

HJ

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

HJ 857-2017

Measurement method and technical specification for PEMS test of exhaust pollutants from heavy-duty diesel and gas fuelled vehicles

重型柴油车、气体燃料车排气污染物车载测量方法及技术要求

(English Translation)

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Foreword.....

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1 Scope of application

This Standard specifies PEMS measurement method and technical specification for exhaust pollutants from heavy-duty diesel and gas fuelled vehicles. It is applicable to emission compliance inspection and in-use compliance inspection of new production vehicles of heavy-duty diesel vehicles and gas-fueled vehicles that meet stage 5 of GB 17691-2005.

This Standard is applicable to measurement of exhaust pollutants from M 2 , M 3, N2 (but excluding low-speed goods vehicles) and N3 vehicles that are equipped with compression ignition, gas fuel ignition engines with a design speed of more than 25km/h, as well as M 1 vehicles that a total mass is greater than 3500kg.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For undated references, the latest edition of the referenced document applies.

GB/T 12534, Motor vehicles - General rules of road test method

GB/T 15089-2001, Classification of power-driven vehicles and trailers

GB 17691-2005, Limits and measurement methods for exhaust pollutants from compression ignition and gas fuelled positive ignition engines of vehicles (III IV V)

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

HJ 437-2008, Technical specification for on-board diagnostic (OBD)system of compression ignition and gas fuelled positive ignition engines of vehicles

HJ 438-2008, Durability of Emission Control Systems of Compression Ignition and Gas Fuelled Positive Ignition Engines of Vehicles

HJ 689-2014, Limits and Measurement Methods for Exhaust Pollutants from Diesel Engines of Urban Vehicles (WHTC)

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB 17691-2005 and HJ 689-2014 as well as the followings apply.

3.1

portable emissions measurement system PEMS a complete set of emission testing systems, that can be installed in the vehicle, that can simultaneously measure exhaust flow, pollutant concentration, ambient temperature, humidity, atmospheric pressure, and that can conduct real-time measurement or collection of related parameters such as engine speed, torque, load, vehicle speed, latitude, longitude, and altitude.

3.2 PEMS method

a method that installs the portable emission measurement system on the testing vehicle, so as to measure the exhaust pollutant emissions when the vehicle is driving on the actual road.

3.3 transient cycle the transient cycle (ETC or WHTC) used when type inspection is carried out for the engine according to GB 17691-2005 or HJ 689-2014.

3.4 work-based window a continuous interval from the trial termination point to the cutoff point; when the cumulative work in the interval is equal to the engine work in the transient cycle, the continuous interval is defined as a work-based window.

3.5 window brake-specific emissions the ratio of the total mass of vehicle exhaust pollutants emitted in the work-based window to the amount of work done in the window, in g/kWh.

3.6 work-based window method a method that evaluates vehicle emissions by comparing the compliance of specific emissions of various work-based windows with those of engine type inspection specific emissions.

3.7 average window power percentage the percentage that the average power of the engine in the work-based window accounts for the maximum net power of the engine.

3.8 valid work-based window

4.3.2 Determination of test vehicle compliance

a) For any pollutant specified in Article 4.1.1, if the proportion of the work-based window that meets the emission limit requirements accounts for 90% or more of the valid work-based window, the test vehicle will be judged as meeting the emission standards. Otherwise, it is determined that the emission exceeds the standard.

b) Among the valid data points, the data points whose NO_x emission concentration meets the limit requirements of Article 4.1.2 account for 95% or more of the valid data points, then the test vehicle is determined to meet the emission standards.

Otherwise, it is determined that the emission exceeds the standard.

5 Emission compliance inspection of new production vehicles

and in-use compliance inspection

5.1 Emission compliance inspection of new production vehicles

5.1.1

The manufacturer shall formulate scientific and efficient self-inspection procedures in accordance with the requirements of this Standard. Conduct self-inspection on emission compliance of newly produced models (or series). Report the results of the self-inspection to the competent environmental protection authority.

5.1.2 When the environmental protection authority conducts the inspection of the new

production vehicle emission standards on the model (or series), 3 vehicles are randomly selected from the mass-produced vehicles. Determine according to the following rules:

a) Randomly select 1 vehicle from the 3 vehicles that are drawn in Article 5.1.2.

Carry out the actual road emission test according to the method specified in

Annex B. If the vehicle meets the requirements of Article 4.1, it is determined as conforming.

b) If the vehicle does not meet the requirements of Article 4.1, if the manufacturer submits a written application, the environmental protection authority shall conduct the actual road emission test according to the method specified in Annex

B for the other two vehicles selected in Article 5.1.2. If both vehicles meet the requirements of Article 4.1, it is determined to be conforming, otherwise it is not conforming.

5.2 In-use compliance inspection

5.2.1

The manufacturer shall conduct self-inspection of in-use compliance according to the test methods specified in this Standard. The in-use compliance self-inspection of the engine manufacturer shall be carried out on the basis of the engine model (or family).

The in-use compliance self-inspection of vehicle manufacturers shall be carried out on

- Dry base CO concentration, %;
- Hydrogen molar ratio.

B.1.4 Test conditions

B.1.4.1 The composition of test conditions shall be close to the distribution of road operating conditions when the vehicle is in normal use. Vehicle operating road conditions include urban roads, suburban roads and expressways. According to the vehicle category, the specific distribution and characteristics refer to the provisions of

B.1.4.2-B.1.4.6. The actual composition ratio is allowed to have a deviation of $\pm 5\%$.

Due to some practical reasons, manufacturer can also adjust the test conditions according to the actual situation. However, the relevant situation shall be reported to the competent department of environmental protection.

B.1.4.2 The test shall be carried out continuously in the order of urban-suburban-high-speed driving. According to the size of the vehicle's driving speed, distinguish the attributes of the vehicle's running road. Urban road: the vehicle speed is between 0-

50km/h, and the average speed is 15-30km/h. Suburban road: the first short trip with a vehicle speed exceeding 55km/h is recorded as the beginning of the suburban road, the vehicle speed is not more than 75km/h, and the average speed is 45-70km/h.

Expressway: the first short trip with a vehicle speed exceeding 75km/h is recorded as the beginning of the expressway, and the average vehicle speed is greater than 70km/h.

B.1.4.3 For M 1 , M 2 , M 3 , and N 2 vehicles (except urban vehicles), the time allocation ratio of each operating road condition during the test is 20% of urban roads, 25% of suburban roads and 55% of expressways.

B.1.4.4 For urban vehicles, the time allocation ratio of each operating road condition during the test is 70% of urban roads and 30% of suburban roads.

B.1.4.5 For N3 vehicles (except postal and sanitation vehicles), the time allocation ratio of each operating road condition during the test is 10% of urban roads, 10% of suburban roads and 80% of expressways.