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

GB/T 12538-2023

Road vehicles - Determination of centre of gravity

道路车辆 质心位置的测定

(English Translation)

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Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020
Directives

for Standardization - Part 1. Rules for the Structure and Drafting of Standardizing
Documents.

This document serves as a replacement of GB/T 12538-2003 Road Vehicles with Two Axles
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Determination of Center of Gravity. In comparison with GB/T 12538-2003, apart from
structural adjustments and editorial modifications, the main technical changes are as
follows.

- a) The scope of application is modified (see Chapter 1; Chapter 1 of Version 2003);
- b) Terms and definitions are added (see Chapter 3);
- c) Measurement preparation and preliminary measurement are added (see Chapter 4);
- d) The requirements for vehicle preparation are modified (see 4.2; Chapter 3 of Version
2003);

- e) The accuracy requirements for the measuring instruments are modified (see 4.3; Chapter 5 of Version 2003);
- f) The definition of test data is modified to satisfy multi-axle requirements (see 4.4; 4.1 of Version 2003);
- g) The calculation formula for the horizontal center of gravity is modified (see 5.1 and 5.2; 6.1 of Version 2003);
- h) The principle of axle lift method is added (see 6.1.1);
- i) The data processing method of the axle lift method is modified (see 6.1.2; 4.2 ~ 4.6 of Version 2003);
- j) The calculation formula for the height of center of gravity of the axle lift method is modified (see 6.1.3 and 6.1.4; 6.2 of Version 2003);
- k) The test record of the axle lift method is modified (see 6.1.5; Chapter 7 of Version 2003);
- l) The method of measuring the height of center of gravity using the stable pendulum method is added (see 6.2);
- m) The method of measuring the height of center of gravity using the tilt-table method is added (see 6.3);
- n) The special requirements for trailers are added (see 6.4).

This document modifies and adopts ISO 10392.2011 Road Vehicles - Determination of Center of Gravity.

In comparison with ISO 10392.2011, there are many technical differences, and the involved clauses are marked with a vertical single line () in the outer margin of the page. A table of these

technical differences and their causes is provided in Appendix B.

This document makes the following editorial modifications.

---Appendix E (informative) "Test Record of Tilt-table Method" is added.

Please be noted that certain content of this document may involve patents. The institution issuing this document does not undertake the responsibility of identifying these patents.

This document was proposed by Ministry of Industry and Information Technology of the People's Republic of China.

This document shall be under the jurisdiction of National Technical Committee 114 on Auto of

Standardization Administration of China (SAC/TC 114).

The drafting organizations of this document. China Automotive Technology and Research Center Co., Ltd.; CATARC Automotive Inspection Center (Tianjin) Co., Ltd.; Guangxi Zhuang

Autonomous Region Automobile and Tractor Research Institute Co., Ltd.; CATARC Automotive Inspection Center (Wuhan) Co., Ltd.; Xiangyang Da'an Automotive Inspection Center Co., Ltd.; Yutong Bus Co., Ltd.; Jinan Yuantong Measurement and Control Technology

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1 Scope

This document specifies a method for the determination of center of gravity of road vehicles and describes a method for the determination of horizontal center of gravity and three methods

for the determination of the height of center of gravity.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 3730.1 Terms and Definitions of Motor Vehicles, Trailers and Combination Vehicle - Part

1 Types

GB/T 3730.3 Motor Vehicles and Towed Vehicles - Dimensions of Vehicles - Terms and Definitions (GB/T 3730.3-1992, ISO 612.1978, NEQ)

3 Terms and Definitions

The terms and definitions defined in GB/T 3730.1, GB/T 3730.3 and GB/T 12549 are applicable to this document.

4 Measurement Preparation and Preliminary Measurement

Adopt the vehicle coordinate system specified in GB/T 12549, that is, the positive x direction

points forward along the main movement direction of the vehicle, the positive y direction points

horizontally to the left, and the positive z direction points upward.

The longitudinal and vertical position of the seat shall be adjusted in accordance with the vehicle manufacture's requirements, and the seat back angle shall be adjusted (for seats with

corresponding adjustment functions).

5 Determination of Horizontal Center of Gravity

The horizontal distance between the vehicle's center of gravity and the longitudinal center plane

is the horizontal position of center of gravity (y_{CG}), expressed in (mm), which is calculated in

accordance with Formula (5).

6 Determination of Height of Center of Gravity

During the measurement, the loading load must be reliably fixed to avoid displacement caused

by vehicle lifting. In order to balance the impact of the block, both the lifting and descending processes shall be measured.