
Mopeds — Measurement method for location of centre of gravity

*Cyclomoteurs — Méthode de mesure de l'emplacement du centre de
gravité*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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This second edition cancels and replaces the first edition (ISO 8705:1991) which has been technically revised.

Introduction

The stability of a moped is a very important element of its active safety. The moped/rider combination and the environment in which this combination is used form a unique closed-loop system. However, the evaluation of the moped/rider combination stability is extremely complex because of interaction of the intrinsic moped stability, the influence of position of the rider and his response to continuously changing conditions.

In the evaluation of moped stability, the determination of the kinetic characteristics of the moped/rider combination is considered an important part of the design parameters of the vehicle itself.

The test procedure described in this International Standard deals with one aspect of the kinetic characteristics: the determination of the centre of gravity of the moped and of the moped/rider combination.

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Mopeds — Measurement method for location of centre of gravity

1 Scope

This International Standard specifies a measuring method for determining the location of the centre of gravity of the moped and of the moped/rider combination. It applies to two-wheeled mopeds.

Other measuring methods can be used if it is demonstrated that the results are equivalent.

The measuring results obtained by the method given in this International Standard alone (see Annex A) cannot be used for an evaluation of the vehicle stability because they deal with only one aspect of this very complex phenomenon.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3779, *Road vehicles — Vehicle identification number (VIN) — Content and structure*

49 CFR Part 572, subpart B [*Code of Federal Regulations*, issued by the National Highway Traffic Safety Administration (NHTSA)]

3 Definitions of axis systems

3.1 The moped axis system (x, y, z) is a right-hand orthogonal axis system fixed in the moped such that when the moped is moving in a straight line on a level road, the x -axis is substantially horizontal, points forwards and is in the longitudinal plane of symmetry. The y -axis points to the rider's left side and the z -axis points upwards. This coordinate system applies to translation motion and rotational motion together with the moped.

Assuming that the moped is fixed to the platform, the coordinate system is also applied to the platform.

3.2 The Earth-fixed axis system (X, Y, Z) is a right-hand orthogonal axis system fixed on the Earth. The X - and Y -axes are in a horizontal plane and the Z -axis points upwards.

4 Measurement conditions

4.1 Measurement conditions for a moped shall be as follows:

- a) the moped shall be free from mud and deformation, and operate normally;
- b) the fuel shall be filled up to the top level specified in the operation manual;
- c) lubricating oil and cooling water shall be filled up to the level specified in the operation manual;

- d) tyre pressure shall be as specified in the operation manual;
- e) tools shall be provided at the regular storage positions;
- f) front and rear suspension systems shall be fixed at a static position;
- g) the front wheel shall be positioned along the x -axis.

If the conditions are to be modified according to the object of the measurement, the modified conditions shall be recorded in the measurement report.

4.2 Measurement conditions when a rider is on the moped shall be as follows:

- a) measurement conditions of the moped shall be as set forth as in 4.1;
- b) a test dummy ¹⁾ having a mass of 73,4 kg, or an equivalent man, shall be used as the rider;
- c) the rider shall be positioned as follows:
 - 1) the rider shall be positioned on the vertical centre surface of the moped;
 - 2) the rider shall sit on the seat, hold the handle bar by both hands, and place both feet on the foot rests;
 - 3) obtain the angle formed by the line connecting the point S ²⁾ and point H ³⁾ and the x -axis; that angle shall be the angle of the rider's posture;
 - 4) obtain the distance between the front axle and the point H along the x -axis, that distance shall be the seating position of the rider.

However, if the conditions are to be modified according to the object of measurement, the modified conditions shall be recorded in the measurement report.

5 Measuring instruments (apparatus)

Measuring instruments to measure the centre of gravity shall be as follows or having equivalent functions and accuracy.

- 5.1 **precision square level**, that can measure up to 0,1 mm/1 m.
- 5.2 **steel tape measure**, with a tolerance of $\pm [0,3 + 0,1(L - 1)]$ mm at a length, L expressed in metres.
- 5.3 **angle gauge**, that can measure the rotational angle to $0,1^\circ$ electrically or mechanically.
- 5.4 **weighing scales**, with enough accuracy to weigh the object to 0,1 kg.
- 5.5 **support**, used when placing the platform on the weighing scale.
- 5.6 **platform**, with the highest possible rigidity and of light weight.

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- 1) Test dummy as specified in 49 CFR Part 572, subpart B, or equivalent.
 - 2) Point indicating the centre of rotation of the dorso and the arms of the rider.
 - 3) Point indicating the centre of rotation of the dorso and femoral regions of the rider.