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# GB

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## GB/T 18276-2017

Replacing GB/T 18276-2000

### Test-bed methods and evaluating index of dynamic property of motor vehicles

汽车动力性台架试验方法和评价指标

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## Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces GB/T 18276-2000 “Test-bed method and evaluating index of dynamic property of motor vehicles”.

As compared with GB/T 18276-2000, the main technical changes of this standard are as follows:

- This standard is only applicable to in-use commercial vehicles equipped with ignition or compression ignition engines. Other vehicles may refer to this standard (see clause 1).
- DELETE the terms and definitions of net power, measured driving wheel power, corrected driving wheel power and simulated inertia, ADD the terms and definitions of “driving wheel power” (see clause 3; clause 2 of 2000 version);
- DELETE the “test conditions” (see clause 3.3 of the 2000 version);
- ADD the “test equipment” requirements (see clause 6);
- ADD the “test preparation” requirements (see clause 6);
- MODIFY the “detection method”, PROVIDE specific detection method based on different detection working conditions, DELETE the acceleration time, coast-down distance, and time test (see clause 8; clause 4 of 2000 version);
- ADD the “evaluation of test results” (see clause 9);
- MODIFY the “limit” (see 9.1; clause 3.4 of 2000 version);
- DELETE the “Basic requirements for dual drum chassis dynamometers”, “Automotive dynamic performance test form”, and “Calculated radius of automobile tires” (see Appendix A, Appendix B, Appendix D of the 2000 version);
- ADD the “Recommended vehicle speed and driving wheel power at maximum torque condition” (see Appendix A);
- MODIFY the “Correction method of driving wheel power” (see Appendix B; Appendix C of the 2000 version).

This standard was proposed by the Ministry of Transport of the People's Republic of China.

# Test-bed method and evaluating index of dynamic property of motor vehicles

## 1 Scope

This standard specifies the test bed test parameters, evaluation indicators, testing equipment, testing preparations, testing methods, and testing results assessment, etc., of the dynamic properties of motor vehicles.

This standard applies to the in-service commercial vehicles equipped with ignition or compression ignition engines, other vehicles may refer to this standard.

## 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 standard.

GB/T 2977 Size designation, dimensions, inflation pressure and load capacity for truck tires

## 3 Terms and definitions

The following terms and definitions apply to this document.

### 3.1

#### **Driving wheel power**

The output power of a vehicle engine via the drive train to the drive wheels.

### 3.2

#### **Observed effective power**

The output power of the engine under actual intake conditions.

[GB/T 18297-2001, definition 3.1]

### 3.3

as the evaluation index.

## 6 Testing equipment

**6.1** The dynamometer shall meet the technical requirements of JT/T 445.

**6.2** Double drive-axle vehicle testing shall use a three-axle six-roller dynamometer.

**6.3** It is equipped with ambient temperature, relative humidity, atmospheric pressure measurement device, temperature measurement device measurement accuracy is  $\pm 1.5$  K, relative humidity measurement device measurement accuracy is  $\pm 5\%$ , atmospheric pressure measurement device measurement accuracy is  $\pm 0.5$  kPa.

## 7 Testing preparation

### 7.1 Dynamometer

#### 7.1.1 Warm-up

Use the anti-drag motor or motor vehicle to drive the drum to rotate the dynamometer to warm it up, until the coast-down time of the dynamometer approaches stable.

#### 7.1.2 Indicator value zeroing

The dynamometer is statically unloaded and the force and speed indications are zeroed or reset.

### 7.2 Motor vehicles under testing

**7.2.1** The vehicle is unladen.

**7.2.2** The specifications of the fuel and lubricating oil used in motor vehicles shall comply with the specifications of the manufacturer's technical conditions.

**7.2.3** Check the tread depth and air pressure of the drive axle tires. The depth of the pattern shall not be less than 1.6 mm. Tires shall not contain foreign matter. The tire shall be dry and the air pressure shall comply with the provisions of GB/T 2977.

**7.2.4** Collect the following parameters of the vehicle under testing:

- a) Engine rated power ( $P_e$ ), in kilowatts (kW);
- b) Maximum engine torque ( $M_e$ ), in Newton meter ( $N \cdot m$ );

**8.1.1.2** The pilot drives the vehicle steadily up to the dynamometer and sets the driving wheel of the vehicle on the drum. The axis of the driving wheel shall be parallel with the axis of the drum, fix the non-driving wheel of the vehicle.

**8.1.1.3** Start the motor vehicle, gradually accelerate, move the transmission to the direct gear (the automatic transmission shall be placed in “D” position), so that the motor vehicle can run stably with the minimum speed of the direct gear.

**8.1.1.4** Set the speed of the vehicle in accordance with the maximum torque condition as determined in 8.1.1.1, the dynamometer performs constant speed power metering.

**8.1.1.5** Load the dynamometer, step the acceleration pedal to the end, after the vehicle speed is stabilized for 5 s at set speed, read the average value of the measured power of the dynamometer for not less than 3 s, take record.

**8.1.1.6** During the reading, the actual speed shall be stabilized within the set speed  $\pm 0.5$  km/h.

### **8.1.2 Rated power condition testing**

**8.1.2.1** Fix the vehicle in accordance with 8.1.1.2 and 8.1.1.3 and start it.

**8.1.2.2** Step the accelerator pedal to the end, load the dynamometer with the maximum power scan point, record the maximum power point velocity ( $v_P$ ), in kilometers per hour (km/h).

**8.1.2.3** Set the dynamometer to perform constant speed dynamometer testing in accordance with  $v_P$ . After the vehicle speed is stable for 5 seconds at the set speed, read the mean value of the measured power of the dynamometer for not less than 3 s and take record.

**8.1.2.4** During readings, the actual speed shall be stabilized within  $\pm 0.5$  km/h of the  $v_P$  value.

### **8.1.3 Driving wheel power calculation**

**8.1.3.1** The driving wheel power is calculated in accordance with formula (2):

$$P = P_g + P_c + P_f \dots\dots\dots(2)$$

Where:

P -The driving wheel power, in kilowatts (kW);

$P_g$  - Measured power of the dynamometer, in kilowatts (kW);

$P_c$  - Internal dynamometer power loss, in kilowatts (kW);

## Appendix B

### (Normative)

#### Driving wheel power correction method

##### B.1 Standard environmental conditions

**B.1.1** Atmospheric pressure:  $p_0 = 100$  kPa.

**B.1.2** Relative humidity:  $\Phi_0 = 30\%$ .

**B.1.3** Ambient temperature:  $T_0 = 298$  K (25 °C).

**B.1.4** Dry air pressure:  $p_{s0} = 99$  kPa.

Note: The dry air pressure is calculated based on the total pressure of 100 kPa and the partial pressure of water vapor of 1 kPa.

##### B.2 Power correction factor

The measured power is corrected in accordance with the formula (B.1) to the corrected power in the standard status.

$$P_0 = \alpha \cdot P \dots\dots\dots(B.1)$$

Where:

$P_0$  - Corrected power in standard environmental status, in kilowatts (kW);

$\alpha$  - correction factor, which is  $\alpha_a$  for ignition engine, and  $\alpha_d$  for compression ignition engine;

$P$  - Measured power, in kilowatts (kW).

##### B.3 Ignition engine correction factor

The ignition engine correction factor  $\alpha_a$  can be calculated in accordance with formula (B.2):

$$\alpha_a = (99/p_s)^{1.2} \times (T/298)^{0.6} \dots\dots\dots(B.2)$$

Where:

$T$  - Ambient temperature during the test, in Kelvin (K);