

ICS 83.160.10

CCS G 41



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 18861-2012

**Test methods of rolling resistance for motor vehicle tyres and
motorcycle tyres -- Multi-point test**

(English Translation)

Issued on: December 31, 2012

Implemented on: September 1, 2013

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of PRC**

Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	6
4 Measurement methods...	7
5 Test equipment...	7
6 Test conditions...	9
7 Test procedures...	10
8 Data processing...	14
9 Data analysis...	17

1 Scope

This standard specifies a method, for measuring the rolling resistance of new car, truck and motorcycle tyres, under controlled laboratory conditions.

This standard applies to new car pneumatic tyres, truck pneumatic tyres, motorcycle pneumatic tyres, except for tyres only for temporary replacement use.

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) is applicable to this standard.

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

GB/T 2978 Size designation, dimensions, inflation pressure and load capacity for passenger car tyres

GB/T 2983 Series of motorcycle tyres (GB/T 2983-2008, ISO 4249-1:1985,

Motorcycle tyres and rims (code-designated series) - Part 1: Tyre; ISO 4249-2:1990,

Motorcycle tyres and rims (code-designated series) -Part 2: Tyre load ratings; ISO

4249-3:2004, Motorcycle tyres and rims (code-designated series) - Part 3: Rims;

ISO 5751-1:2004, Motorcycle tyres and rims (metric series) - Part 1: Design guides;
ISO 5751-2:2004, Motorcycle tyres and rims (metric series) - Part 2: Tyre dimensions and load-carrying capacities; ISO 5751-3:2004, Motorcycle tyres and rims (metric series) - Part 3: Range of approved rim contours; ISO 5995-1:1982,
Moped tyres and rims - Part 1: Tyres; ISO 6054-1:1994, Motorcycle tyres and rims (code-designated series) - Diameter codes 4 to 12 - Part 1: Tyres, NEQ)
GB/T 6326 Tyre terms and definitions (GB/T 6326-2005, ISO 4223-1:2002,
Definitions of some terms used in tyre industry - Part 1: pneumatic tyres, NEQ)

5.1.1 Drum diameter

The diameter of the drum of the testing machine is as follows: The diameter of the drum for car and motorcycle tyres is at least 1.5 m (the standard drum diameter is 1.7 m); the diameter of the drum for truck tyres is at least 1.7 m. The values of rolling resistance and rolling resistance coefficient shall be expressed as values for a 1.7 m drum. It shall be noted that the rolling resistance results are different for different drum diameters.

According to 9.3, if necessary, different drum diameters can be converted.

5.1.2 Drum surface quality

The outer surface of the drum shall be smooth steel or textured; it shall be kept clean.

The roughness of the steel surface shall comply with the requirements given in C.6. See Appendix D.4 for textured drumheads.

5.1.3 Drumhead width

The drum surface width shall be greater than the running surface width of the test tyre.

5.2 Test rims

The tyre shall be mounted on the test rim, which is specified in Appendix C.

5.3 Load, positioning, control, instrument accuracy

The tyres, their loads and positioning shall comply with the requirements given in C.3.

The control accuracy shall comply with the provisions of C.4. The instrument accuracy shall comply with the provisions of C.5.

5.4.1 Standard ambient temperature

The standard ambient temperature is 25 °C. The ambient temperature shall be measured on the extension line of the wheel axle centerline, at 0.15 m ~ 1 m away from the nearest sidewall surface of the tyre.

5.4.2 Allowable ambient temperature

If the standard ambient temperature cannot be reached, the test is allowed within the ambient temperature range of 20 °C ~ 30 °C. However, the test data shall be corrected to the rolling resistance value under standard ambient temperature conditions, according to 9.2.

5.4.3 Drum surface temperature

At the beginning of the test, the temperature of the outer peripheral surface of the drum is approximately the same as the ambient temperature.

pressure of passenger car tyres, truck tyres, motorcycle tyres shall comply with the provisions of Table 2. The control accuracy of the test starting air pressure shall comply with the provisions of C.4.1.

6.5 Time and velocity variables of deceleration method

When the deceleration method is selected, the increment of running time (Δt) shall not be greater than 0.5 s; the variation of test speed shall not be greater than 1 km/h.

6.6 Selected test conditions

If it is necessary to conduct a sensitivity test of tyre pressure, load, speed to tyre rolling resistance, please refer to the test conditions given in Appendix D.

7.1 General

The stages of the test procedure shall be carried out in the order given below.

7.2 Test run

Install the test tyre on the measuring rim. Inflate it according to the test air pressure, which is specified in 6.4. Install it on the testing machine. Run it for at least 1 hour, according to the test load specified in 6.3 and at a test speed not lower than that specified in 6.2.

7.3 Thermal balance

Place the tyre and rim assembly at the test site. Place the test tyre at the test ambient temperature, to reach thermal equilibrium, to allow the test tyre to reach the ambient

temperature. The thermal equilibrium time of car and motorcycle tyres is more than 3 hours; the thermal equilibrium time of truck tyres is more than 6 hours.

7.4 Air pressure adjustment

After thermal equilibrium, check the air pressure of the test tyre; adjust it to meet the requirements of 6.4; recheck after 10 minutes, to ensure the specified test air pressure of the tyre.

7.5 Warm up

Warm up the test tyre and drive it, according to the test load specified in 6.3 and the test speed specified in 6.2, until its rolling resistance value becomes stable. The minimum warm-up driving time shall comply with the requirements in Table 3.

- Car tyres and motorcycle tyres: Recommended value is 100 N, but no more than 200 N;
- Truck tyres (load index ≤ 121): Recommended value is 150 N. However, for equipment specially designed for car tyres or light truck tyres, it shall not exceed 200 N; OR for equipment specially designed for truck tyres, it shall not exceed 500 N;
- Truck tyres (load index > 121): Recommended value 400 N, but not exceeding 500 N;
- For standard tests and calibration tests, the skim test load values shall be the same;
- b) Record the applicable data, in axle force (F_t), input torque (T_t) or input power;
- c) Record the tyre load (L_m) perpendicular to the drum surface.

Note 1: In addition to the force measurement method, the measured values include bearing losses and aerodynamic losses of the tyre rim assembly and drum.

Note 2: The bearing friction -- between the tyre shaft and the drum -- depends on the applied load. Therefore, the value of the bearing friction when measuring the axle force under load is different from when measuring the parasitic loss using the skim test reading. In practice, however, the difference is negligible.

7.7.3 Machine method

The machine method is carried out, according to the following procedure:

- a) Move the tyre away from the drum;
- b) Record the input torque and input power at the test speed.

Note: Measurements include bearing and aerodynamic losses of the tyre rim assembly and drum.