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**Forestry and gardening machinery —  
Vibration test code for portable hand-  
held machines with internal combustion  
engine — Vibration at the handles**

*Machines forestières et machines de jardin — Code d'essai des  
vibrations pour machines portatives tenues à la main à moteur à  
combustion interne — Vibrations au niveau des poignées*



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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 22867 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

This second edition cancels and replaces the first edition (ISO 22867:2004), which has been technically revised. The scope has been expanded to include hand-held garden equipment. It also incorporates Technical Corrigendum ISO 22867:2004/Cor 1:2006.

## Introduction

This document is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or -B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

The vibration test code specified in this International Standard is based on ISO 20643, which gives general specifications for the measurement of the vibration emission of hand-held machinery. It differs from ISO 20643 in the number of operators required to be involved in the test, with ISO 20643 requiring at least three operators and this International Standard only one. Another difference is that this International Standard primarily positions the transducers next to the hand in the area between the thumb and the index finger, where they present the least disturbance to the operator gripping the machine.

The determination of vibration characteristics is primarily used for

- manufacturer's declarations,
- comparing data between machines in the machine family concerned,
- development work at the design stage, and
- the estimation of the vibration risk considering the specific conditions (parameters).

The use of this vibration test code will ensure reproducibility of the determination of the vibration characteristics. Measurements made during particular operating modes are of interest for assessment of the vibration exposure, for example, over a typical working day.

The work cycles chosen for this test code are based on the following considerations of application:

- a) chain-saws with an engine displacement of  $< 80 \text{ cm}^3$  are used for various operations, including felling, bucking and delimbing;
- b) chain-saws with an engine displacement of  $\geq 80 \text{ cm}^3$  are normally used for felling and bucking.

Delimbing will cause the saw to run at racing speed; therefore, racing is included only for saws with a  $< 80 \text{ cm}^3$  engine.

For brush-cutters, grass-trimmers, hedge-trimmers and pole-mounted powered pruners, the cutting mode (full load) is estimated to be valid only for short periods, and racing and idling are the two dominant modes. Moreover, the cutting mode has also been found to be diverse and not able to be performed under repeatable conditions.

For trimmers, the full-load and racing modes are integrated into a single mode, owing to the loading effect of the flexible line.

For brush-cutters, hedge-trimmers and pole-mounted powered pruners, it is not possible to simulate the full-load mode in a feasible way, since there are no constant load conditions comparable to those of chain-saws. Since the operating mode "racing" is the worst case, it is taken as being representative.

For garden-blowers, full load and idling are the two dominant modes.

In either of these cases, transport and other tasks between operations will cause the machine to run at idling. Experience has led to the conclusion that equal duration for the different working modes is a good estimation of daily exposure. The values obtained are values intended to be representative of the average of typical vibration magnitudes in real-world use of the machines. However, the actual magnitudes will vary considerably from time to time and will depend on many factors, including operator, task and cutting attachment. The state of maintenance of the machine itself might also be of importance.



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**CAUTION** — Some of the test procedure specified in this International Standard involves processes that could lead to a hazardous situation. Any person performing tests in accordance with this International Standard shall be appropriately trained in the type of work to be carried out. All national regulatory conditions and health and safety requirements shall be followed.

## 1 Scope

This International Standard specifies a vibration test code for determining, efficiently and under standardized conditions, the magnitude of vibration at the handles of portable hand-held, internal-combustion-engine-powered forest and garden machinery, including chain-saws (with the exception of high-handled chain-saws), brush-cutters, grass-trimmers, pole-mounted powered pruners, hedge-trimmers and garden-blowers.

Although the magnitudes measured are obtained in an artificial operation, they nevertheless give an indication of the values to be found in a real work situation.

## 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 5349-2:2001, *Mechanical vibration — Measurement and evaluation of human exposure to hand-transmitted vibration — Part 2: Practical guidance for measurement at the workplace*

ISO 6531, *Machinery for forestry — Portable chain-saws — Vocabulary*

ISO 7112, *Machinery for forestry — Portable brush-cutters and grass-trimmers — Vocabulary*

ISO 7293, *Forestry machinery — Portable chain saws — Engine performance and fuel consumption*

ISO 8041, *Human response to vibration — Measuring instrumentation*

ISO 8893, *Forestry machinery — Portable brush-cutters and grass-trimmers — Engine performance and fuel consumption*

ISO 16063 (all parts), *Methods for the calibration of vibration and shock transducers*

ISO 20643, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6531, ISO 7112 and ISO 20643 apply.

## 4 Vibration quantities to be measured and determined

The quantities to be measured are the frequency-weighted accelerations in the three perpendicular directions,  $a_{hw_x}$ ,  $a_{hw_y}$  and  $a_{hw_z}$ .