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ISO 7116

Third edition
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Mopeds — Measurement method for determining maximum speed

Cyclomoteurs — Méthode de mesure pour déterminer la vitesse maximale

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7116 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 23, *Mopeds*.

This third edition cancels and replaces the second edition (ISO 7116:1995), which has been technically revised.

Introduction

In this third edition of ISO 7116, all the test methods and conditions, such as accuracy of measuring system and climatic conditions, are reviewed and updated for the purpose of obtaining measurement results with higher accuracy.

The test method and conditions on circle type test tracks, which are used in several regions, are also revised substantially in view of the similarity with testing results on straight test tracks.

Mopeds — Measurement method for determining maximum speed

1 Scope

This International Standard specifies a method for determining the maximum speed of a moped as defined in ISO 3833.

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 6726, *Mopeds and motorcycles with two wheels — Masses — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 6726 and the following apply.

3.1
maximum speed
v_{max}
highest steady speed of test moped

3.2
moped kerb mass
m_k
Moped dry mass to which is added the mass of the following:

— fuel: tank filled at least to 90 % of the capacity specified by the manufacturer;

— auxiliary equipment usually supplied by the manufacturer in addition to that necessary for normal operation

EXAMPLES Tool-kit, carrier(s), windscreen(s), protective equipment, etc.

4 Symbols

Table 1 — Symbols

Symbols	Definition	Unit
A_{len}	accuracy of measurement equipment of the measurement section length	m
A_{speed}	resultant accuracy of speed measurement	%
A_{time}	accuracy of time measurement equipment	s
d_T	relative air density during the test	—
d_0	relative air density at the standard reference conditions	—
e_{speed}	resultant speed measurement error of system	km/h
L_{st}	length of the measurement section of type 1, type 3 and type 5 test tracks	m
L_{st1}	length of the measurement section 1 of type 2 and type 4 test tracks	m
L_{st2}	length of the measurement section 2 of type 2 and type 4 test tracks	m
p_T	total barometric pressure during test	kPa
p_0	total barometric pressure at standard reference conditions	kPa
T_T	air temperature during test	K
T_0	air temperature at standard reference conditions	K
t	time to run the measurement section	s
t_a	time to run the measurement section in direction a	s
t_b	time to run the measurement section in direction b	s
t_i	time to run the measurement section test run i	s
v	moped speed	km/h
v_{ave}	average speed of moped of two-direction tests	km/h
v_i	moped speed test run i	km/h
v_{max}	maximum speed of test moped	km/h
ρ_0	air volumetric mass	kg/m^3

5 Standard reference conditions

The standard reference conditions shall be as follows:

a) total barometric pressure, p_0: 101,325 kPa;

b) air temperature, T_0: 293,15 K;

c) relative humidity, H_0: 65 %;

d) air volumetric mass, ρ_0: 1,205 kg/m^3;

e) relative air density, d_0: 0,931 9.

6 Preparation of test moped

6.1 The moped shall conform in all its parts and components with the production series or, if different, a full description of such differences shall be included in the test report.

6.2 The fuel feed, ignition devices and the viscosity of the oils for the moving mechanical parts shall be in accordance with the instructions given by the moped manufacturer.

6.3 The lubricants shall be those prescribed by the manufacturer; the fuel shall be the commercial grade for the type of moped tested.

6.4 The moped engine and transmission shall be properly run in, according to the manufacturer's instructions.

6.5 Before the test, all moped parts shall be stabilized at the normal temperature for the moped in use.

6.6 The test moped mass shall be the moped kerb mass.

6.7 The distribution of the load between the wheels shall be in accordance with the manufacturer's instructions.

6.8 When installing the measurement instruments on the moped, care shall be taken to minimize their effects on the distribution of the load between the wheels and the additional aerodynamic loss.

6.9 Tyres shall be inflated to the pressure specified by the manufacturer.

7 Rider and riding position

7.1 The rider shall wear a close-fitting suit, a protective helmet, eye protection, boots and gloves.

7.2 The rider in the conditions given in 7.1 shall have a mass of 75 kg ± 2 kg and be 1,75 m ± 0,02 m tall.

7.3 The rider shall take the normal and safe riding position which is appropriate for attaining the maximum speed of the moped to be tested. The position shall allow the rider at all times to have proper control of the moped during the test. The position of the rider shall remain as stable as possible in order to avoid any influence on the test results. The description of the position shall be given in the test report or may be replaced with photographs (either during motion or in a static position).

8 Measurement equipment and accuracies

8.1 Measurement equipment

Test equipment to measure the moped speed and the ambient atmospheric conditions shall be as follows:

a) electronic time counter or equivalent time measurement system;

b) photoelectric cell or equivalent sensor;

c) measurement equipment for the distance between photoelectric cells;

d) thermometer;

e) barometer;

f) humidity meter;

g) anemometer.

The photoelectric cell and electronic time counter system, or the equivalent system, shall be used to measure the moped speed. Care shall be taken with the set-up adjustment of photoelectric cells or equivalent sensors (e.g. height of the sensors and the crossing point of the photo-beam and the moped) so that the required accuracy of the length of measurement section is secured. The details of the system shall be given in the test report if the equivalent system is used.

The function and accuracy of the test equipment shall be checked before use in the test.

8.2 Measurement accuracies

8.2.1 Accuracy of speed measurement system

The error of measured moped speed is influenced by the total time to run the measurement section(s), t, the length of the measurement section(s), L_{st}, the accuracy of the time measurement equipment, A_{time}, and the accuracy of measurement equipment of the measurement section length, A_{len}.

The length of the measurement section shall be chosen with reference to instrument accuracy and to the method of determining the running time, such that the actual speed is measured to an accuracy of ±1 %.

The accuracy of measurement equipment (e.g. the tape measure or the surveying instrument) of the measurement section(s) length, A_{len}, shall be given in the test report.

The accuracy of time measurement equipment, A_{time}, is determined by the accuracy of the electronic time counter system itself and the response time of the photoelectric cell sensor. A_{time} shall be given in the test report.

8.2.2 Measurement accuracy of ambient atmospheric conditions

The accuracies of equipment used to measure the ambient atmospheric conditions shall be in accordance with Table 2.

Table 2 — Accuracy

Parameter	At measured value	Resolution
Wind speed	±10 %	0,1 m/s
Wind direction	—	5°
Ambient temperature	—	1 K
Barometric pressure	—	0,2 kPa
Humidity	±5 %	1 %

9 Test tracks

9.1 General requirements

The test shall be carried out on a roadway that allows the maximum speed to be maintained over a measurement section(s) as defined in 9.2. The entry section of the measurement section shall have the same surface and longitudinal profile as the measurement section and be long enough to permit the moped to attain its maximum speed.

The test track shall be flat, level and smoothly paved. The road surface shall be dry and free of obstacles or wind barriers that might impede the measurement of the maximum speed. The test track shall have not more than 0,5 % longitudinal slope and not more than 3 % transverse slope, excluding the deceleration section(s).

The difference in altitude between any two points on the measurement section shall not exceed 1 m. However, the slope to compensate the centrifugal force of loop type and circle type test tracks may be allowed.

The shape and dimensions of the test track and the location of the measurement section(s) shall be given in the test report or replaced by the figure.

9.2 Composition

The test track shall consist of the following sections:

a) the acceleration section to reach maximum speed;

b) the maximum speed measurement section;

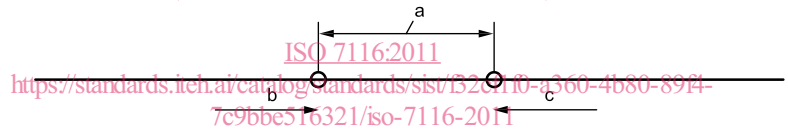
c) the deceleration section to safely stop the test moped.

9.3 Possible shapes and specific requirements

9.3.1 The straight type test track

9.3.1.1 Type 1

The measurement section as shown in Figure 1 shall be located on the straight track. The acceleration sections to the left and right of the measurement section shall be long enough to enable maximum speed to be attained at the measurement section.



a Measurement section.

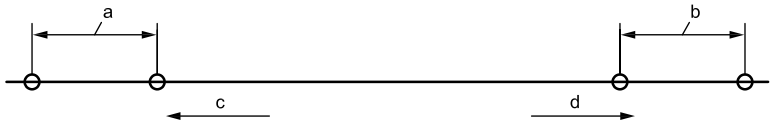
b Direction of moped, a.

c Direction of moped, b.

Figure 1 — Test track type 1

9.3.1.2 Type 2

The two measurement sections, 1 and 2, whose lengths may be different, as shown in Figure 2, shall be located at each end of the straight test track, and in a virtually straight line.



a Measurement section 1.

b Measurement section 2.

c Direction of moped, a.

d Direction of moped, b.

Figure 2 — Test track type 2