INTERNATIONAL STANDARD

ISO 8662-7

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Hand-held portable power tools — Measurement of vibrations at the handle —

Part 7:
Wrenches, screwdrivers and nut runners with impact, impulse or ratchet action

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

Partie 7: Clés, tournevis et serreuses à percussion, à impulsion ou à cliquet

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Contents

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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.

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 8662-7 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 or random sanders*

— *Part 9: Rammers*

— *Part 10: Nibblers and shears*

— *Part 11: Fastener driving tools (nailers)*

— *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*

Annexes A and B of this part of ISO 8662 are for information only.

Introduction

This part of ISO 8662 specifies how a type test for the measurement of vibrations at the handles of wrenches, screwdrivers and nut runners with impact, impulse or ratchet action shall be performed. It supplements ISO 8662-1, which gives the general specifications for the measurement of vibrations at the handle of portable hand-held power tools. It specifies the operation of the power tool under type test and other requirements for the performance of the type test.

The power tools described in this part of ISO 8662 are used for tightening and untightening threaded fasteners, i.e. nuts and screws. The principle of the operation of these power tools is that the energy from the driving medium causes a rotor to transmit energy incrementally by impact or impulse from a rotary or oscillatory action to the output shaft. The clutch mechanisms and power tool geometry differ among different power tool types, and therefore give different types of force reaction and vibration to the operator's hand.

In impact and ratchet power tools, the clutches are generally all metallic. In impact power tools, the number of impacts on the output shaft per revolution of the motor is typically one or two, whereas in ratchet power tools this number is greater. The clutches of impulse power tools generally contain a fluid which is forced through one or more restrictive passageways each time the motor rotates relative to the output shaft.

The reproducibility determined from a great number of tests in which the power tools were operated in typical work situations was found to be poor, and the possibility of improving it is small. It was therefore concluded that the type test must be carried out using an artificial load, so chosen that the values measured correspond to those found in typical work situations. The reproducibility of the proposed method has been found to be good.

Higher vibration magnitudes can easily occur in real work situations, caused either by misalignment between the power tool and fastener, or by the use of universal joints or angle heads.

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Hand-held portable power tools — Measurement of vibrations at the handle —

Part 7:
Wrenches, screwdrivers and nut runners with impact, impulse or ratchet action

1 Scope

This part of ISO 8662 specifies a laboratory method for measuring vibrations at the handles of wrenches, screwdrivers and nut runners with impact, impulse, rapping or ratchet action. It is a type-test procedure for establishing the vibration value at the handles of the power tools when operating on a specified load.

This part of ISO 8662 mainly covers power tools with 6,3 mm to 40 mm (1/4 in to 1 1/2 in) male or female square-drive output shafts; other drive geometries are also included. One-shot tools and stall-torque-type ratchet wrenches are excluded from this part of ISO 8662.

The power tools covered by this part of ISO 8662 may be pneumatically or hydraulically driven.

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

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8662. 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 691:—[1], *Assembly tools for screws and nuts — Wrench and socket openings — Tolerances for general use.*

ISO 2787:1984, *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.*

1) To be published. (Revision of ISO 691:1983)

3 Quantities to be measured

Quantities to be measured are as follows:

a) the root-mean-square (r.m.s.) acceleration in accordance with ISO 8662-1:1988, 3.1, and presented as a weighted acceleration in accordance with ISO 8662-1:1988, 3.3 and as a frequency analysis in accordance with ISO 8662-1:1988, 3.2;

NOTE — Frequency analysis can be deleted if the absence of d.c.-shift can be proved by other means.

b) the air or hydraulic pressure;

c) the blow frequency;

d) the feed force;

e) the rotational frequency.

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.

NOTE — For light handles, for example made of plastics, care must be taken not to load the handle with too large a mass when mounting the transducer. If the handle acts as a mechanical filter, then a light transducer may be glued to the surface; in this case the mass of transducer and its mounting shall be less than 5 g.

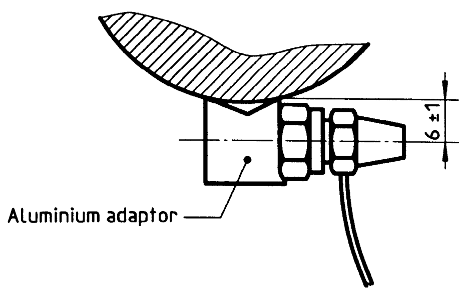
4.3 Mechanical filters

If piezoelectric accelerometers are used, the use of mechanical filters as specified in ISO 8662-1:1988, 4.3, is strongly recommended.

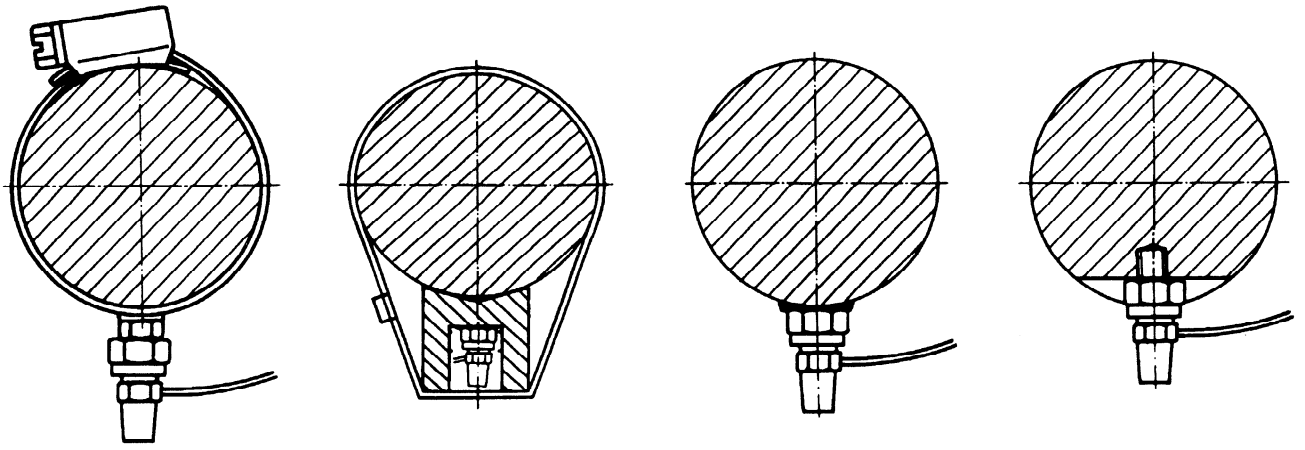
4.4 Fastening of the transducer

Fastening of the transducer and mechanical filter on the power tool control handle shall be in accordance with ISO 8662-1:1988, 4.2 (see figure 1).

Dimension in millimetres



a) Adaptor fastening to be used for straight control-handle. The adaptor may be clamped with hose clips or glued to the surface.



b) For pistol control-handle, bow control-handle or straight support-handle, the transducer may be mounted in one of four ways:

A: Using a hose clip to which a block is brazed or welded;
B: Using an adaptor to which the transducer is screwed; the adaptor is mounted with the use of plastic straps;
C: Using a suitable adhesive wax on a flat surface;
D: Grinding a flat surface and drilling and tapping a hole.

Figure 1 — Options for the fastening of transducers

4.5 Auxiliary equipment

The supply air pressure shall be measured using a precision class pressure gauge in accordance with ISO 2787. The hydraulic pressure shall be measured with the same accuracy as the air pressure.

A scale having an accuracy of at least ± 1 N shall be used when measuring the feed force.

The blow frequency of the power tool during the test can be determined by an electronic filter, using the signal from the vibration transducer or other suitable means.

4.6 Calibration

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

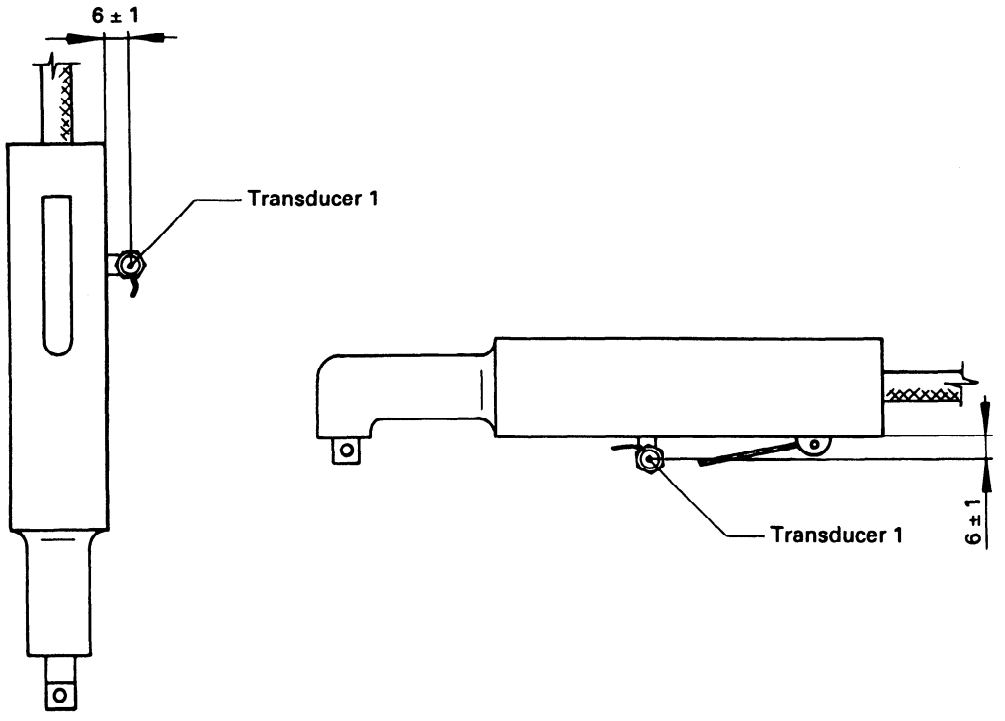
5 Measurement direction and measurement location

For different types of power tools, measurements shall be made in the directions and locations illustrated in figure 2.

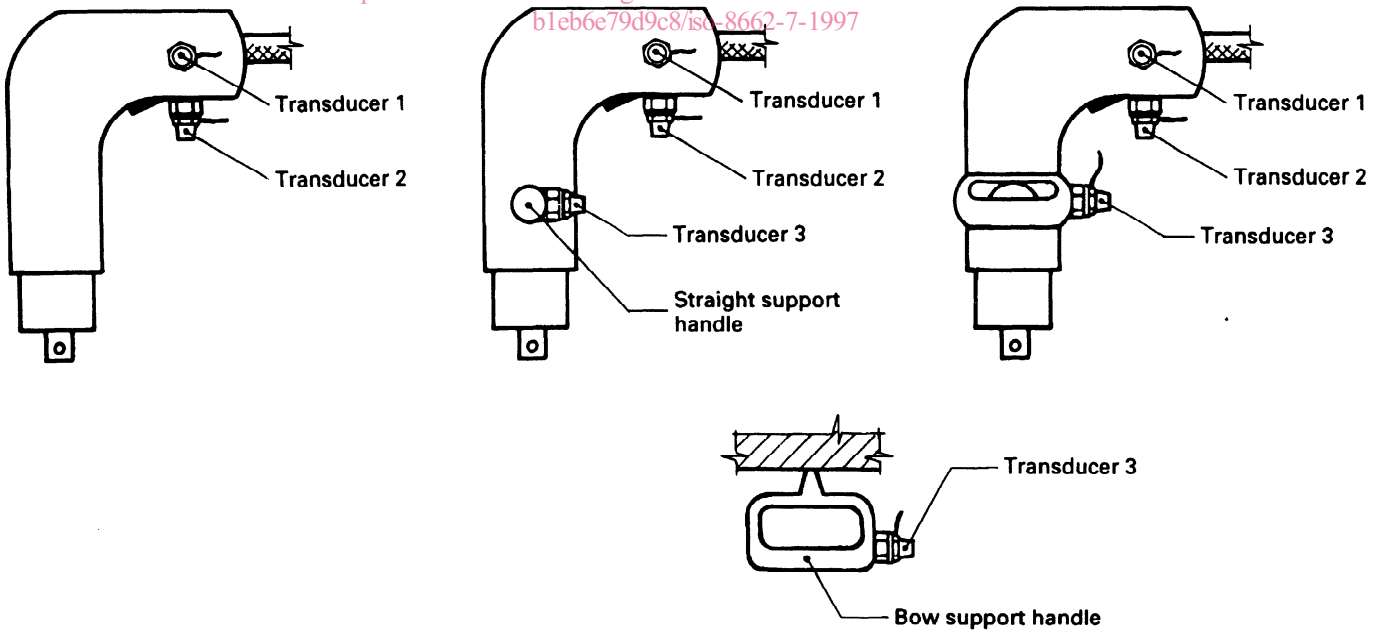
Measurements shall be made on the handle/handles, where the operator normally holds the power tool. The normal position of the transducer shall be halfway along the length of the handle. If the placing of the trigger makes this impossible, then the transducer shall be placed as close as possible to this position.

For straight control-handle power tools, the transducer shall be located so as to measure the acceleration on the power tool surface in a tangential direction relative to the motor shaft. The transducer shall therefore be located in accordance with figures 1 a) and 2 a) at a distance of (6 ± 1) mm from the surface of the power tool.

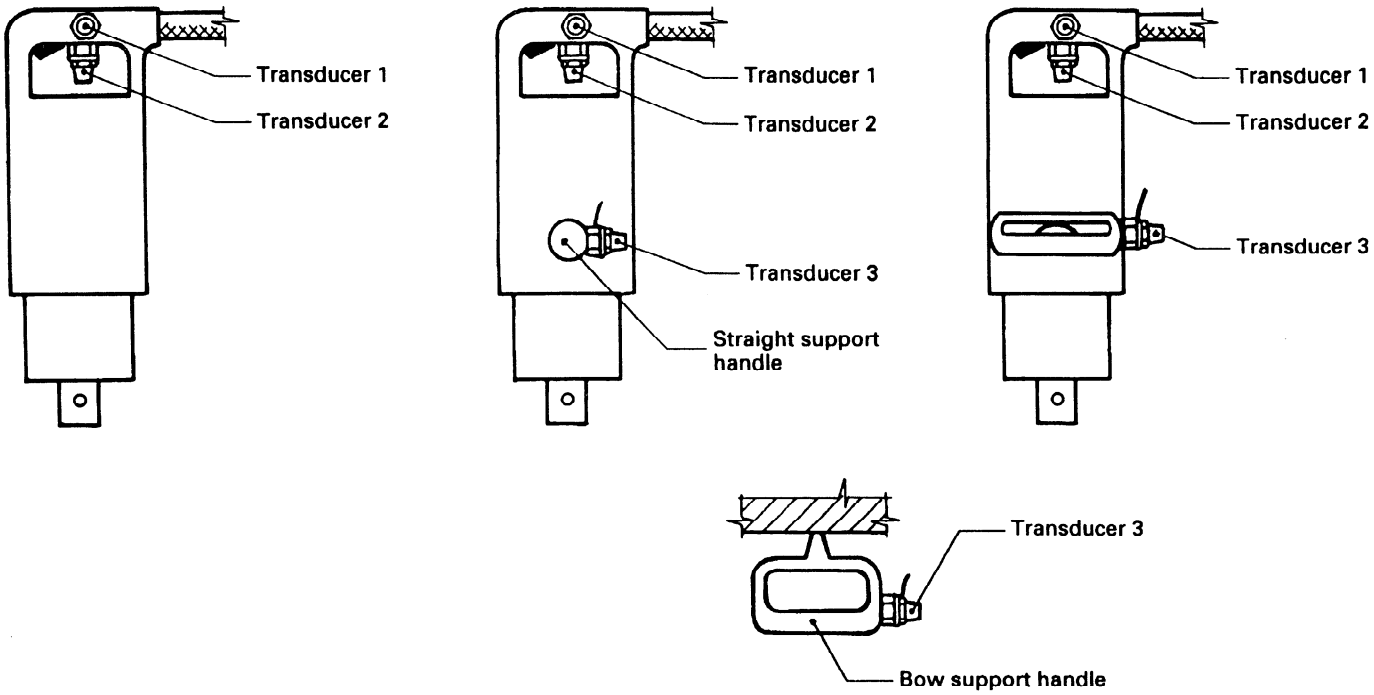
Dimensions in millimetres



a) Straight control-handle power tools, i.e. the control handle is parallel with the motor shaft. The output shaft may be coaxial with or at an angle to the motor shaft.



b) Pistol control-handle power tools, with or without support handle. The output shaft may be coaxial with or at an angle to the motor shaft.



c) Bow control-handle power tools, with or without support handle. The output shaft may be coaxial with or at an angle to the motor shaft.

Figure 2 — Measurement direction and examples of position of transducers

6 Determination of working procedure

6.1 General

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

For hydraulic power tools, a warmup time of about 10 min should be allowed before starting the measurements. For pneumatic power tools, no such warmup period is necessary. All clutches shall be warmed up for about 20 s by operating the tool against the loading device described in 6.2.

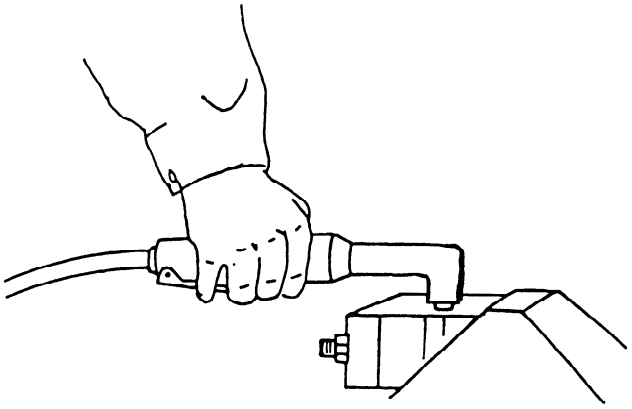
During testing, the power tool shall operate at the rated power supply and shall be used in accordance with the manufacturer's specifications. For pneumatic power tools, the air shall be supplied to the power tool by a hose having a length of at least 2 m, which is attached to the power tool via a threaded hose connector and secured with a hose clip. Quick couplings shall not be used. The operation of the power tool shall be stable and smooth (see 6.3).

During the test, the loading device shall be arranged so that the operator can have an upright or almost an upright posture and work the power tool with its output shaft pointing vertically downwards. He shall be able to hold the power tool comfortably during the test. Arm and wrist angles as illustrated in figure 3 shall be used for the different power tool types.

6.2 Loading device

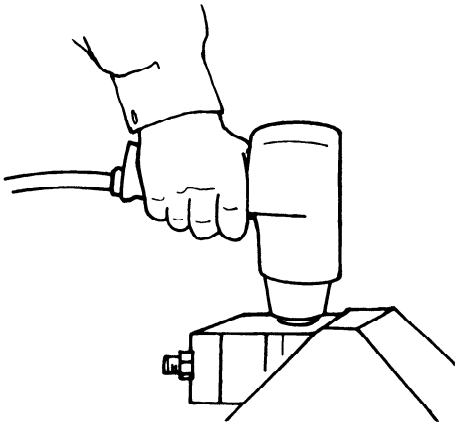
6.2.1 General

During the measurement, the power tool shall be operated against a loading device (a brake device) in order to obtain a stable rotational frequency of the output shaft of $(0{,}15 \pm 0{,}05)\ s^{-1}$. Examples of the design of two suitable brake devices are given in annex B.



a) On straight control-handle power tools with angle head [see figure 2 a), right], the operator's arm shall be perpendicular to the control handle, and in the plane of the motor and output shaft.

b) On straight control-handle power tools with straight head [see figure 2 a), left], the operator's arm shall be horizontal, and perpendicular to the handle. Note the indication that the transducer shall be mounted parallel with the operator's forearm.



c) On pistol control-handle power tools without support handle [see figure 2 b), left], with square-drive (or corresponding) sizes up to and including 10 mm, one-handed operation shall be used.