

INTERNATIONAL  
STANDARD

ISO  
7960

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**Airborne noise emitted by machine  
tools — Operating conditions for  
woodworking machines**

*Bruit aérien émis par les machines-outils — Conditions de fonctionnement  
des machines à bois*



Reference number  
ISO 7960:1995(E)

## 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 7960 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 6, *Noise of machine tools* and ISO/TC 43, *Acoustics*.

Annexes A to H, J to N and P to U form an integral part of this International Standard. Annex V is for information only.

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# Airborne noise emitted by machine tools — Operating conditions for woodworking machines

## 1 Scope

This International Standard, together with basic noise emission International Standards, describes the mechanical and acoustical specifications necessary for a reproducible test method for the determination of airborne noise emitted by woodworking machines.

NOTE 1 Acoustic measurement procedures and noise data reporting are given in the basic acoustic Standards selected from the ISO 3740 series, ISO 4871 and the ISO 11200 series (see annex V).

This International Standard specifies operating conditions and microphone positions for the measurement of noise emitted by woodworking machines.

It applies to:

- Single-blade circular saw benches (annex A);
- planing machines (annex B);
- thickness planing machines (annex C);
- single-spindle moulding machines (annex D);
- double-end profiling machines (annex E);
- edge banding machines (annex F);
- double-end sizing and edge banding machines (annex G);
- two-side and multi-side planing machines and moulding machines (annex H);
- bandsawing machines (annex J);
- Single-end tenoning machines (annex K);
- routing machines (annex L);
- double-end trim circular machines (nonstroke) (annex M);

- Single-blade stroke circular sawing machines for cross cutting (annex N);
- vertical and horizontal panel sizing sawing machines (annex P);
- multiblade circular sawing machines (for ripping) (annex Q);
- sanding machines (annex R);
- double-edging circular sawing machines (for rough cutting) (annex S);
- double-blade stroke circular sawing machines for cross cutting (annex T);
- double-end tenoning machines (for tenoning only) (annex U).

The existence of special-purpose machines, for which such Standard operating conditions cannot be specified, is acknowledged. This International Standard applies to the types of woodworking machines listed above. Additional types will be covered in future editions of this International Standard (ISO 7960).

## 2 Normative reference

The following Standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All Standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the Standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7984:1988, *Woodworking machines — Technical classification of woodworking machines and auxiliary machines for woodworking.*

### 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 7984 apply.

## 4 General provisions for machine installation and Operation

Specified operating conditions for particular types of machines are given in the annexes. When testing multi-purpose machines, each function shall be mounted separately according to the requirements specified in the annexes.

### 4.1 Machine installation

The machine shall be installed according to the manufacturer's instructions. If the manufacturer does not provide such instructions, this shall be stated in the test report, together with the installation method used.

The machine shall be installed in such a way that access to all sides is possible.

### 4.2 Machine Operation

The Operation during measurement shall be representative of the noisiest normal and typical use of the machinery that is reproducible. Standard operating conditions shall be those specified in the relevant annex. Where conditions are not specified in annexes, manufacturer's instructions shall be followed. Where neither specifications nor instructions exist, the machine shall be set up to give maximum noise emission.

The machine shall be tested when carrying out a sequence of operations deemed to be representative of the use of the machine, using test materials and operating conditions specified in the relevant annex. In addition, a test shall be performed under no load. The level of the no-load noise is that produced when the machine is running, ready for load test, unless otherwise specified in the annex.

NOTE 2 Distinctive features of noise within the machine-cycle may have to be measured separately or may be included in a single measurement of equivalent continuous sound pressure level sampled over the whole operating cycle.

Machines with Provision for dust extraction shall be tested with the extraction working, under both idling and operating conditions.

In order to determine the influence of the dust extraction system on the total noise, an additional measurement shall be carried out at a point at the Operator position (see suggested figures in the annexes), with the dust extraction switched off.

The operating conditions and the sequence of operations shall be defined, recorded and reported.

New or re-sharpened tools shall be used for all tests under load and the machine shall be running at normal operating temperature.

General safety requirements shall take precedence over conditions specified in the annexes.

### 4.3 Specification of test materials

The test material shall be one of the materials specified in 4.3.1 to 4.3.3.

**4.3.1 Particle board**, made from particles of wood bonded with synthetic resin and/or organic binder, density 500 kg/m<sup>3</sup> to 750 kg/m<sup>3</sup>, three-layer construction and moisture content 6 % to 10 %.

**4.3.2 Coated particle board**, of the type specified in 4.3.1, coated on both sides with a rigid plastic of the melamine type, of maximum 0,2 mm thickness, moisture content 6 % to 10 %.

**4.3.3 Softwood**, pre-planed resinous (similar to spruce, Norway spruce or Scots pine), in good condition and of uniform quality, with average annual growth ring thickness of 5 mm or less. The grain should run parallel to the longest edge but a general gradient of less than 12 % on at least one side is tolerable. Moisture content shall be between 8 % and 14%. Density shall be between 300 kg/m<sup>3</sup> and 600 kg/m<sup>3</sup>.

### 4.4 Microphone positions

Microphone positions for measurement of the noise at the operator's position(s) are given in the annexes. Some forms of acoustical enclosure or hood may require redefinition of the Operator microphone position in some cases; in such case the microphone shall be positioned to be representative of the noise at the position of the operator's head.

Provision of data for the noisiest position is optional.

Prescribed microphone positions for the determination of sound power level are given in the annexes.

The use of additional microphone positions is optional.

## 5 Test report (see annexes)

For measurements that are made according to the requirements of this International Standard, the following information shall be compiled as completely as possible and recorded:

- a) description of the machine under test (including its dimensions);
- b) mounting conditions (including auxiliary equipment, safety devices and noise control measures);

- c) operating conditions and sequence of operations;
- d) details of machine tool and cutting data (cutters saw-blades, etc.);
- e) details of test material;
- f) photo or detailed illustration of the machine tested;
- g) name and address of the firm/institution that has carried out the measurements (including date and place).

NOTE 3 The above requirements are met if the data sheets given in the annexes are used.

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## Annex A (normative)

### Woodworking machines — Operating conditions for single-blade circular saw benches

#### A.1 General

This annex contains a series of standard operating conditions to be applied in connection with measurement of noise from circular saws. Microphone positions are specified to allow measurement of sound pressure level at the operator's position and for determining the sound power level of a machine of this type.

These standard conditions shall be complied with as closely as possible. If, in a specific situation, it is necessary to deviate from standard conditions, the actual condition applied for the test shall be recorded where a blank space in the column "Condition chosen within permitted range or conditions deviating from standard" allows for such a situation.

Mandatory and standard safety attachments shall be mounted and in use during the tests.

This annex may also serve as a data sheet on which information on operating conditions is recorded.

This annex shall be used in connection with measurement of noise from the following machines.

	<b>Machine classification number</b> (see ISO 7984)
Circular saw bench with or without travelling table	12.131.36
Circular sawing machine with travelling table	12.131.372

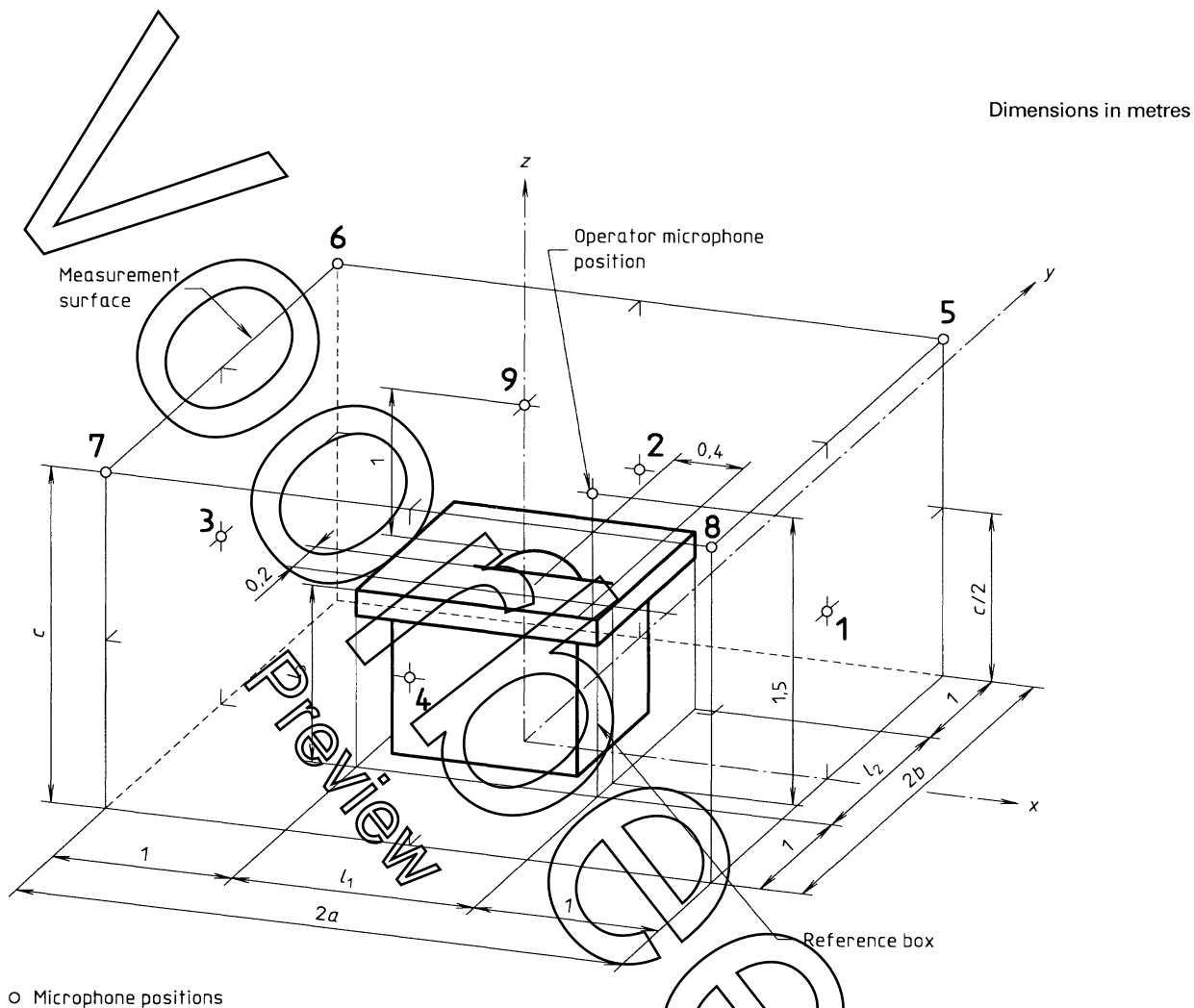
This annex may also be applied for measurement of noise from special-purpose machines having a similar construction and function.

#### A.2 Noise measurements

The machine shall be tested under the following conditions.

- a) Testing under no load with operating arrangement and tool and cutting data as specified in this annex.
- b) Testing under load as specified in this annex. The measurement result is the average of a series of at least three operations. During the first part of the work cycle, when the test material is fed into the tool, a higher level of noise may be emitted which depends on the infeed rate. On manually fed machines the infeed rate is difficult to control and therefore this part of the operating cycle shall not be included in the measurement.
- c) Operator microphone position for test purpose (see figure A.1):
  - 1,5 m above floor level;
  - 0,4 m forward of the spindle centreline;
  - 0,2 m to the left side of the sawblade.

NOTE 4 The use of integrating sound level meters is recommended but is not mandatory.



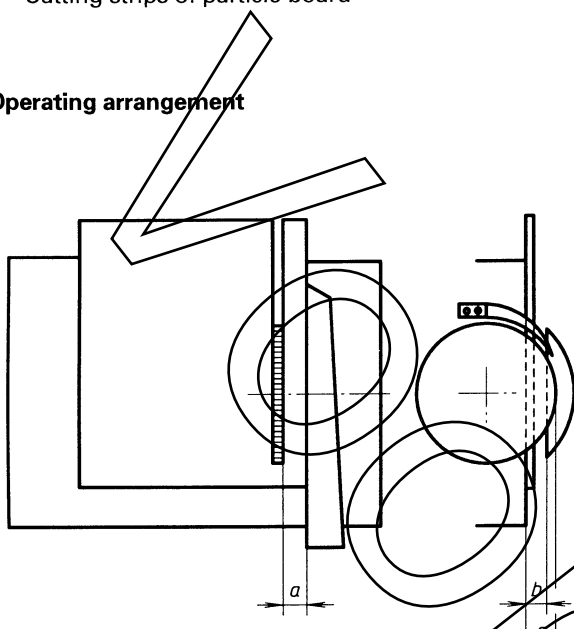
**Figure A.1 — Measurement surface and microphone array for determination of sound power level for single-blade circular saw benches** (see ISO 3740 series for explanation of symbols)



**A.3 Data sheet for Single-blade circular saw benches**

<b>Machine data</b>	
Make: .....	
Model: .....	
Year of manufacture: .....	Serial No.: .....
Overall dimensions of machine?	
length ..... mm	width ..... mm
height ..... mm	
Maximum blade diameter ..... mm	Clamp flange diameter ..... mm
Nominal rotational speed:	
motor ..... r/min	blade ..... r/min
<b>Machine installation</b>	
Machine installed according to manufacturer's instructions	<b>Remarks/description:</b>
yes <input type="checkbox"/>	no <input type="checkbox"/>
Machine installed with dust extraction according to manufacturer's specifications	
yes <input type="checkbox"/>	no <input type="checkbox"/>
Machine mounted on Vibration isolators	
yes <input type="checkbox"/>	no <input type="checkbox"/>
Machine equipped with noise-reducing hood	
yes <input type="checkbox"/>	no <input type="checkbox"/>
Other noise control measures	
yes <input type="checkbox"/>	no <input type="checkbox"/>
1) Those elements which protrude from the machine and which are not likely to contribute to the noise emission (for example hand-wheels, levers) may be disregarded.	

Data sheet for single-blade circular saw benches (continued)

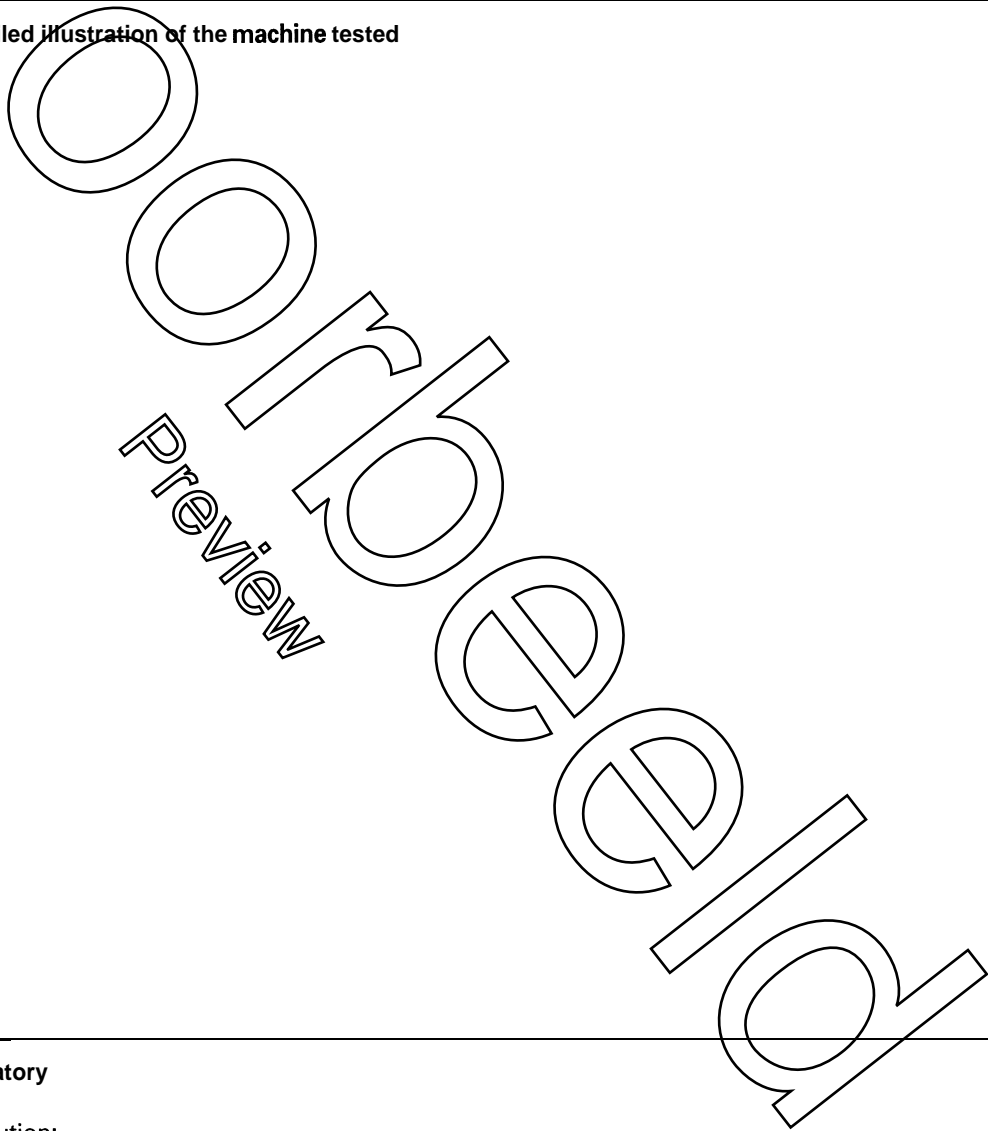
Testing operation	Units	Standard condition(s)	Condition chosen within permitted range or conditions deviating from standard
<p><b>Operating arrangement</b></p>  <p>Parallel fence position, <i>a</i></p> <p>Saw guard position, <i>h</i></p> <p>Sawblade projection, <i>c</i></p> <p><b>Tool and cutting data</b></p> <p>Type of tool: standard sawblade with carbide-tipped teeth</p> <p>Tooth profile: double alternate helix (staggered)</p> <p>Spindle speed</p> <p>Feed rate</p> <p>Blade diameter ≤ 315 mm</p> <p>    sawblade diameter</p> <p>    cutting speed</p> <p>    number of teeth</p> <p>    tooth width</p> <p>    actual blade thickness</p> <p>Blade diameter &gt; 315 mm</p> <p>    sawblade diameter</p> <p>    cutting speed</p> <p>    number of teeth</p> <p>    tooth width</p> <p>    actual blade thickness</p>	<p>mm</p> <p>mm</p> <p>mm</p> <p>r/min</p> <p>m/min</p> <p>mm</p> <p>m/s</p> <p>mm</p> <p>mm</p> <p>mm</p> <p>mm</p> <p>mm</p> <p>mm</p> <p>mm</p> <p>mm</p>	<p>50</p> <p>20</p> <p>30</p> <p>4 000 <sup>1)</sup></p> <p>6 ± 2</p> <p>250</p> <p>.....</p> <p>48 to 60</p> <p>3,2 ± 0,1</p> <p>2,2 ± 0,1</p> <p>355 (350)</p> <p>.....</p> <p>54 to 60</p> <p>3,2 to 3,6 (± 0,1)</p> <p>2,2 to 2,6 (± 0,1)</p>	
<p>1) Spindle speed shall be as close as possible to 4 000 r/min.</p>			

**Data sheet for Single-blade circular saw benches (concluded)**

**Testing material**

Material: particle board, three-layer construction (see 4.3)  
Moisture content: 6 % to 10%  
Board thickness: 16 mm  
Board length: 600 mm to 800 mm  
Board width: 600 mm to 800 mm, processed down to a final minimum width of 150 mm  
Preliminary processing: none

**Photo or detailed illustration of the machine tested**



**Testing laboratory**

Firm/institution: .....  
Add ress: .....  
Telephone: .....  
Date: ..... Signature: .....  
Test carried out:  
place: .....  
date: .....

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## Annex B (normative)

### Woodworking machines — Operating conditions for planing machines

#### B.1 General

This annex contains a series of Standard operating conditions to be applied in connection with measurement of noise from planing machines. Microphone positions are specified to allow measurement of sound pressure level at the operator's position and for determining the sound power level of a machine of this type.

These Standard conditions shall be complied with as closely as possible. If, in a specific Situation, it is necessary to deviate from Standard conditions, the actual condition applied for the test shall be recorded where a blank space in the column "Condition chosen within permitted range or conditions deviating from Standard" allows for such a Situation.

Mandatory and Standard safety attachments shall be mounted and in use during the tests.

This annex may also serve as a data sheet on which information on operating conditions is recorded.

This annex shall be used in connection with measurement of noise from the following machines.

	<b>Machine classification number</b> (see ISO 7984)
Planing machine	12.211.1
Combined planing and thickness planing machine used as a planing machine (separate testing shall also be performed in accordance with annex C)	{ 12.81 (used as planing machine) 12.82 12.83 (used as planing machine)

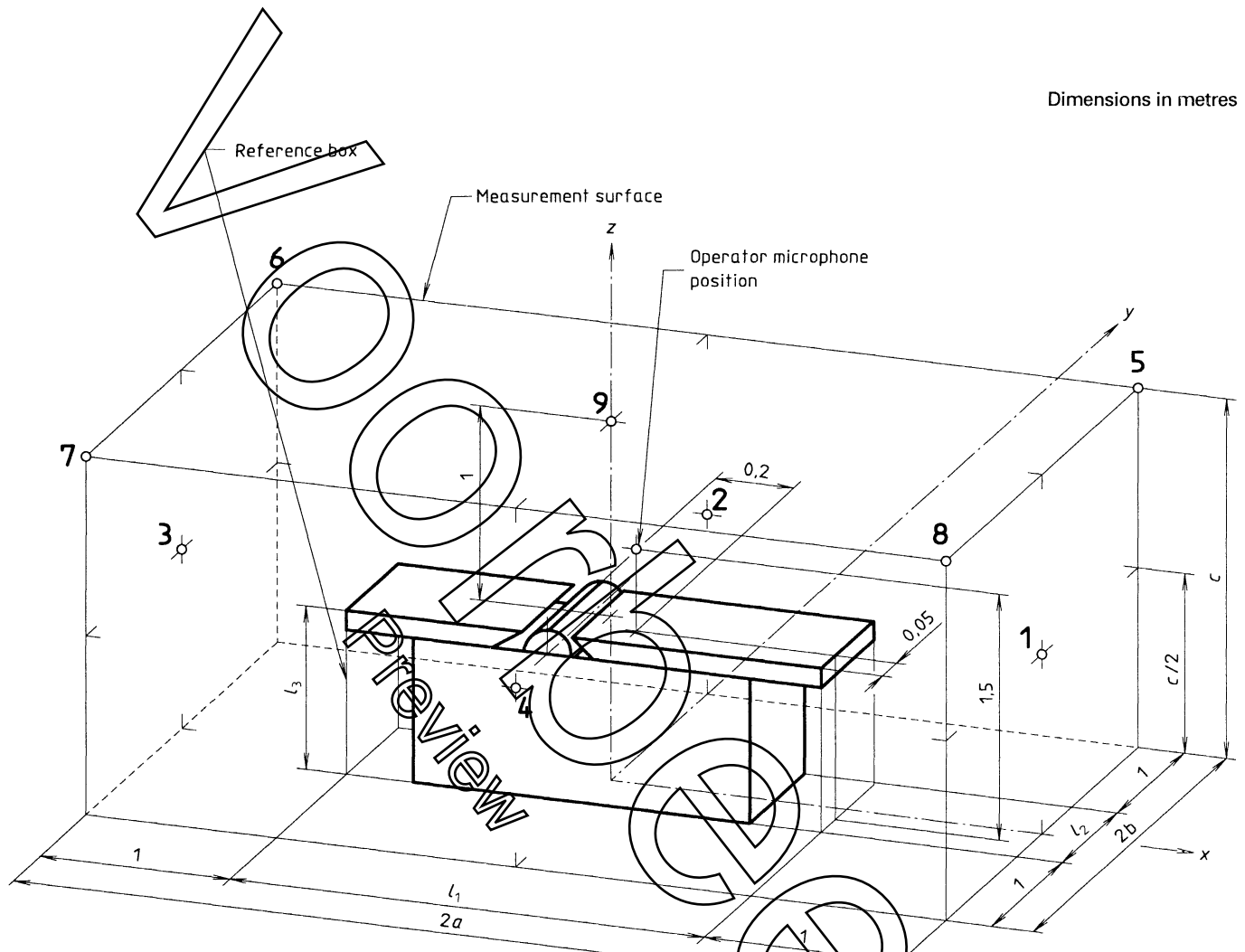
This annex may also be applied for measurement of noise from special-purpose machines having a similar construction and function.

#### B.2 Noise measurements

The machine shall be tested under the following conditions.

- a) Testing under no load with operating arrangement and tool and cutting data as specified in this annex.
- b) Testing under load as specified in this annex. The measurement result is the average of a series of at least three operations. During the first part of the work cycle, when the test material is fed into the tool, a higher level of noise may be emitted which depends on the infeed rate. On manually fed machines the infeed rate is difficult to control and therefore this part of the operating cycle shall not be included in the measurement.
- c) Operator microphone position for test purpose (see figure B.1):
  - 1,5 m above floor level;
  - 0,2 m forward of the cutter centreline;
  - 0,05 m to the right of forward left edge of the table.

NOTE 5 The use of integrating sound level meters is recommended but is not mandatory.



○ Microphone positions

**Figure B.1 — Measurement surface and microphone array for determination of sound power level for planing machines** (see ISO 3740 series for explanation of symbols)

**B.3 Data sheet for planing machines**

<b>Machine data</b>	
Make: .....	.....
Model*: .....	.....
Year of manufacture: .....	Serial No.: .....
Overall dimensions of machine <sup>1)</sup> :	
length .....	width ..... height .....
mm	mm mm
Cutter length .....	Cutting diameter .....
mm	mm
Number of cutting knives: .....	
Nominal rotational speed:	
motor .....	r/min cutter ..... r/min
r/min	r/min
<b>Machine installation</b>	
	Remarks/description:
Machine installed according to manufacturer's instructions	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
Machine installed with dust extraction according to manufacturer's specifications	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
Machine mounted on Vibration isolators	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
Machine equipped with slotted table lips	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
Machine equipped with helical Cutter-block	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
Other noise control measures	.....
yes <input type="checkbox"/>	.....
no <input type="checkbox"/>	.....
<p>1) Those elements which protrude from the machine and which are not likely to contribute to the noise emission (for example hand-wheels, levers) may be disregarded.</p>	

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