# International Standard 6014

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION



# Earth-moving machinery — Determination of ground speed

*Engins de terrassement — Détermination de la vitesse au sol*

**Second edition — 1986-06-15**

**UDC 621.878/.879 : 629.11.072** **Ref. No. ISO 6014-1986 (E)**

**Descriptors** : earth moving machinery, tests, determination, speed.



Price based on 3 pages

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6014 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

This second edition cancels and replaces the first edition (ISO 6014-1979), of which it constitutes a minor revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.





Printed in Switzerland

# Earth-moving machinery — Determination of ground speed



## 1 Scope and field of application

This International Standard specifies a method of determining the speed of earth-moving machinery. It applies to both wheeled and track-laying earth-moving machinery.

The test method specified may be used for many purposes; for each individual purpose the condition of the machine, for example laden or unladen, is to be stated in the test report.

## 2 Definitions

For the purposes of this International Standard, the following definitions apply.

**2.1 test track** : Area upon which the test is conducted.

**2.2 test track length** : Measured length of the track over which the speed is determined.

**2.3 time recorder** : Apparatus arranged to measure the time interval.

**2.4 time interval** : Time taken for the machine to travel the test track length.

**2.5 machine speed** : Average speed of the machine as it is driven over the test track length.

**2.6 test speed** : Mean value of the average speeds recorded in the individual tests.

**2.7 mass** : Mass of the machine in the condition in which it is tested, including the mass of the operator and fuel.

## 3 Apparatus

Any equipment may be used to measure the speed of the machine provided that the accuracies specified in clause 5 are achieved. For example, the following equipment may be used (see the figure).

**3.1 Light source,** used to activate a photo-sensitive transistor. It may be an electric lamp fed by a battery, generator or mains supply.

**3.2 Control box,** linked to the photo-sensitive transistor and the electronic digital display timer, incorporating a switch to permit time measurements in either direction.

**3.3 Electronic digital display timer** (otherwise referred to as the variable time base counter), used to measure the time interval during which the machine under test traverses the test lengths of the track.

NOTE — Alternatively, the time may be measured with stop-watch equipment.

**3.4 Electrical supply,** which may be a direct current supplied by batteries, when an inverter is required to produce an alternating current from a direct current electrical supply. Alternatively, a mains alternating current may be used.

**3.5 Tape measure,** at least 25 m in length, to determine the test track length.

**3.6 Adjustable tripods,** to support all light sources and photo-sensitive transistors at the same height.

## 4 Test conditions

The test may be carried out on any type of track but the test track length shall be a minimum of 20 m and in any case of sufficient length to be compatible with the speed of the machine being tested. Since the apparatus used in the test can be completely portable, it is possible to make speed measurements on gradients, on natural ground and on normal road surfaces in any condition. The time recorder shall be set up in such a way that the machine under test has a sufficiently long approach route to the test length in which to gain the speeds required, and enough room to brake, turn around and, if required, undergo a test in the opposite direction. The test track and machine conditions shall be as specified in the appropriate standard (for example, ISO 3450: for braking tests which require a knowledge of the speed of the machine, the conditions shall be as required in the Standard).

For level test tracks, the difference in height between any two points not less than 25 m apart along the test track shall not exceed 100 mm.

The cross-fall for all test tracks shall not exceed 1 in 40.

Immediately prior to the test, the machine shall be run for a period sufficient to ensure that the engine, transmission, oils and coolant are at normal working temperatures.

## 5 Procedure

The machine, prepared as required, shall be driven towards the test area at a constant speed and shall be driven through the test track length without any change on the throttle setting or gear. It shall be driven in a direction parallel to the longitudinal axis of the test length of the track. The time interval for a point on the machine to traverse the test track length shall be recorded.

The test shall be carried out not less than three times in each direction if the track is level, and not less than six times in one direction if the speed on a gradient is to be determined. The maximum wind speed for tests in one direction shall be 6 m/s. The average machine speed over the test track length shall be calculated for each individual test and the mean value of all the speeds calculated and reported as the test speed.

The following accuracies shall be adhered to when conducting the tests :

| Measurement | Accuracy |
|---|---|
| Test length of track, $l$, in metres | ± 0,25 % |
| Time interval, $t$, in seconds | ± 2,0 % |

The speed, $v$, in metres per second, shall be calculated from the formula

$$v = \frac{l}{t}$$

The test speed shall be the mean of not less than six individual speed measurements.

## 6 Test report

The test report shall contain the following information :

a) reference to this International Standard;

b) the type of machine;

c) the make of machine;

d) the number or identification of the machine;

e) whether a wheeled or tracked machine;

f) condition of the machine, for example laden or unladen, or as otherwise tested;

g) mass of machine, in kilograms;

h) auxiliary components attached, for example dozer blade;

i) attitude of attachment, for example "bucket at the carry position";

j) tyre size, ply rating, and condition;

k) tyre pressure, in kilopascals;

l) condition of the test track, i.e. wet or dry;

m) type of test track, i.e. asphalt, concrete, gravel, natural ground;

n) measured length of test track, in metres;

o) longitudinal gradient of test track, i.e. level, up gradient, down gradient;

p) cross-fall of test track;

q) machine gear at which test was conducted;

r) weather conditions, including wind speed, in metres per second, and direction relative to the test track;

s) any other details relevant to the particular test carried out, for example type and mode of operation of brakes, condition of machine;

t) machine speed measurements :

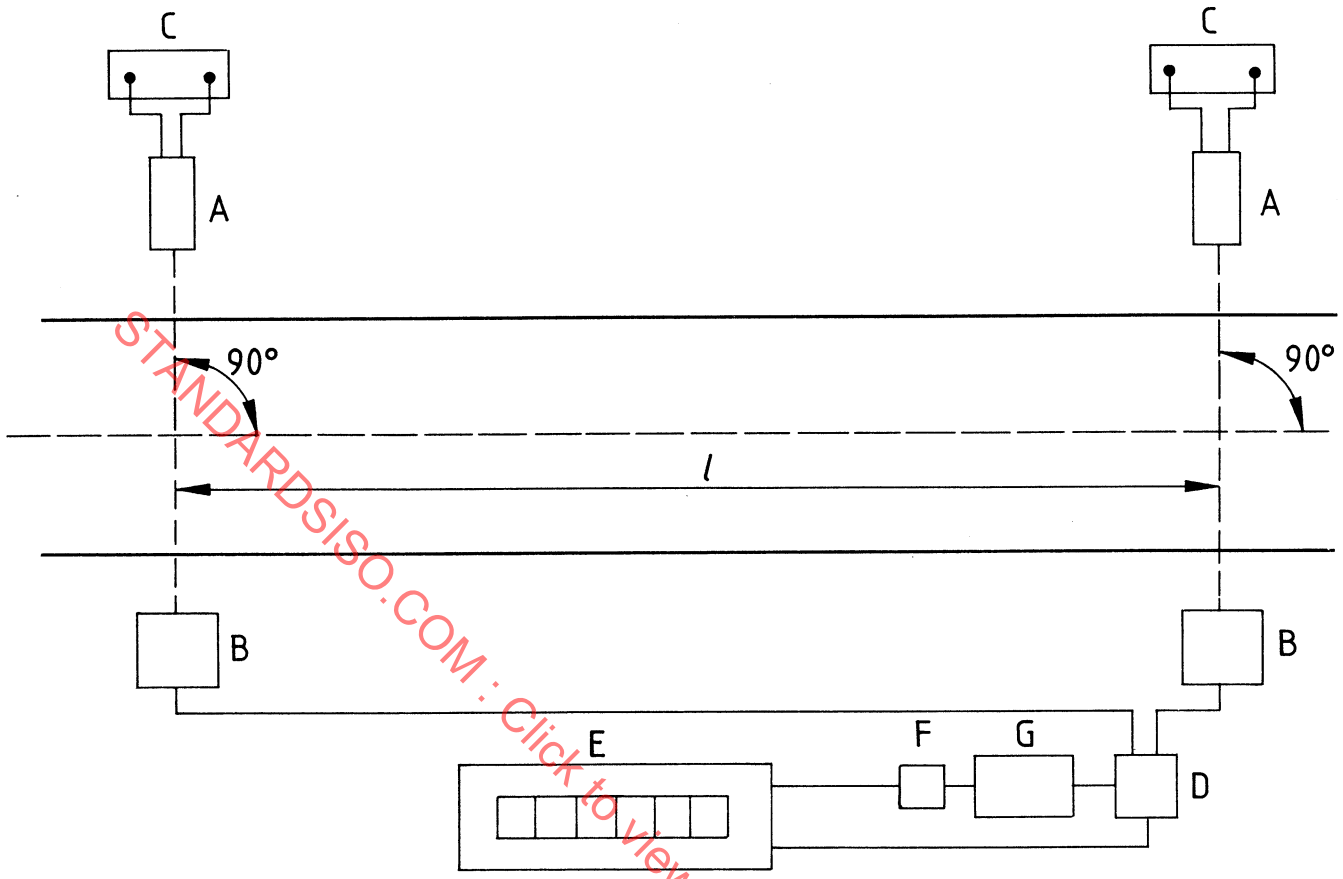
Test track length, $l$: . . . m  Gear engaged: . . .

| Test No. $n$ | Direction of travel (for example left to right, right to left, downhill) | Time interval $t$ s | Machine speed $v = \frac{l}{t}$ m/s (km/h) |
|---|---|---|---|
| 1 | | $t_1$ | $v_1$ |
| 2 | | $t_2$ | $v_2$ |
| 3 | | $t_3$ | $v_3$ |
| 4 | | $t_4$ | $v_4$ |
| 5 | | $t_5$ | $v_5$ |
| 6 | | $t_6$ | $v_6$ |
| . | | . | . |
| . | | . | . |
| . | | . | . |
| $n$ | | $t_n$ | $v_n$ |

u) determined test speed, $v$, of machine, in kilometres per hour :

$$v = \frac{v_1 + v_2 + v_3 + \ldots + v_n}{n}$$

NOTE — The average value of speed $v$ should be rounded to one decimal place.






A Light source

B Photo-sensitive transistor

C 12 V battery

D Control box

E Electronic digital display timer

F Inverter

G d.c. supply battery

*l* Test track length

**Figure — Typical layout of equipment for the measurement of machine speed**

This page intentionally left blank