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Safety Property Requirements and Test Methods for Automobile Fuel Tank and Its Installation

汽车燃油箱及其安装的安全性能要求和试验方法

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Safety Property Requirements and Test Methods for Automobile Fuel Tank and Its Installation

1 Scope

This Standard specifies the safety performance requirements and test methods of automobile fuel tank containing liquid fuel.

This Standard also specifies the safety requirements for the installation of automobile fuel tank on the vehicles.

This Standard is applicable to the metal and plastic fuel tank of the Type-M, Type-N, and Type-O automobiles.

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 document.

GB 18352.6-2016 Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA 6)

3 Terms and Definitions

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

3.1 Automobile fuel tank

An independent tank assembly fixed on an automobile for storing fuel; is assembled by a fuel tank, a filler pipe, a filler port, a fuel tank cover, a pipe joint, and other auxiliary devices.

NOTE: it is referred to as fuel tank in this Standard.

3.2 Capacity of the fuel tank

In the fuel tank design parameters, the fuel filling volume specified by the manufacturer.

a) A non-removable fuel tank cover that opens and closes automatically;

b) Any other measures that have the same effect. For example (including but not limited to), drawstring fuel tank cover, chain fuel tank cover, etc.; or the fuel tank cover using the same key as the ignition key (in this case, only when the fuel tank cover is locked, can the key remove from the fuel tank). However, for the Type-M1, and Type-N1 vehicles, it is not enough to use only the drawstring or chain fuel tank covers.

4.1.5 The seal between the fuel tank cover and the filter port shall be firm and reliable. When locked, the fuel tank cover shall press the gasket onto the filler pipe tightly.

4.1.6 When the metal fuel tank is performed pressure-proof test according to 5.1, there shall be no cracks or leakage; but the permanent deformation is allowed.

4.1.7 During the normal use of the vehicle, the fuel shall not overflow from the fuel tank cover; neither overflow from the automatic compensating pressure device. When performing the flip test according to 5.2, the fuel tank cover is allowed for the leakage of the fuel; however, the leakage speed shall not exceed 30g/min; gasoline fuel tank cover shall not have the leakage of the fuel.

4.1.8 When the plastic fuel tank is performed impact resistant test at low temperature as per 5.3, there shall be no leakage of fuel.

4.1.9 When the plastic fuel tank is performed pressure-proof test as per 5.4, there shall be no cracks or leakage; but the permanent deformation is allowed.

4.1.10 The fuel permeability requirements for the plastic fuel tank are as follows:

a) Perform the test according to 5.5. When the ambient temperature is 40°C±2°C, the fuel evaporation shall be no greater than 20g/24h; if the test at an ambient temperature of 40°C±2°C does not meet the requirements, perform the test at the ambient temperature of 23°C±2°C, then the fuel evaporation shall be no greater than 10g/24h.

b) If the whole vehicle assembled with fuel tank meets the requirements of 5.3.4 in GB 18352.6-2016, the fuel tank is considered to meet the requirements of a).

4.1.11 When the plastic fuel tank is performed fuel resistance test according to 5.6, it shall meet the requirements of 4.1.8 and 4.1.9.

4.1.12 When the plastic fuel tank is performed fire resistance test according to 5.7, it shall be no leakage of fuel.

4.1.13 When the plastic fuel tank is performed high-temperature resistance property test according to 5.8, it shall be no leakage of fuel or severe deformation.

4.2.11 The fuel tank and its accessories shall be designed and installed to avoid any fire caused by static electricity. For fuel tanks containing fuel with a flash point of 55°C below, it is necessary to take discharge measures.

5 Test Methods

5.1 Pressure-proof test of metal fuel tank

The fuel tank shall be installed with all accessories under normal use. Fill the fuel tank with a non-flammable liquid (for instance, water). Block all the ports of the fuel tank to the outside; pressurize it slowly through the fuel pipe of fuel tank till it reaches twice the working pressure; it shall be no less than 80kPa under any case; maintain the pressure for 30s.

Check and record the leakage and deformation of the fuel tank.

5.2 Flip test

5.2.1 Fix the fuel tank body and all its accessories including the automatic compensating pressure device onto the test bench according to its installation method on the vehicle.

5.2.2 The fuel tank shall rotate around an axis parallel to the longitudinal axis of the vehicle.

5.2.3 The test shall be carried out for twice; once to fill the fuel tank with 90% of the rated capacity of liquid for testing; once to fill the fuel tank with 30% of the rated capacity of liquid for testing. The liquid for testing is the non-flammable liquid, its viscosity and density are similar to that of the fuel under normal use (water can be used).

5.2.4 Turn the fuel tank 90° to the right from its installation position; keep it in this position for at least 5min. Then continue to rotate 90° in the above direction; keep it in the fully flipped position for at least 5min. Return the fuel tank; discharge the liquid for testing that failed to flow back to the fuel tank from the vent hole; add it if necessary. Rotate the fuel tank 90° to the left in the opposite direction; keep it in this position for at least 5min. Then continue to rotate 90° in this direction; keep it in the fully flipped position for at least 5min.

Flipping speed: every 90° rotation angle, the rotation time shall be 1min~3min.

Check and record the leakage conditions of the fuel tank.

5.5 Fuel permeability test of plastic fuel tank

5.5.1 The test oil s hall be the benchmark fuel specified in GB/T 18352.6-2016, or the benchmark fuel for current automotive emission test. The fuel tank of the vehicle equipped with compression-ignition engine shall use diesel; while the fuel tank of the vehicle equipped with ignition engine shall use gasoline.

5.5.2 Pretreatment before test: inject test fuel into the fuel tank to reach 50% of the rated capacity. The fuel tank is not sealed and stored in an environment with temperature at 40°C±2°C till the amount of fuel loss per unit time reaches a stable state, but no more than 4 weeks.

5.5.3 Empty the fuel tank and inject the new test fuel to reach 50% of the rated capacity. Seal the fuel tank and store it in an environment with temperature at 40°C±2°C. When the internal temperature of the fuel tank reaches the test temperature, release the internal pressure of the fuel tank. The test period is 8 weeks, measure the fuel evaporation. Determine the average fuel evaporation per 24h.

5.5.4 If taking the test method in 5.5.3, the fuel evaporation exceeds the index specified in 4.1.10, then adjust the ambient temperature at 23°C±2°C; retest the same fuel tank according to the same test method.

5.6 Fuel resistance test of the plastic fuel tank

After the fuel tank has completed the permeability test in 5.5, it shall take the low-temperature impact resistance test in 5.3 and pressure-proof test in 5.4.

Check and record the leakage of the fuel tank.

5.7 Fire resistance test of plastic fuel tank

5.7.1 Fuel tank installation and fuel type filling requirements:

a) If the fuel tank is only used for the ignition engines or can be used both for the ignition engine and the compression ignition engine, then the commercial gasoline shall be filled for each test;

b) If the fuel tank is only used for the vehicles equipped with compression ignition engine, commercial diesel shall be filled for each test;

c) The fuel tank and its accessories shall be installed and fixed on the test bench as much as possible to simulate the actual loading state. If the vehicle is equipped with the components that affect the spread of fire, it shall also be installed. All openings shall be sealed during the test; the automatic compensation pressure device shall be dept in working condition. Fill the fuel specified in Items a) and b) to fuel tank and reaches 50% of its rapid capacity.

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