

ICS 43.040

QC

**AUTOMOTIVE INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Measuring method of cleanliness of automobile transmission
assembly**
(English Translation)

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1 Scope

This Document specifies the method for testing the cleanliness of automobile transmission assembly.

This Document applies to the cleanliness testing of Types M and N automobile transmission assembly and electric drive assembly (including lubricating oils and components).

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in 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 Document.

GB/T 14039 Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles

GB/T 25915.1-2021 Cleanrooms and associated controlled environments - Part 1.

Classification of air cleanliness by particle concentration

GB/T 41481-2022 Road vehicles - Cleanliness of components and systems

3 Terms and Definitions

For the purposes of this Document, the following terms and definitions apply.

3.1 Cleanliness of assembly

The cleanliness of assembly is expressed by the mass or quantity, geometric size, and type of impurity particles.

NOTE: The cleanliness of assembly is divided into cleanliness of disassembly and cleanliness of non- disassembly.

3.2 Impurity

Pollutants that enter from the outside, remain on the product itself, or are generated by the system during the product's manufacturing, storage, transportation, use, and maintenance.

3.3 Filter membrane

The cleanliness test uses a polymer film sheet with a knitted or mesh structure and special separation capabilities to retain the particles of interest through separation.

3.4 Cleaner

The liquid medium that is used to clean the sample.

3.5 Blank experiment

A set of experiments to determine the cleanliness of the system using methods for detecting sample cleanliness in the absence of a sample.

3.6 Mass constant

The process of repeatedly drying, cooling, and weighing a substance until its mass remains constant.

3.7 Blank value

The value that is obtained from blank experiment.

3.8 Attenuation test

A set of tests that is used to determine cleaning parameters such as sample cleaning pressure, flow rate, and flow velocity, etc.

3.9 Lubricating oil

Liquid lubricant that is used between the relatively moving surfaces of a friction pair.

3.10 Particle

Tiny structures formed from solid organic or inorganic matter, such as metals, plastics, ceramics, minerals, rubber, and fibers, etc.

3.11 Particle size

It mainly includes particle length, particle width, and inscribed circle diameter of the particle.

NOTE: Unless otherwise specified, the longest size shall be used.

3.12 Particle length

The maximum vertical distance between two parallel lines at both ends of the particle is

4. Testing Methods

4.1.1.1 Cleanliness test of Types M and N automotive transmission assemblies and electric

drive assemblies (hereinafter referred to as "assemblies") alters the cleanliness characteristics of the sample; therefore, cleanliness test shall not be repeated on the same sample.

4.1.1.2 For lubricating oil cleanliness test (such as contamination level and elemental analysis), samples can be retained for retest if the lubricating oil is homogeneous.

4.1.2 Cleaner

The cleaner shall meet the following requirements.

- a) It shall be able to quickly remove impurities from the sample without altering the characteristics of the impurity particles;
- b) It shall be non-corrosive to the sample, harmless to the human body, and not chemically
- a) The testing room shall have independent working areas for impurity extraction, drying, and analysis;
- b) The testing room shall have dust prevention measures, and the indoor cleanliness level shall at least meet the ISO Class 9 requirements of GB/T 25915.1-2021;
- c) The testing room shall be well-ventilated, with a temperature of 15°C~30°C and relative humidity $\leq 70\%$;

d) The testing room shall have fire prevention and anti-static measures.

4.1.6 Samples

Samples shall meet the following requirements.

- a) Samples shall be sealed in packaging during transportation and storage to avoid collisions and contamination from external pollutants;
- b) Non-testing areas shall be cleaned before testing.

4.1.7 Blank value

The blank value shall meet the following requirements.

- a) The mass or number of the particles shall be less than 1/10 of the sample cleanliness limit;
- b) The largest particle shall be less than half the maximum permissible particle size of the sample, determined according to the lower limit of the particle's range; see Table 5 for range division;
- c) The blank value shall not be deducted from the test results.

4.1.8 Personnel

Personnel shall meet the following requirements.

- a) Testing personnel shall wear anti-static and dustproof work clothes and caps;
- b) Testing personnel shall be professionally trained, familiar with the testing process, proficient in operating the testing equipment, able to diagnose equipment malfunctions, and perform routine maintenance.

4.2.1 Impurity extraction device

The impurity extraction device may include.

- a) Manual filtration devices, including. cleaning chamber with exhaust system, vacuum pump, pressure tank, spray gun, funnel, filter membrane support frame, suction flask, etc.;
- b) Automatic filtration devices, including. cleaning chamber, spray gun, automatic membrane forming system, automatic circulating filtration system, etc.;
- c) Glassware, including. desiccator, weighing bottle, conical flask, measuring cup, measuring cylinder, etc.;
- d) Other apparatuses, including. sampler, flat-tipped toothless stainless steel tweezers, weighing pan, oil-resistant rubber gloves, etc.