

GB 18176-2016 Limits and Measurement Methods for Emissions from Mopeds (China IV)

The type V durability of pollution-control devices test procedures and requirements referred to in GB 18176-2016

Note: This document is an unofficial translation, in case of doubt, please refer to the original text.

- 6.2.5 Test type V test(durability test of pollution-control device)
- 6.2.5.1 Before the test, the manufacturer shall provide two sets of the same catalytic converters, one for durability test and the other for precious metal content according to the requirements of QC/T 1003. The measurement results shall not be higher than 1.2 times the values declared by the manufacturer.
- 6.2.5.2 All mopeds to undergo type test shall perform the durability test of pollution-control device according to the requirements set out in Annex F. The total durability mileage is 11000km
- 6.2.5.3 At the request of the manufacturer, the testing service can use the deterioration factors in Table 4 to carry out the test type I before completing the test type V. After completing test type V, the testing service shall replace the deterioration factors in Table4 with the deterioration factors determined according to Annex F.

Table 4 Deterioration factors (DF)

CO	HC	NOx
1.3	1.2	1.2

- 6.2.5.4 The deterioration factor shall be determined according to the test procedure in point 6.2.5.2. The deterioration factor is used to determine whether the pollutants emitted by moped meet the requirements in point 6.2.1 and point 7.1.

Annex F

(Normative)

Durability Test of Pollution-control Devices (Test Type V)

F1 Introduction

This Annex describes the procedures for type V test to verify the durability of pollution-control devices of mopeds.

F2 Requirements for durability test mileage

The total durability test mileage shall be in accordance with 6.2 .5.2.

F3 Test moped

The test mopeds shall be in good mechanical order at the start of mileage accumulation and it shall not have more than 100 km accumulated after it was first started at the end of the production line.

F4 Fuel

During the durability test of pollution-control device, the fuel for driving test shall be commercially available unleaded gasoline or gas fuel, and its technical specifications shall meet the requirements recommended by the manufacturer in the user manual. The emission performance test shall utilize the reference fuel specified in Annex H.

If the test mopeds is/are equipped with a two-stroke engine, lubricating oil shall be used in the proportion and of the grade recommended by the manufacturer in the user manual.

F5 Maintenance and adjustment of moped

F5.1 Maintenance, adjustments and the use of the controls of the test mopeds shall be as recommended by the manufacturer in the appropriate repair and maintenance information and in the user manual.

F5.2 During maintenance, only the following items can be inspected, cleaned, adjusted or replaced.

- Timing device;
- Idle speed and idle air-fuel ratio;
- Valve clearance;
- Torque of engine fixing bolts;
- Spark plug;
- Engine oil;
- Fuel pipe;
- Crankcase venting pipe;
- Battery terminal post and venting pipe;
- Throttle control state;
- Engine oil filter;
- Air filter;
- Removal of carbon deposit.

- F.5.3 In the case of unscheduled maintenance, such approval will be given if:
- part failure or system malfunction, or the repair of such failure or malfunction does not directly affect the combustion of the engine, or it is merely restricted to the removal or replacement of the spark plug;
 - need for maintenance or repairs is indicated by an overt indication of malfunction such as persistent misfire, vehicle stall, overheating, fluid leakage, loss of oil pressure, or charge indicator warning:
- F.5.4 For parts other than the engine, emission control system or fuel system, maintenance can only be carried out when the function of the parts/ system fails .
- F.5.5 Emission measurement may not be used as a mean of determining the need for unscheduled maintenance.
- F.5.6 If the part failure or system malfunction occurrence and/or repair rendered the moped unrepresentative of mopeds in use, the vehicle shall not be used as a test moped.
- F.5.7 Any test moped which incurs major mechanical failure necessitating disassembly of the engine shall not be used as a test vehicle. This prohibition does not apply to failures occurring after the completion of all required tests at the total test distance.
- F.5.8 Except for the initial maintenance or only changing the engine oil or filter, the interval mileage of other maintenance shall not be less than 2,000km.

F.6 Moped operation procedures on test road or chassis dynamometer

- F.6.1 General requirements
- F.6.1.1 During the test type V, the reference mass deviation of the vehicle shall be within ± 5 kg.
- F.6.1.2 Throughout the durability test, all the pollution-control devices or systems shall be installed on the vehicle.
- F.6.1.3 In the test type V, the continuous operation time of the moped shall not exceed 12 h. During the continuous operation, it is allowed to shut down the engine, but the time after shutting down the engine is not counted in the operation time of 12 h.
- F.6.1.4 After each continuous operation, the moped's engine shall be shut down for a rest period of minimum 6h or till the engine oil temperature reaches the ambient temperature.
- F.6.1.5 For the test type V, either of the following two test methods may be selected.
- F.6.1.5.1 Durability test procedure with full mileage accumulation
- Test vehicle shall undergo the complete durability test as per the total test mileage provided 11000km. After the start of durability test, the type I emission test shall be carried out at equal test intervals, and the deterioration coefficient shall be calculated after the durability test is completed. The test process is shown in Figure F.1.

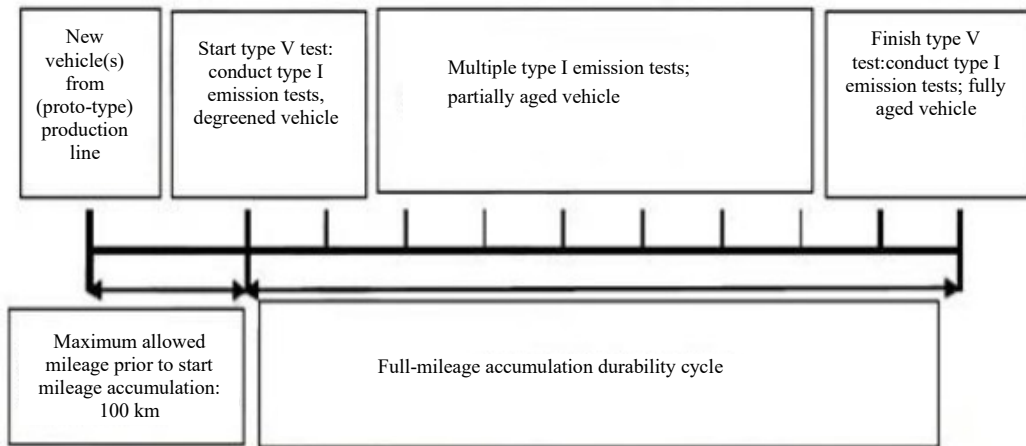


Figure F.1 Test type V- durability test procedure with full mileage accumulation

F.61.5.2

Accelerated durability test procedure with partial mileage accumulation

The test vehicle shall carry out the durability test of at least 50% of the total test mileage specified in Table 4 (50% of the total durability test mileage). After the start of durability test, the type I Emission test shall be carried out at equal test intervals, and the deterioration coefficient shall be calculated after the durability test is completed. The test process is shown in Figure F.2.

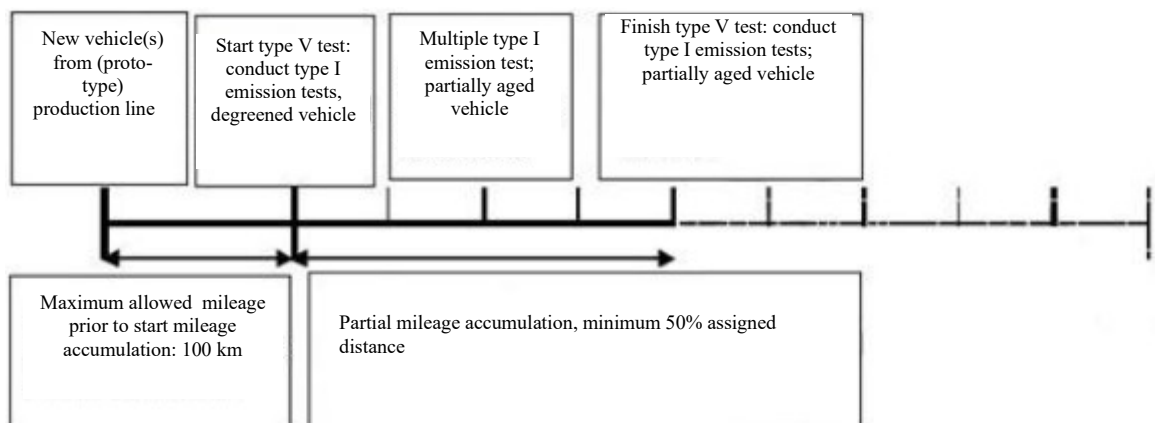


Figure F.2 Test type V-accelerated durability test procedure with partial mileage accumulation

F.6.2

Driving cycle

F.6.2.1

During the operation on the test road or chassis dynamometer, One operation cycle shall be performed as shown in Figure F.3:

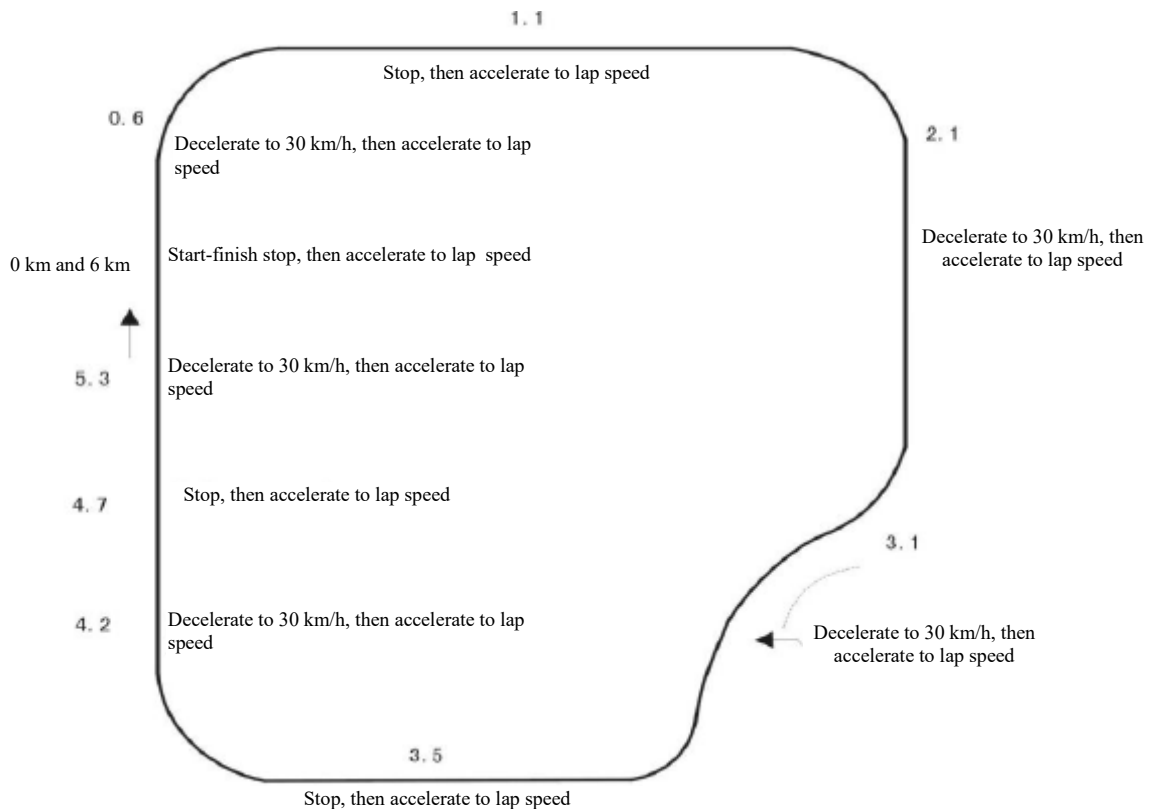


Figure F.3 Driving cycle

During the driving cycles, the moped shall be accelerated and decelerated normally according to the shift specifications of the moped manufacturer.

The driving procedure of test type V consists of 11 cycles, and the driving mileage of each cycle is 6km.

During the first nine driving cycles, the test vehicle is stopped four times with the engine idling each time for 15 seconds.

A driving cycle shall consist of five decelerations, dropping from cycle speed to 15 km/h. The moped shall then gradually be accelerated again until the maximum cycle speed is attained.

For the tenth cycle, the mopeds should run at 45km/h.

The 11th cycle shall begin with a maximum acceleration from stop point up to 45km/h. At halfway, the brakes are applied normally until the test vehicle comes to a stop. This shall be followed by an idle period of 15 seconds and a second maximum acceleration.

F.6.2.2 An alternative durability mileage accumulation cycle can be used at the request of the moped manufacturer after agreement of the testing service, The alternative cycle shall have the same average vehicle speed, vehicle speed distribution, number of vehicle stops per kilometer and acceleration times per kilometer as the test cycle (shown in detail in figure F.3 and table F.1) on the test road or chassis dynamometer.

F.6.2.3 If the durability test is completed on a test track or road, the reference mass of the mopeds shall be at least equal to the mass tested on the chassis dynamometer.

F.6.2.4 At the manufacturer's request, and with the agreement of the testing service, the highest speed it can reach shall be used for the test when the test moped cannot reach the specified cycle speed.

Table F.1 Maximum vehicle speed in a cycle

Cycle	Maximum cycle speed/(km/h)
1	45

2	35
3	45
4	45
5	35
6	35
7	35
8	45
9	35
10	45
11	45

F.63 Durability test equipment

F.63.1 Chassis dynamometers used to accumulate test type V durability mileage shall enable the durability mileage accumulation cycle in F.6.2. In particular, the dynamometer shall be equipped with systems simulating inertia and resistance.

F.63.2 The chassis dynamometer shall be adjusted to the running resistance at a stable vehicle speed of 50 km/ h. The methods of determining the resistance and adjusting the brake is the same as those in Annex CB. The setting of chassis dynamometer for durability test shall be consistent with the inertia and resistance setting used in type I test. During the durability test the same inertia, flywheel setting and calibration procedure shall be used as those used in the test type I.

F.63.3 The durability test shall be carried out on the chassis dynamometer in accordance with the test cycle (shown in Figure F.3 and Table F.1). When equipped with moped autopilot system, the throttle, clutch, brake and gear-shifting device of the moped should be controlled in real time to meet the specifications.

F.63.4 The moped's cooling system shall be such that the vehicle temperatures (lubricating oil, coolant, exhaust system, etc.) during driving on the dynamometer shall be similar to those during running on road.

F.63.5 If necessary, some other test bench adjustments and characteristics shall be the same as those required in Annex C (e.g., inertia, being mechanical or electrically simulated).

F.63.6 The test vehicles may be moved to a different bench in order to conduct type I emission verification tests.

F.7 Emission tests and deterioration factor

F.7.1 Requirements for emission tests

F.7.1.1 A zero kilometer emission test may be performed prior to the beginning of service accumulation in accordance with the requirements of 6.2.1.

F.7.1.2 The first emission test at not more than 20% of the accumulation mileage and the final emission test at 50% of the total accumulation mileage or the total accumulation mileage included, and at least other two tests shall be performed at equal intervals between the minimum and total test distances. At least one emission test according to the requirements of type I test described in 6.2.1 shall be conducted at each test point (if multiple tests are conducted, the average value of multiple test results shall be taken as the test result of that mileage point).

F.7.1.3 All emission tests shall be carried out at the accumulation mileage point more than 500 km before or after maintenance.

F.7.2 Selection of test points for emission tests in the type V test

F.7.2.1 The first test must be conducted at an accumulated distance within 250 kilometers of the nominal distance at the first test point.

- F.7.2.2 The final test must be conducted at an accumulated distance within 250 kilometers of the test mileage or the total test mileage.
- F.7.2.3 Selection of test points for the second and the third emission tests
- F.7.2.3.1 If no maintenance is scheduled, the second and the third emission tests shall be carried out at equal intervals between the minimum and total test distances.
- F.7.2.3.2 If maintenance is scheduled, under the condition of maintaining the same test interval as far as possible, the second and the third emission tests shall be carried out at the accumulation mileage point more than 500 km before or after maintenance.

F.7.3 Test results

During the test type V, the result of each emission test at all the test points shall meet the limit listed in Table 2 in 6.2.

F.7.4 Determination of the deterioration factor

F.7.4.1 The measurement results of all exhaust pollutants are plotted as a function of accumulation mileage. The accumulation mileage is rounded to an integer according to the rounding method, and the best fitting straight line of all measurement points is obtained by the least square method. If the partial mileage durability test method is selected, the extrapolation method shall be used to obtain the emission of each exhaust pollutant at the total accumulation mileage. The 0 km test results shall not be considered in the calculation.

F.7.4.2 The data can be used to calculate the deterioration factor only when the emissions at all points on the best fit line of each exhaust pollutant are lower than the limits in Table 2 of 6.2.

F.7.4.3 For each exhaust pollutant, the deterioration factor (DF) is calculated by the following formula:

Where:

$$DF = \frac{M_{i2}}{M_{i1}} \dots\dots\dots (1)$$

M_{i1} -- Interpolation of the emission of each exhaust pollutant when the accumulation mileage is 250 km, mg/km;
 M_{i2} -- Interpolation of the emission of each exhaust pollutant at the total accumulation mileage, mg/km.

- F.7.4.4 These interpolations shall be retained to at least one decimal place. The calculation results of deterioration factor shall be rounded to 3 decimal places according to the rounding rules of values.
- F.7.4.5 Deterioration factors computed to be less than 1.000 shall be 1.000.
- F.7.4.6 For dual fuel vehicles, the deterioration factor when using gasoline can be used as the deterioration factor when using gaseous fuel.