INTERNATIONAL STANDARD

ISO 7116

Second edition
1995-03-01

Mopeds — Measurement of maximum speed

Cyclomoteurs — Mesurage de la vitesse maximale

Reference number
ISO 7116:1995(E)

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.

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.

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

This second edition cancels and replaces the first edition (7116:1981), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Mopeds — Measurement of maximum speed

1 Scope

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

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3833:1977, *Road vehicles — Types — Terms and definitions.*

ISO 6726:1988, *Mopeds and motorcycles with two wheels — Masses — Vocabulary.*

3 Preparation of test vehicle

3.1 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.

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

The fuel shall be the commercial grade for the type of vehicle tested.

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

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

3.5 The moped mass shall be the vehicle kerb mass, as defined in ISO 6726:1988, definition 4.1.2.

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

3.7 When installing the measuring instruments on the moped, care shall be taken to minimize their effects on the distribution of the load between the wheels. When installing the speed sensor, care shall be taken to minimize the additional aerodynamic loss.

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

4 Rider and riding position

4.1 Including equipment specified in 4.2, the rider shall have a mass of 75 kg ± 5 kg and be 1,75 m ± 0,05 m tall.

4.2 The rider shall wear a well-fitting one-piece riding suit or similar clothing, and a protective helmet.

4.3 He shall sit on the seat provided for the rider, with his feet upon the pedals or foot-rests and his arms normally extended.

5 Test track and use

5.1 The test shall be carried out on a roadway which allows the maximum speed to be maintained over a measuring strip as defined in 5.2. The distances shall be measured to an accuracy better than 0,5 %. The entry section to the the measuring strip shall have the same surface and longitudinal profile as the strip and be long enough to permit the moped to attain its maximum speed.

The roadway shall be clean, smooth and dry, and have a good coefficient of adhesion; it shall have not more than 0,5 % longitudinal slope and not more than 3 % transverse slope on the measuring and stabilizing strips. The difference in altitude between any two points on the test strip shall not exceed 1 m.

There shall be no lateral obstacles which might influence the effect of the wind on the measurement.

5.2 The possible shapes for a measuring strip and the use to be made of them are as follows.

a) **Type 1**

The strip L shown in figure 1 shall be run in both directions consecutively.

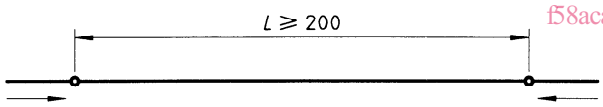

Figure 1

b) **Type 2**

The two strips L_1 and L_2 shown in figure 2 may have the same or different lengths, but they shall run in a virtually straight line.

The two strips L_1 and L_2 shall be 20 m long or less and shall be at least 50 m apart.

The two strips L_1 and L_2 shall be run each time in the same direction, in sequence, without interruption.

The run shall then be carried out in the opposite direction in a consecutive sequence, unless the exception in 7.3 applies.

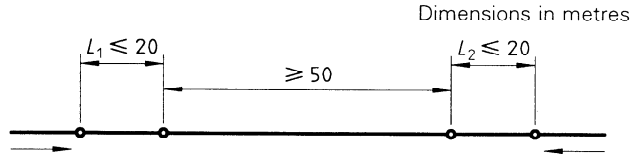

Figure 2

c) **Type 3**

The two strips L shown in figure 3 shall have the same length, be practically parallel and in a virtually straight line.

If the two strips L have some curve (see 5.1), the effect of the centrifugal force shall be compensated by means of the lateral slope of the test track.

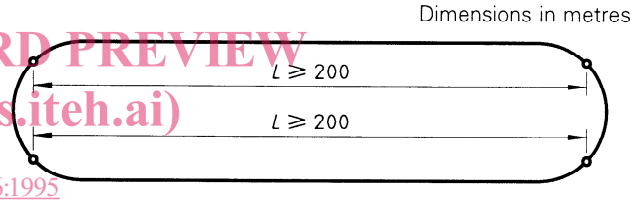

Figure 3

Instead of the two strips L shown in figure 3, the measuring strip may equal the total length of the test track in the form of a loop. In this case, the radius of the curves shall not be less than 160 m and the effect of the centrifugal force shall be compensated by means of the lateral slope of the test track.

5.3 The length of the measuring strip shall be chosen with reference to instrument accuracy and to the method of determining the running time t, such that the actual speed can be measured with an accuracy of $\pm$ 1 %.

Manual measuring equipment is acceptable only if the running time to be measured is more than 20 s.

NOTE 1 Measuring equipment is considered to be manual if the intervention of the operator is necessary to start and/or stop a chronometer or other devices, in order to measure the total time to run the measuring strip.

When choosing type 2 measuring strip, it is necessary to use electronic measuring equipment (e.g. photo-electric cells or similar) to determine the running time.

6 Atmospheric conditions

Atmospheric conditions shall be as follows:

— atmospheric pressure: $\geqslant$ 97 kPa

— temperature: $\geqslant$ 278 K

— relative humidity: $\leqslant$ 95 %

— maximum wind speed measured 1 m from the ground: 3 m/s

— maximum wind speed for gusts measured 1 m from the ground: 5 m/s

— relative air density, d_0, under reference conditions: 0,919 7

During the test, the relative air density, d, calculated from the following equation:

$$d = d_0 \times \frac{p}{100} \times \frac{293}{T}$$

where

p is the air pressure, in kilopascals;

T is the absolute temperature, in kelvins,

shall not vary by more than 7,5 % from the air density under reference conditions.

7 Test procedure

7.1 Use the gear ratio which allows the moped to attain its maximum speed on the level. Hold the throttle control fully open and deactivate any devices for enriching the mixture.

7.2 The rider shall maintain the riding position defined in 4.3.

7.3 The moped shall have reached its maximum constant speed by the time it arrives at the measuring strip. This shall be covered, for types 1 and 2 measuring strips, in two consecutive runs, one in each direction.

For the type 2 measuring strip, it is acceptable to carry out the test in only one direction if it is not possible for the moped to reach its maximum speed in one of the two directions.

In this case,

a) cover the measuring strip five consecutive times;

b) ensure that the axial component of the wind speed is not greater than 1 m/s.

7.4 For the type 3 measuring strip, cover the two strips L consecutively in only one direction without any interruption.

If the measuring strip coincides with the total length of the test track ["loop" option in 5.2 c)], cover it in only one direction at least twice. The measured values of running times shall not differ by more than 3 %.

7.5 Determine the total time t required to cover the measuring strip in each direction with an accuracy better than 0,7 %.

7.6 Make this measurement at least three times consecutively, except for the method described in 7.3 a).

8 Calculation of average speed

The average speed v, in kilometres per hour, for the run shall be calculated as specified in 8.1 to 8.3.2.

8.1 Type 1 measuring strip

$$v = \frac{3{,}6 \times 2L}{t} = \frac{7{,}2L}{t}$$

where

L is the length of the strip, in metres;

t is the total time to run two L strips, in seconds.

8.2 Type 2 measuring strip

8.2.1 Two-direction test

$$v = \frac{3{,}6 \times 2L}{t} = \frac{7{,}2L}{t}$$

where

L is the length of the two strips $(L_1 + L_2)$, in metres;

t is the total time to run two times $(L_1 + L_2)$ strips:

$$t = (t_1 + t_2) + (t_2 + t_1)$$

where

t_1 is the time to run L_1, in seconds,

t_2 is the time to run L_2, in seconds.

8.2.2 Single-direction test

$$v = \frac{3{,}6 \times L}{t}$$

where

L is the length of the two strips $(L_1 + L_2)$, in metres;

t is the total time to run $(L_1 + L_2)$ strips:

$$t = (t_1 + t_2)$$

where

t_1 is the time to run L_1, in seconds,

t_2 is the time to run L_2, in seconds.

8.3 Type 3 measuring strip

8.3.1 Measuring strip consisting of two strips L (see figure 3)

$$v = \frac{3{,}6 \times 2L}{t} = \frac{7{,}2L}{t}$$

where

L is the length of the strip, in metres;

t is the total time to run two L strips, in seconds.

8.3.2 "Loop" test track [see "loop" option in 5.2 c)]

$$v = v_a k$$

where

v_a is the actual speed, in kilometres per hour:

$$v_a = \frac{3{,}6L}{t}$$

where

L is the distance really travelled by the moped on the loop, in metres;

t is the lap time, in seconds:

$$t = \frac{1}{n}\sum_{i=1}^{n} t_i$$

where

n is the number of laps,

t_i is the time to run each lap;

k is a correction factor $(1{,}00 \leqslant k \leqslant 1{,}05)$. This coefficient depends on the characteristics of the test track and shall be determined experimentally for each loop track, following the procedure in annex A.

8.4 Requirement

The lowest and the highest mean values shall not differ by more than 3 %.

9 Test report

The test report shall indicate the maximum speed of the moped, expressed in kilometres per hour to the nearest round figure, which corresponds to the arithmetical average of the values of the speeds measured during the consecutive tests.

The test report shall confirm test conditions and any moped variations (see 3.1).

Annex A
(normative)

Procedure for determining correction factor for loop track

A.1 The correction factor k for a loop track shall be determined up to the maximum permitted speed.

A.2 The factor shall be determined for several speeds in such a way that the difference between two consecutive speeds is not more than 30 km/h.

A.3 For each speed selected, the test shall be carried out in accordance with the requirements of this International Standard, by both the possible methods:

a) speed measured in a straight line: v_d

b) speed measured on a loop track: v_a

A.4 For each speed measured, the values v_a and v_d shall be plotted (see figure A.1) and each consecutive pair of points shall be connected by a straight line.

A.5 For each speed measured, the correction factor k is indicated by the formula:

$$k = \frac{v_d}{v_a}$$

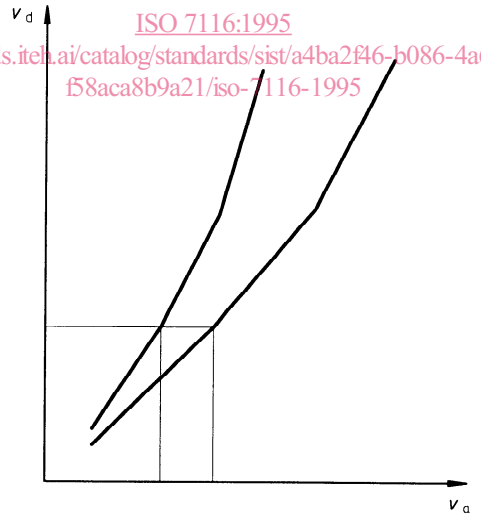

Figure A.1

ICS 43.140.00

Descriptors: road vehicles, motor vehicles, mopeds, tests, determination, speed, maximum value, velocity measurement.

Price based on 5 pages