
**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

*Machines à moteur portatives — Mesurage des vibrations au niveau
des poignées —*

Partie 12: Scies et limes alternatives et scies oscillantes ou circulaires



Foreword

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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 8662-12 was prepared by Technical Committee ISO/TC 118, *Compressors, pneumatic tools and pneumatic machines*, Subcommittee SC 3, *Pneumatic tools and machines*.

ISO 8662 consists of the following parts, under the general title *Hand-held portable power tools — Measurement of vibrations at the handle*:

- *Part 1: General*
- *Part 2: Chipping hammers and riveting hammers*
- *Part 3: Rock drills and rotary hammers*
- *Part 4: Grinders*
- *Part 5: Pavement breakers and hammers for construction work*
- *Part 6: Impact drills*
- *Part 7: Wrenches, screwdrivers and nut runners with impact, impulse or ratchet action*
- *Part 8: Polishers and rotary, orbital and random orbital sanders*
- *Part 9: Hammers*
- *Part 10: Nibblers and shears*
- *Part 11: Fastener driving tools (nailers)*

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- *Part 12: Saws and files with reciprocating action and saws with oscillating or rotating action*
- *Part 13: Die grinders*
- *Part 14: Stone-working tools and needle scalers*

Annex A of this part of ISO 8662 is for information only.

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Introduction

This part of ISO 8662, which specifies a type test for the measurement of vibration at the handles of files with reciprocating action and saws with reciprocating, rotating or oscillating action. It supplements ISO 8662-1, which gives the general specifications for the measurement of vibrations at the handles of hand-held power tools. It specifies the operation of the power tool under the type test and other requirements for the performance of the type test.

Reciprocating files and reciprocating, rotating or oscillating saws are used for sawing and filing of all kinds of material, e.g. metal, wood and plastics. During test, the power tool is operated on workpieces of wood or steel. The test method chosen simulates a typical work situation.

The principle of the operation of a saw is that a pneumatic motor rotates a circular saw blade or causes a saw blade, often in the shape of a circular sector, to move in an oscillating motion to cut a piece of material. The oscillation motion is usually very small.

Saws and files may be pneumatically or hydraulically driven

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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

1 Scope

This part of ISO 8662 specifies a laboratory method for measuring the vibrations at the handles of hand-held pneumatic saws with reciprocating, rotating or oscillating action and files with reciprocating action. It is a type-test procedure for establishing the magnitude of vibrations at the handles of the power tool when operating under a specified load.

NOTE — Rotating files, termed die grinders, are covered by ISO 8662-13.

It is intended that the results be used to compare different power tools or different models of the same type of power tool. With the operation specified for the power tool, the values obtained will give an indication of those found in real work situations.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8662. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8662 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 2787:1994, *Rotary and percussive pneumatic tools — Performance tests*.

ISO 8662-1:1988, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 1: General*.

3 Quantities to be measured

The quantities to be measured are:

- the acceleration presented as a weighted acceleration in accordance with ISO 8662-1;
- the air pressure, in accordance with ISO 2787;
- rotational speed or frequency of oscillation of the inserted tool.

4 Instrumentation

4.1 General

The specifications for the instrumentation given in ISO 8662-1:1988, 4.1 to 4.6, apply.

4.2 Transducer

The specification for the transducer given in ISO 8662-1:1988, 4.1, applies.

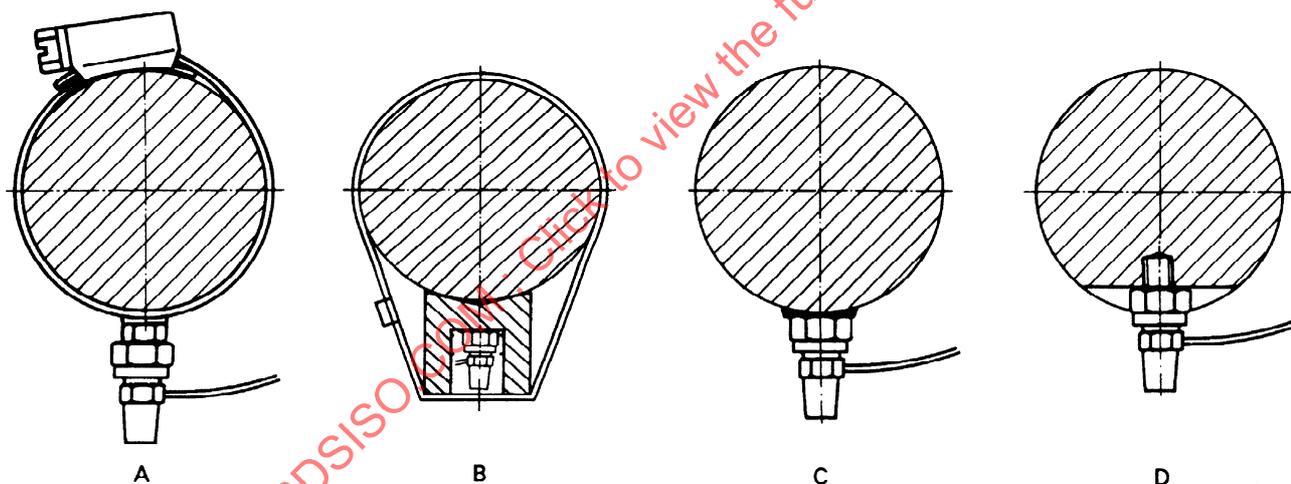
4.3 Mechanical filter

It is not normally necessary to use a mechanical filter for measurements according to this part of ISO 8662 (see ISO 8662-1:1988, 3.2).

4.4 Fastening of transducer

Fastening of the transducer shall be in accordance with ISO 8662-1:1988, 4.2. Small transducers may be glued to a flat surface using a suitable adhesive. In all cases, the fastening of the transducer shall be in accordance with the transducer manufacturer's instructions (see figure 1).

If the handle has a soft resilient cover, this shall be removed or, a clamp, on which the transducer is mounted, shall be tightened securely around the resilient cover. If the tool has a handle with a resilient cover, the test report shall state the action taken.



The transducer may be mounted in one of the following ways:

- A: By using a hose clip to which a block is brazed or welded.
- B: By using an adaptor to which the transducer is screwed; the adaptor is mounted with the use of plastic straps.
- C: By gluing the transducer.
- D: By grinding a flat surface and drilling and tapping a hole into which the transducer is screwed.

Figure 1 — Options for fastening of transducers

4.5 Auxiliary equipment

The air pressure of pneumatically driven power tools shall be measured, using a manometer of precision class, in accordance with ISO 2787.

The rotational or oscillating frequency shall be determined, e.g. using the signal from the transducer, by an electronic filtering system, tachometer or other suitable means.

4.6 Calibration

Calibration shall be carried out in accordance with ISO 8662-1:1988, 4.8.

5 Measurement direction and measurement location

5.1 Measurement direction

Measurements shall be made in the direction indicated in figure 2.

- for reciprocating power tools, in the direction of reciprocation;
- for rotating saws, in the direction perpendicular to the axis of rotation;
- for oscillating power tools, in the direction perpendicular to the axis of oscillation and parallel to the motion of oscillation, i.e. parallel to the surface of the workpiece.

5.2 Measurement location

Measurements shall be made on the main handle, where the operator normally holds the tool and applies the feed force.

The position of the transducer shall be on the handle, halfway along the gripping length of the handle or on the power tool housing (see figure 2). If the placing of the trigger makes this impossible, the transducer shall be placed as close as possible to the hand between the thumb and the index finger.

If the power tool is equipped with a second handle, a transducer shall be located on that handle as well.

6 Determination of working procedure

6.1 General

Measurements shall be carried out on a new, properly serviced and lubricated power tool.

During the test, the power tool shall be held in a manner typical to that when sawing or filing.

During the test, the power tool shall operate at rated pressure and shall be used in accordance with the manufacturer's specifications. The air shall be supplied to the power tool by a hose having a length of at least 2 m, attached to the power tool via a threaded connector and secured with a hose clip.

During the test, the operation shall be stable and smooth. The working process shall be arranged so that the operator can have an upright or almost upright posture. The operator shall be able to hold the power tool comfortably during the test (see figure 3).

6.2 Workpiece

For saws intended for wood work, a workpiece of marine plywood (19 ± 2) mm shall be used.

For saws intended for metal sawing, a workpiece of mild steel as thick as the maximum cutting depth specified by the manufacturer shall be used.

For files, a workpiece of mild steel having a thickness of 5 mm shall be used. Filing shall be carried out on the edge. The stroke shall be as long as possible and the reciprocating frequency and the inserted file shall be as recommended for normal use by the manufacturer.

For saws designed to cut only specific materials, measurements shall be made when cutting the maximum thickness of such materials as specified by the manufacturer.

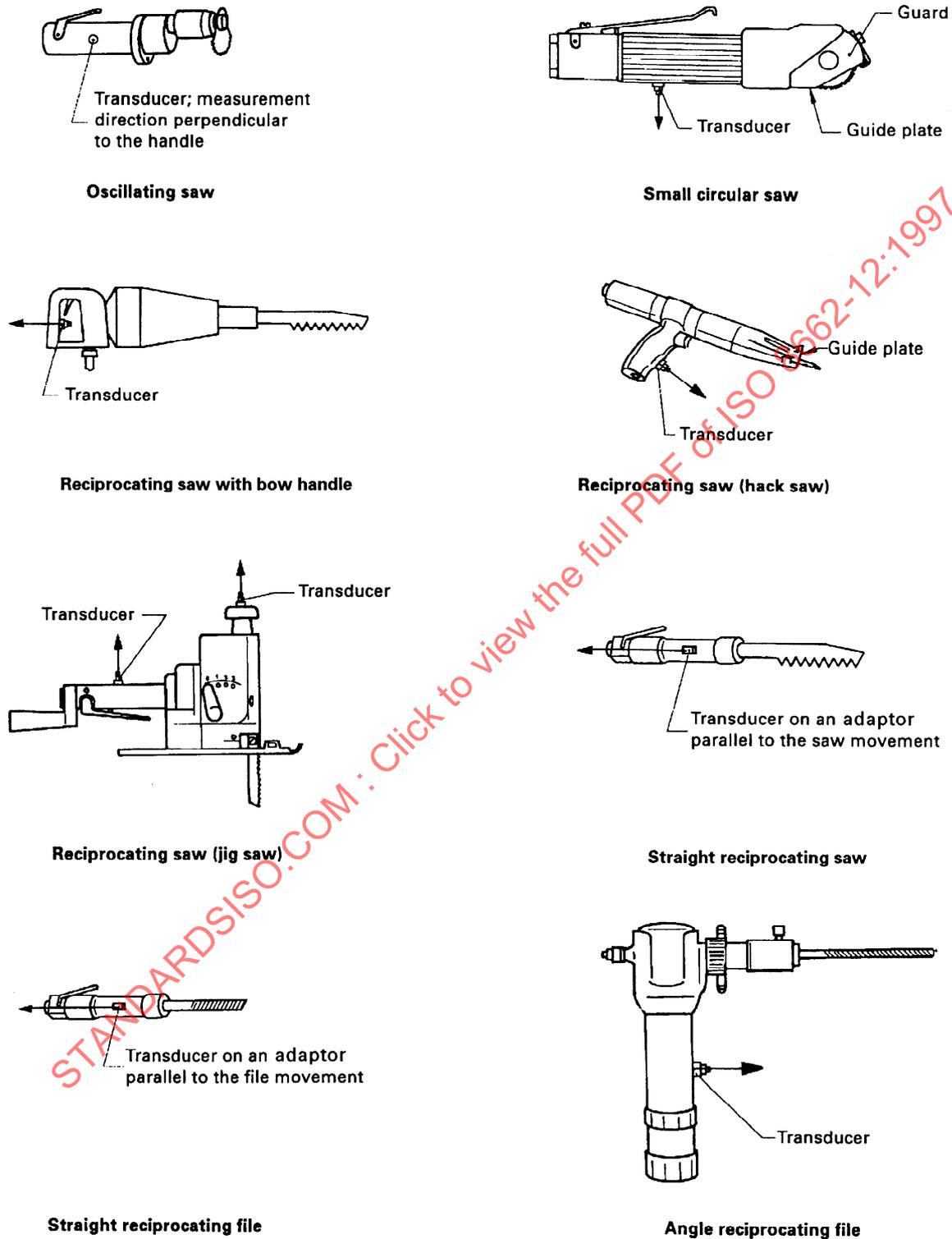


Figure 2 — Measurement direction and example of position and fastening of transducers

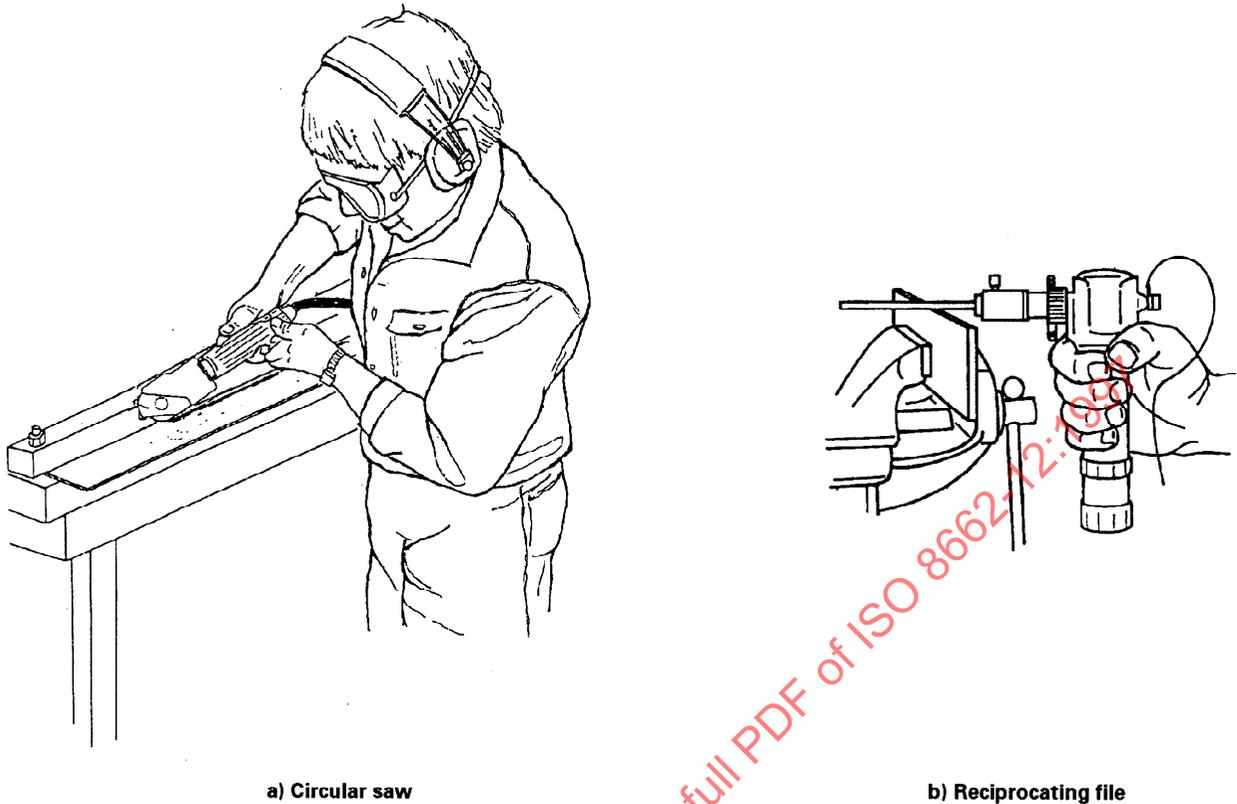


Figure 3 — Examples of working position of operator

6.3 Loading

The power tool shall be tested at maximum loading as specified by the manufacturer, at rated power, and loaded accordingly.

The loading of the tool shall ensure that operation of the power tool is stable. The cut shall be as near the workpiece support as the power tool being tested allows.

The test rig for saws shall be as shown in figure 4. The test rig shall be rigid enough not to influence the test result.

7 Measurement procedure and validity

7.1 Test procedure

Three skilled operators shall each carry out one test series with the power tool to be tested. A test series shall consist of five test runs. In each test run, stable operation shall be established and the readings shall be taken during a period of not less than 4 s.

7.2 Validity of test

Measurements shall be continued by each operator until a valid test series has been obtained, i.e. when the coefficient of variation of five consecutive weighted values is less than 0,15 or the standard deviation is less than 0,30 m/s².

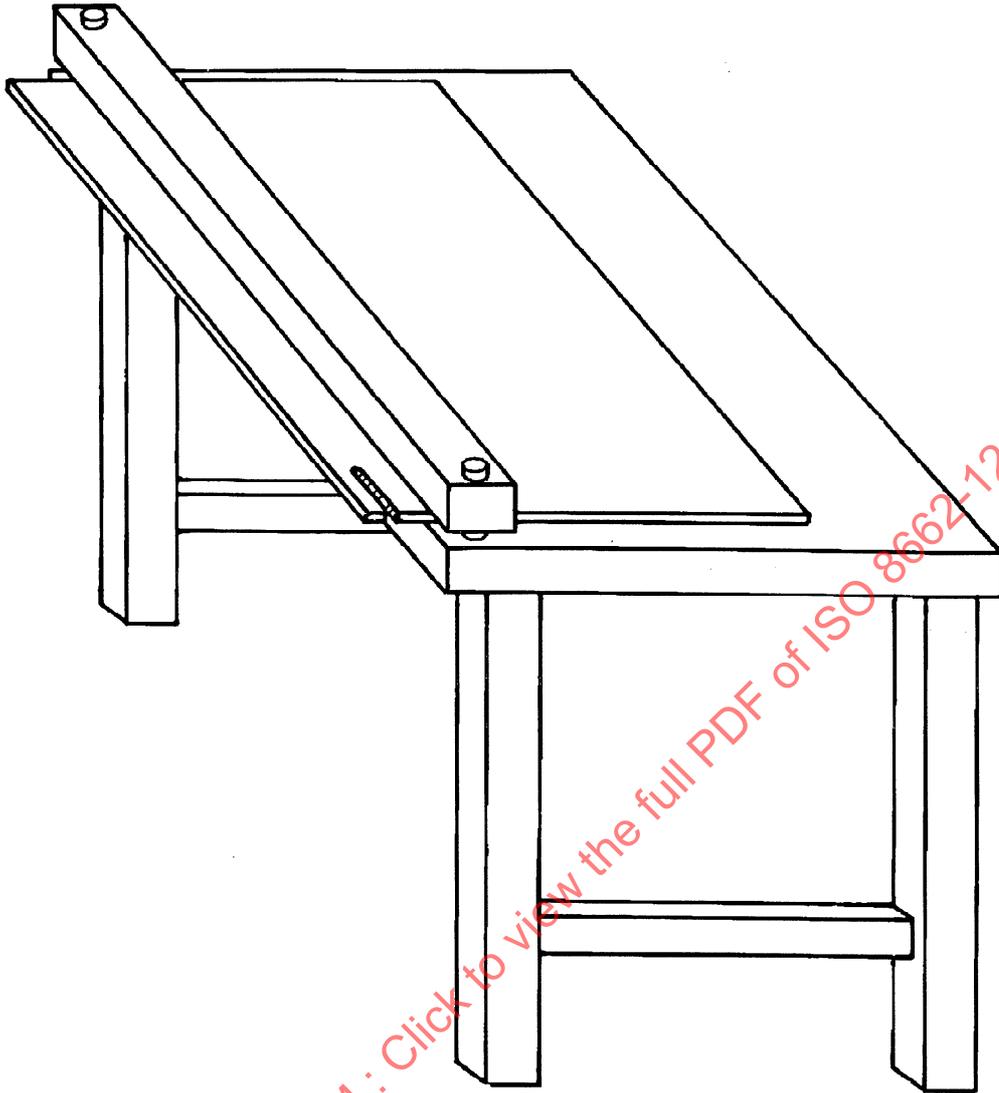


Figure 4 — Saw — Test rig

7.3 Coefficient of variation

The coefficient of variation, C_v , of a test series is defined as the ratio of the standard deviation, s_{n-1} , of a series of measurement values to the mean value, \bar{x} .

$$C_v = \frac{s_{n-1}}{\bar{x}}$$

where

s_{n-1} is the standard deviation:

$$s_{n-1} = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

\bar{x} is the mean value of the series:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

in which

x_i is the i th value measured, expressed in metres per second squared;

n is the number of measurement values.

7.4 Evaluation of results

The arithmetic mean of five values for each transducer position and for each operator shall be calculated. For each transducer position, the overall arithmetic mean value shall be calculated using the mean value obtained for each of the three operators. The largest of these overall arithmetic mean values shall be the basis for the declaration.

8 Test report

In addition to the specifications given in ISO 8662-1:1988, clause 7, the following information shall be given in the test report:

- a) air pressure;
- b) dimensions of the test tool;
- c) specification of the workpiece and of the load of the power tool during test;
- d) reciprocating, rotational or oscillating frequency;
- e) sketch showing the position of the handles and the position of the accelerometers;
- f) the results of the test (see 7.4).

A model test report is given in annex A.

Annex A (informative)

Model test report for saws and files with reciprocating action and saws with oscillating or rotating action

<p>The test has been carried out in accordance with ISO 8662-1:1988, <i>Hand-held portable power tools — Measurement of vibrations at the handle — Part 1: General</i>, and ISO 8662-12:1997, <i>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</i>.</p>	
General	
Tested by:	Reported by:
Date:	
Power tool tested	
Type:	Manufacturer:
Model No.:	Serial No.:
Mass, kg:	Rated no-load speed, r/s:
Operating conditions	
Air pressure, bar:	Reciprocating, rotational or oscillating speed:
Cutting speed:	Specification of workpiece:
Duration of each test run, s:	
Measuring equipment	
Accelerometer — manufacturer, type:	
Accelerometer — mass, g:	
Mechanical filters (if any) — manufacturer, type:	
Amplifier — manufacturer, type:	
Analyser — manufacturer, type:	
Tape recorder — manufacturer, type:	
Fastening of transducer and mechanical filter	
Description of method for fastening of transducer and mechanical filter, if any.	
Signal processing	
State the type of signal integration in the spectral analyser and the method of determining the weighted acceleration.	
Additional specifications	
Report for the tape recorder, if used, the correction factors per octave band or third octave band centre frequencies.	
Report any other details, if applicable, concerning the measurement.	