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The technical requirements and test methods for Macpherson strut aluminum alloy control arm assembly of passenger car

乘用车麦弗逊悬架铝合金控制臂总成技术条件及试验方法

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1 Scope

This standard specifies the terms and definitions, technical conditions, test methods of the Macpherson strut aluminum alloy control arm assembly of passenger car.

This standard applies to the Macpherson strut aluminum alloy control arm assembly of passenger car.

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) is applicable to this standard.

GB/T 3190 Wrought aluminium and aluminium alloy - Chemical composition

GB/T 3191 Extrusion rods and bars of aluminium and aluminium alloys

GB/T 3730.2 Road vehicle - Masses - Vocabulary and codes

ISO 4130 Road vehicles - Three-dimensional reference system and fiducial marks - Definitions

3 Terms and definitions

Terms and definitions, which are defined in documents referenced in this document, as well as the following terms and definitions, apply to this document.

3.1

Aluminum alloy control arm mount of Macpherson suspension

The triangle control arm, which is composed of aluminum arm, ball pin, rubber bushing, as shown in Figure 1, AND is used for Macpherson suspension (hereinafter referred to as the control arm assembly).

specified direction and loading speed.

3.7

Maximum design axle load (F_A)

The maximum axle load, which is specified by the vehicle manufacturer.

4 Technical requirements

4.1 General requirements

4.1.1 The control arm assembly shall be free from defects, such as white spots, rust, scratches, bumps, folds, cracks, burrs, looseness.

4.1.2 The ball pin and the ball seat shall be cleaned before assembly. It shall be flexibly rotated after assembly, without loosening or jamming.

4.2 Material properties

Aluminum alloy materials shall comply with the provisions of GB/T 3190 and GB/T 3191, OR meet the requirements of the drawings.

4.3 Performance requirements

4.3.1 Aluminum body compressive strength limitation

When carrying out the test specified in 5.1, F_C shall be within the range of [$3F_A$, $4F_A$], OR meet the requirements of the drawing.

4.3.2 Aluminum body tensile strength limitation

When carrying out the test specified in 5.2, F_P shall be within the range of [3FA, 4F], OR meet the requirements of the drawing.

4.3.3 Bushing press-off force

When carrying out the tests specified in 5.3, F_k shall meet the requirements of the drawings.

4.3.4 Longitudinal fatigue test

During the tests specified in 5.4, none of the following phenomena shall occur:

a) The aluminum alloy arm body has cracks, which have a length of more than 10 mm OR does not meet the requirements of the drawing;

b) The ball pin is cracked, broken, or slipped from the arm body;

Connect it to the test fixture, according to the actual vehicle installation method OR install it according to the manufacturer's requirements. Apply a longitudinal load F_x to the control arm assembly, through the center of the ball pin, as shown in Figure 5.

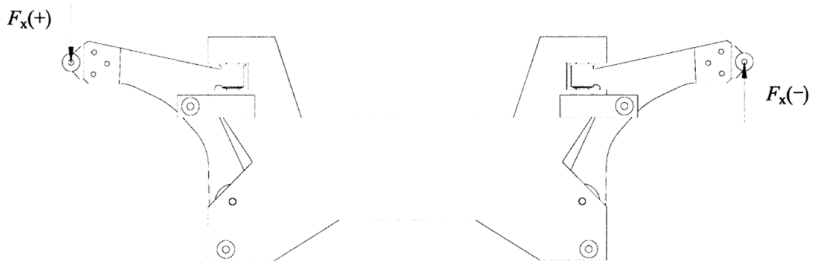

Figure 5 -- Schematic diagram of installation for test of longitudinal fatigue

5.4.2 The loading direction conforms to the provisions of 3.2. The loading load is positive, in the positive direction of the X-axis of the vehicle's coordinate system, negative otherwise.

5.4.3 Load size: $-0.3F_A$ to $+0.7F_A$ OR according to the requirements of the drawings. Loading waveform: Sine wave; loading frequency: 1 Hz ~ 3 Hz; number of loadings: 150000 times or according to the requirements of the drawings.

5.4.4 The installation torque of fasteners shall meet the requirements of the drawing.

5.4.5 During the test, the non-metallic parts shall be cooled by blowing air, so that the surface temperature does not exceed 70 °C.

5.5 Lateral fatigue test

5.5.1 Place the control arm assembly and the accompanying test piece horizontally. Connect it to the test fixture, according to the actual vehicle installation method OR install it according to the manufacturer's requirements. Apply a lateral load F_y, to the control arm assembly, through the center of the ball pin, as shown in the Figure 6.

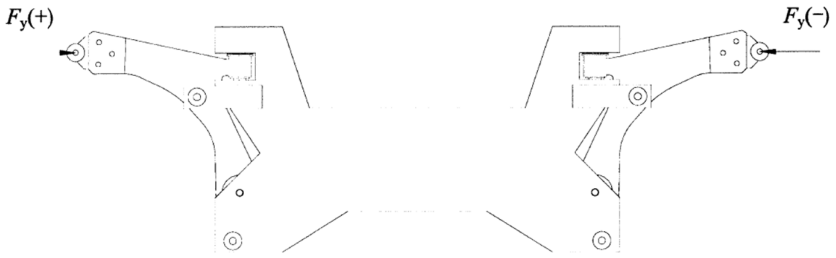

Figure 6 -- Installation diagram for test of lateral fatigue test

5.5.2 The loading direction is in accordance with the provisions of 3.3. The loading load is based on the positive direction of the Y-axis of the vehicle's coordinate system as positive, otherwise it is negative.

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