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Hand-held portable power tools — Test methods for evaluation of vibration emission —

Part 12: Die grinders

Machines à moteur portatives — Méthodes d'essai pour l'évaluation de l'émission de vibrations —

Partie 12: Meuleuses d'outillage



Reference number
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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 28927-12 was prepared by Technical Committee ISO/TC 188, *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 3, *Pneumatic tools and machines*.

This first edition of ISO 28927-12 cancels and replaces ISO 8662-13:1997, which has been technically revised. It also incorporates the Technical Corrigendum ISO 8662-13:1997/Corr.1:1998. The most important changes are

- vibration measurement in three axes and, where applicable, at both hand positions,
- new test method; a real grinding process is introduced, and
- new transducer positions, with an improved definition of the transducer positions and orientation.

ISO 28927 consists of the following parts, under the general title *Hand-held portable power tools — Test methods for evaluation of vibration emission*:

- *Part 1: Angle and vertical grinders*¹⁾
- *Part 2: Wrenches, nutrunners and screwdrivers*²⁾
- *Part 3: Polishers and rotary, orbital and random orbital sanders*³⁾
- *Part 4: Straight grinders*⁴⁾
- *Part 5: Drills and impact drills*⁵⁾
- *Part 6: Rammers*⁶⁾

1) Together with ISO 28927-4, replaces ISO 8662-4, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 4: Grinders*.

2) Replaces ISO 8662-7, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 7: Wrenches, screwdrivers and nut runners with impact, impulse or ratchet action*. All screwdrivers and nutrunners except for one-shot tools now covered.

3) Replaces ISO 8662-8, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 8: Polishers and rotary, orbital and random orbital sanders*.

4) Together with Part 1, replaces ISO 8662-4, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 4: Grinders*.

5) Replaces ISO 8662-6, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 6: Impact drills*. Non-impacting drills now covered.

6) Replaces ISO 8662-9, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 9: Rammers*.

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- *Part 7: Nibblers and shears*⁷⁾
- *Part 8: Saws, polishing and filing machines with reciprocating action and small saws with oscillating or rotating action*⁸⁾
- *Part 9: Scaling hammers and needle scalers*⁹⁾
- *Part 10: Percussive drills, hammers and breakers*¹⁰⁾
- *Part 11: Stone hammers*¹¹⁾
- *Part 12: Die grinders*¹²⁾

7) Replaces ISO 8662-10, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 10: Nibblers and shears*.

8) Replaces ISO 8662-12, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 12: Saws and files with reciprocating action and saws with oscillating or rotating action*.

9) Together with Part 11, replaces ISO 8662-14, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 14: Stone-working tools and needle scalers*.

10) Replaces ISO 8662-2 and its amendments, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 2: Chipping hammers and riveting hammers*, ISO 8662-3 and its amendments, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 3: Rock drills and rotary hammers*, and ISO 8662-5 and its amendments, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 5: Pavement breakers and hammers for construction work*. Chipping and riveting hammers, rock drills and rotary hammers all covered.

11) Together with Part 9, replaces ISO 8662-14, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 14: Stone-working tools and needle scalers*.

12) Replaces ISO 8662-13 *Hand-held portable power tools — Measurement of vibrations at the handle — Part 13: Die Grinders*.

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Introduction

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

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 codes for portable hand-held machines given in ISO 28927 (all parts) are based on ISO 20643, which gives general specifications for the measurement of the vibration emission of hand-held and hand-guided machinery. ISO 28927 (all parts) specifies the operation of the machines under type-test conditions and other requirements for the performance of type tests. The structure/numbering of its clauses follows that of ISO 20643.

The basic principle for transducer positioning first introduced in the IEC 60745 series of European standards is followed, representing a deviation from ISO 20643 for reasons of consistency. The transducers are primarily positioned next to the hand in the area between the thumb and the index finger, where they give the least disturbance to the operator gripping the machine.

It has been found that vibrations generated by die grinders vary considerably in typical use. This is largely due to variations in the unbalance of the inserted tool and from the contact between the inserted tool and the surface of the workpiece. The vibration value is also to a large extent dependent on the skill of the operator. This part of ISO 28927 uses a real working process for the test.

In order to provide a method that gives good measurement reproducibility, the procedure is described in detail and it is essential that the procedure be followed. The procedure is chosen to give vibration values which are, as far as possible, in accordance with ISO 20643. The values obtained according to this part of ISO 28927 are type-test values. The procedures of ISO 5349 are required whenever exposure at the workplace is to be assessed.

The values obtained are type-test values intended to be representative of the average of the upper quartile of typical vibration magnitudes in real-world use of the machines. However, the actual magnitudes vary considerably from time to time and depend on many factors, including the operator, the task and the inserted tool or consumable. The state of maintenance of the machine itself might also be of importance. Under real working conditions, the influences of the operator and process can be particularly important at low magnitudes. It is therefore not recommended that emission values below 2,5 m/s² be used for estimating the vibration magnitude under real working conditions. In such cases, 2,5 m/s² is the recommended vibration magnitude for estimating the machine vibration.

If accurate values for a specific work place are required, then measurements (according to ISO 5349) in that work situation can be necessary. Vibration values measured in real working conditions can be either higher or lower than the values obtained using this part of ISO 28927.

Higher vibration magnitudes can easily occur in real work situations, caused by the use of excessively unbalanced inserted tools, bent shafts of burrs or worn-out collets.

The vibration test codes given in ISO 28927 (all parts) supersede those given in ISO 8662 (all parts), which has been replaced by the corresponding parts of ISO 28927 (see Foreword).

NOTE ISO 8662-11, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 11: Fastener driving tools*, can be replaced by a future part of ISO 28927.