adjust the air spring to the standard status. Disconnect the air source. Within the maximum stroke, let it stretch and retract at the rate of not more than 300 mm/min for 50 times. Measure the maximum outer diameter of the air spring during the telescopic process. Check whether the air spring has abnormal deformation and air leakage during the telescopic process.

5.5.3.2 Dynamic elastic-property test

Adjust the air spring to the standard height. Use the method of changing the pressure from the maximum pressure to 0.10 MPa and a decrease of 0.10 MPa, to fill in the compressed air. Under each air pressure, disconnect the air source. At the amplitude of ± 50 mm and frequency of 0.4 Hz, carry out 10 cycles of perpendicular vibrations. Continuously record the load-deformation curve and the pressure-deformation curve of the last cycle as the dynamic elastic-property curve of the air spring. Among them, the slope of the load-deformation curve is the dynamic stiffness value.

For the hysteresis loop as obtained by the test, it may use the average value of the applied/removed load or deformation as the elastic-property curve without hysteresis. The schematic curves are as shown in Figure B.1 and Figure B.3 of Appendix B.

First use water to fill the air spring, to discharge the air from inside of the air spring. Then adjust the air spring to the maximum stretching status and ensure the water pressure is at 0.50 MPa.

From the maximum stretching position of the air spring, for each 10 mm decrease in height, read out the discharged water amount according to the flow sensor or the measuring cup. Meanwhile measure its maximum outer diameter and record it, until the air spring reaches the maximum compression status. Record the volume of remaining water.

The above measurement process shall be carried out under the specified water pressure and thereby determine the volume curve of the air spring.

5.5.5 Destructive test

Fix the air spring at a standard height. At a rate of not exceeding 1.00 MPa/min, slowly fill the high-pressure water into the air spring, until the bellow is broken. Record the maximum water pressure before the bellow is damaged. Use this pressure as the destructive pressure of bellow.

5.5.6 Test of frame's fatigue life

Adjust the air spring to the standard height and 0.70 MPa air pressure. Disconnect the air source. It is recommended to use a single-swing arm which has an arm length of 600 mm or a symmetric two-way swing arm. The hinge point is located at ± 30 mm on the air spring's installation surface. At the frequency of 2.0 Hz ~ 3.0 Hz and the amplitude of ± 50 mm, repeat vibrations. During the test, according to the actual test conditions, it may use the cooling method.

Before and during the test of air spring, at the interval of 24 h, carry out airtightness test. Measure the test pressure and the maximum outer diameter at the standard height. During the measurement, it shall ensure that the temperature and status of the air spring are the same as previously.

When the 24-h pressure drop of the air spring reaches 0.10 MPa or the surface cord fabric of bellow is exposed, it is considered that the air spring has been damaged. Stop the test. Use this cumulative number of vibrations as the number of tests of frame's fatigue tests of the air spring.

When the air spring reaches the specified number of vibrations without damage, it may stop test. However, it shall indicate the 24-h pressure drop and outer diameter at this time.

The test may be carried out intermittently. But the time when an air spring vibrates for 3 million times shall be not more than 40 days.

The test of physical-mechanical properties of the rubber compound are carried out on the corresponding equipment as specified in A.3.4.

A.2.3 Test methods

A.2.3.1 Tensile test

The test of tensile strength, elongation at break, permanent deformation at break of rubber compound of bellow are carried out according to the provisions of GB/T 528, using a type-1 dumbbell specimen.

A.2.3.2 Test of compression set

The test of compression set of the rubber compound of bellow is carried out according to the method as specified in GB/T 7759.

A.2.3.3 Test of hardness

The hardness test of the rubber compound of bellow is carried out in accordance with the provisions of GB/T 531.1.

A.2.3.4 Flexural test

The flexural test of the rubber compound of bellow is according to the provisions of GB/T 13934. The specimen is bent for 1 million times at a rate of (300 ± 10) times per minute. Check whether there is crack in the groove of the specimen.

A.2.3.5 Test of low-temperature resistance

The test of low-temperature resistance of the rubber compound of bellow is carried out according to the provisions of GB/T 1682. Determine the brittleness temperature of the rubber compound.

A.2.3.6 Test of thermal-air aging

The test of thermal-air aging of the rubber compound of bellow is carried out according to the provisions of GB/T 3512, using the type-1 dumbbell specimen. Determine the change rate of tensile strength, the change rate of elongation at break, the change of hardness of the rubber compound after thermal aging.

A.2.3.7 Test of ozone-aging resistance

The test ozone-aging resistance of the rubber compound of bellow is carried out according to the method A as specified in GB/T 7762. The test conditions are that the ozone concentration is $(50 \pm 5) \times 10^{-8}$ (volume fraction), the test temperature is $(40 \pm 2) ^\circ\text{C}$, to make the specimen produce an elongation of $(20 \pm 2) \%$. The placement time is 72 h.

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----