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Technical specifications of methanol fuel engine

甲醛燃料发动机技术条件

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Numbers, names and implementation dates of 13 automotive industry standard

No.	Standard No.	Standard name	Replaced standard No.	Date of implementation
402	QC/T 1145-2021	Diesel/methanol dual-fuel engine - Technical specifications		2021-07-01
403	QC/T 1150-2021	Fuel system technical specifications of methanol vehicle		2021-07-01
404	QC/T 1151-2021	Technical specifications of methanol-fueled vehicle		2021-07-01
405	QC/T 1142-2021	Test method of natural frequency for automobile wheels		2021-07-01
406	QC/T 1143-2021	Test method for static bending stiffness of automobile wheels		2021-07-01
407	QC/T 417-2021	Electrical wire harness assemblies for motorcycles and mopeds	QC/T 417.2-2001	2021-07-01
408	QC/T 1144-2021	Oxygen sensor for motorcycles and mopeds		2021-07-01
409	QC/T 1146-2021	Technical requirements for methanol fuel engines		2021-07-01
410	QC/T 1147-2021	Electronically controlled silicon oil fan clutch for automobile engine		2021-07-01
411	QC/T 1148-2021	Electric opening and closing system for automobile back door		2021-07-01
412	QC/T 207-2021	Ordinary gas spring for automobile	QC/T 207-1996	2021-07-01
413	QC/T 629-2021	Automobile sun shield	QC/T 629-2005	2021-07-01
414	QC/T 1130-2021	Measurement methods fuel consumption for methanol vehicles		2021-07-01

Technical specifications of methanol fuel engine

1 Scope

This document specifies the terms and definitions, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage of methanol fuel engines for automobiles.

This document applies to ignition engines, that use M100 methanol fuel for automobiles.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. 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 1859.1 Reciprocating internal combustion engines - Measurement of sound power level using sound pressure - Part 1: Engineering method

GB/T 6809 (all parts) Reciprocating internal combustion engines - Vocabulary of components and systems

GB 7258 Technical specifications for safety of power-driven vehicles operating on roads

GB 14023 Vehicles, boats and internal combustion engine - Radio disturbance characteristics - Limits and methods of measurement for the protection of off-board receivers

GB/T 14097-2018 Reciprocating internal combustion engines - Limit values of emitted noise

GB 17691-2018 Limits and measurement methods for emissions from diesel fueled heavy-duty vehicles (CHINA VI)

GB 17930 Gasoline for motor vehicles

GB/T 18297 Performance test code for road vehicle engines

GB 18352.6-2016 Limits and measurement methods for emissions from light-duty vehicles (CHINA 6)

GB/T 19055 Reliability test methods for motor vehicle engines

GB/T 20651.2 Reciprocating internal combustion engines - Safety - Part 2: Ignition engine

GB/T 23510 Fuel methanol for motor vehicles

GB/T 28046.2 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads

GB/T 28046.3 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads

GB/T 28046.4 Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads

QC/T 471 Specifications for auto diesel engines

QC/T 526 Automobile engine - Engineering approval evaluation program

QC/T 901 Quality inspection and evaluation method of automobile engine products

3 Terms and definitions

The terms and definitions as defined in GB/T 6809, as well as the following terms and definitions, apply to this document.

3.1

M100 Methanol fuel for motor vehicles

Chemicals, whose methanol mass content is over 99.5% AND whose purity meets the requirements of GB/T 23510.

3.2

Methanol fuel engine

The ignition engine (hereinafter referred to as engine), that uses M100 methanol fuel for automobile as fuel, allows auxiliary fuel gasoline to be used for starting; whose gasoline auxiliary fuel cannot be used at the same time as methanol fuel.

3.3

GB/T 28046.2, GB/T 28046.3, GB/T 28046.4.

4.1.9 There shall be no leakage of engine oil, alcohol, water and gas.

4.1.10 The appearance, assembly adjustment quality, cleanliness of the engine shall meet the requirements of the product drawings and process documents.

4.1.11 The ratio of engine oil/methanol consumption AND the maximum piston air leakage, under full load, shall meet the requirements of GB/T 19055.

4.1.12 The surface painting of the engine shall meet the requirements of the product drawings and process documents.

4.1.13 The methanol supply device shall be distinguished from the auxiliary fuel gasoline supply device, by the label.

4.2 Consistency requirements

The tolerances of engine's rated power, maximum torque, minimum fuel consumption rate shall meet the requirements of GB/T 18297, during type inspection and production consistency inspection.

4.3 Low temperature starting requirements

4.3.1 Auxiliary starting devices (such as gasoline starting, etc.) are allowed to be used, in low-temperature environments; they shall meet the starting requirements of low-temperature cold start, which are specified by the manufacturer.

4.3.2 The engine is filled with the specified methanol engine oil, as required by the manufacturer. The battery voltage is within the specified range. The starter drives the engine to tow 3 times. The duration of each towing is 10 s ~ 15 s. The towing interval is 2 min. During the towing process, the speed shall be able to meet the maximum speed requirement for engine start.

4.3.3 During the engine start-up and warm-up process, if auxiliary starting measures (such as gasoline starting, etc.) are used, the auxiliary fuel and methanol fuel shall be switched, under the engine coolant temperature conditions, which are specified by the manufacturer.

4.4 Reliability requirements

4.4.1 The overall reliability of the engine shall meet the "pass" requirement of reliability assessment, in GB/T 19055.

4.4.2 The engine's reliability test focuses on parts that are prone to failure, due to methanol corrosion. Corrosion of parts such as cylinder liner/piston ring, valve/seat, bearing bush, duct oil seal, crankshaft's front and rear oil seal, spark

plug, methanol injector, cylinder head, intake pipe, supercharger, catalytic converter, EGR system, crankcase ventilation system, etc., may cause failure.

4.5 Durability requirements

The durability of the engine shall meet the requirements of QC/T 471.

4.6 Technical requirements for emission, noise, radio disturbance characteristics

4.6.1 Engine pollutant emissions shall meet the requirements of single gas fuel vehicles in GB 18352.6-2016 OR single gas fuel engines in GB 17691-2018.

4.6.2 The emissions of unburned methanol and formaldehyde from the engine shall comply with the relevant national standards.

4.6.3 The on-board diagnostic (OBD) system of the engine shall meet the requirements of GB 17691 or GB 18352.6.

4.6.4 The noise of the engine shall meet the requirements of level 3 and above in GB/T 14097-2018.

4.6.5 The radio disturbance characteristics of automobiles, which are equipped with engines, shall meet the requirements of GB 14023.

4.7 Corrosion resistance requirements

4.7.1 The methanol supply device of the engine AND its components shall comply with the relevant standards of methanol fuel system for automobiles.

4.7.2 All alcohol-related parts and components, of the methanol supply system of the engine, shall have the ability to resist methanol corrosion AND pass the reliability test of the whole machine.

4.7.3 Other parts of the engine, that are in contact with methanol fuel, its combustion products and engine oil, such as oil seals, crankcase's ventilation system parts, turbocharger assemblies, bearings of moving parts, shall have the ability to resist methanol corrosion AND pass the reliability test verification of the whole machine.

4.7.4 The components of the methanol supply system of the engine shall be marked, in an eye-catching manner, with the name of the methanol supply device and the direction of methanol flow.

4.8 Safety requirements

The safety performance of the engine shall meet the requirements of GB/T 20651.2.

gas fuel engine in GB 17691-2018.

5.10 The emission test of engine's unburned methanol and formaldehyde shall be conducted, in accordance with the relevant national standards.

5.11 The test of the engine's on-board diagnostic system (OBD) shall be carried out, in accordance with the provisions of GB 17691 or GB 18352.6.

5.12 The engine's noise test method shall be carried out, in accordance with the provisions of GB/T 1859.1.

5.13 The measurement method of the engine's radio disturbance characteristics shall be carried out, in accordance with the provisions of GB 14023.

6 Inspection rules

6.1 Type inspection

Type inspection shall be carried out, in accordance with QC/T 526, in any of the following situations:

a) New products;

b) The product has major improvements (that is, the improved engine's rated speed is increased by more than 10%, compared to the original model, OR the rated power is increased by more than 15%, compared with the original model);

c) There are major changes in the structure;

d) The product is subject to trans-plant production.

6.2 Exit-factory inspection

6.2.1 The engine can leave the factory, only after it has passed the exit-factory inspection, the product quality certificate is issued by the quality inspection department of the enterprise, in accordance with the provisions of national standards, industry standards or enterprise standards.

6.2.2 The inspection items shall include at least the following contents:

a) Visual inspection (assembly integrity, assembly quality);

b) The assembly adjustment inspection of the whole machine shall be carried out, in accordance with the exit-factory technical requirements of the manufacturer, mainly including: hot test run-in, leakage inspection, gap

inspection, abnormal noise inspection, technical adjustment, tightness of each system;

c) Methanol and gasoline auxiliary fuels shall be respectively subject to the verification of fuel type conversion function.

6.3 Spot inspection of quality

The quality of the engine shall be spot-checked, in accordance with the provisions of QC/T 901.

7 Marking, packaging, transportation, storage

7.1 Marking

7.1.1 The nameplate of the engine shall indicate the following:

a) The manufacturer's trademark or full name, engine model and displacement (L), as well as the word of "methanol";

b) Emission level;

c) Engine' exit-factory number and date;

d) Rated power/rated speed [kW/ (r/min)];

e) Maximum torque/speed [N •m/ (r/min)];

f) Net mass (kg).

7.1.2 In accordance with the provisions of GB 7258, mark the permanent engine model and exit-factory number, on an appropriate position of the engine cylinder.

7.2 Packaging

7.2.1 The following requirements shall be met before the engine is packaged:

a) Drain off the engine oil and coolant, before packing the engine;

b) The engine shall be subject to anti-rust treatment, before leaving the factory. Under normal storage conditions, ensure that the engine, accompanying tools and spare parts are not corroded, within 12 months from the date of exit-factory;

c) For seaborne exports, it shall take measures, such as moisture-proof and salt-spray corrosion prevention;

d) All exposed nozzles of the engine shall be covered with protective covers.

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