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**Performance and test methods for automobile steering wheel**

**汽车转向盘技术要求及试验方法**

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# Performance and test methods for automobile steering wheel

## 1 Scope

This standard specifies the performance and test methods for automobile steering wheel.

This standard is applicable to automobile steering wheel.

## 2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

|               |                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------|
| GB/T 250      | <i>Textiles - Tests for colour fastness - Grey scale for assessing change in color</i>           |
| GB/T 251      | <i>Textiles - Tests for colour fastness - Grey scale for assessing staining</i>                  |
| GB/T 3920     | <i>Textiles - Tests for colour fastness - Color fastness to rubbing</i>                          |
| GB 8410       | <i>Flammability of automotive interior materials</i>                                             |
| GB 11121      | <i>Gasoline engine oils</i>                                                                      |
| GB 11557      | <i>The stipulation protecting drivers from being injured by motor vehicle steering mechanism</i> |
| GB/T 16422.2  | <i>Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources</i>    |
| GB/T 19949.2  | <i>Road vehicle - Airbag components - Part 2: Testing of airbag modules</i>                      |
| GB/T 19949.3  | <i>Road vehicle - Airbag components - Part 3: Testing of inflator assemblies</i>                 |
| QC/T 198      | <i>General technical specification for automotive switch</i>                                     |
| QC/T 703-2004 | <i>Specification of PU foam wrap layer for auto steering-wheel</i>                               |
| QC/T 704      | <i>Test methods for overall hardness of PU foam wrap layer for auto steering-wheel</i>           |

## 3 Terms and definitions

For the purpose of this standard, the following terms and definitions apply.

### 3.1

#### **steering wheel**

The component used by a driver to change and maintain the driving direction of an automobile.

### 3.2

#### **steering wheel rim**

The toroidal part of the steering wheel directly operated by the driver's hand, which can bear external force and has certain rigidity and strength.

### 3.3

#### **steering wheel hub**

The part connecting steering shaft and steering wheel.

### 3.4

#### **steering wheel spoke**

The part connecting steering wheel rim and steering wheel hub.

## 4 Technical requirements

### 4.1 General requirements

Upon the first approval of the steering wheel material, the supplier shall provide the user with the material safety data sheet (MSDS) issued by the material supplier. If the steering wheel is to be coated with foam plastic, then, polyether polyurethane foam, which is free of fully halogenated hydrocarbon medium and meeting the requirements of human health, shall be adopted.

The steering wheel is composed of steering wheel rim, steering wheel hub and steering wheel spoke, and equipped with operating mechanisms such as electrical switches and buttons. The central parts of steering wheel rim, steering wheel hub and steering wheel spoke are reinforced by metallic frameworks; and the outside of them is covered with a layer of plastic or other materials.

The requirements for steering wheel assembly to prevent injuries to drivers shall comply with GB 11557.

Cut a sample with a length of 100mm on the steering wheel rim; cut a sample with a dimension of 100mm×60mm on the horn button cover; put them into a xenon lamp accelerated aging test box with the outer surface of sample facing the lamp tube, the blackboard temperature of  $83\pm 3^{\circ}\text{C}$  and the relative humidity of  $45\%\pm 5\%$ . After irradiation according to GB/T 16422.2 for 400h, take out the sample, and assess the grade by comparing with the gray scale for assessing change in color specified in GB/T 250.

#### **5.12 Color fastness to rubbing**

Test according to the method specified in GB/T 3920. Take a 150mm-long section of steering wheel skin from the steering wheel rim and mount it on a tester for color fastness to rubbing; after rubbing for 100 times, assess the grade by comparing with the gray scale for assessing staining according to GB/T 251.

#### **5.13 Flammability**

Test according to the method specified in GB 8410.

#### **5.14 Bending performance**

Mount the steering wheel (using framework for soft steering wheel) on the test fixture as shown in Figure 1 or on the steering wheel fatigue test bench; apply a load of 700N at the weakest part of the steering wheel rim; measure the bending deformation value of steering wheel after load application for 5min (accurate to 0.1mm); and immediately remove the load after measurement; keep still for recovery for 3min; measure the permanent bending deformation value of steering wheel at the same point again (accurate to 0.1mm).

#### **5.15 Torsional performance**

Mount the steering wheel (using framework for soft steering wheel) on the test fixture as shown in Figure 2 or on the steering wheel fatigue test bench; apply 220N·m on the steering wheel rim; and unload after load application for 5min; keep still for recovery for 3min, and measure the plastic deformation angle of steering wheel.

#### **5.16 Reliability requirements**

##### **5.16.1 Bending fatigue performance**

###### **5.16.1.1 Test equipment**

Steering wheel fatigue test bench and special test fixture, as shown in Figure 1.

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