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Machinery for forestry — Noise test code

Matériel forestier — Code d'essai acoustique

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agricultural and forestry*, Subcommittee, SC 15, *Machinery for forestry*.

Introduction

This International Standard is a specific noise test code for forestry machinery mentioned in the scope of this International Standard and as defined in ISO 6814.

A simulated dynamic test condition, rather than an actual work cycle, is used. Simulated dynamic test conditions provide noise emission data which are repeatable and representative. Actual work cycle tests are complex and repeatability can be a problem.

This International Standard may also be used to determine noise emission for each part of the simulated work cycle.

Specific procedures are described in this International Standard to enable the sound power level and the emission sound pressure level in dynamic test conditions to be determined in a manner which is repeatable. This International Standard enables compliance with noise limits to be determined, if applicable. It can also be used for evaluation purposes in noise reduction investigations.

Machinery for forestry — Noise test code

CAUTION — The test method specified in this International Standard may lead to a hazardous situation due to moving and rotating machine parts. Test personnel shall stay in safe zones when measuring and observing the tests.

1 Scope

This noise test code specifies all the information necessary for carrying out efficiently and under standardised conditions the noise emission values of self-propelled forestry machinery. It is applicable to fellers, bunchers, delimbers, forwarders, log loaders, skidders, processors, harvesters, mulchers and multi-function versions of these machine types, as defined in ISO 6814.

Noise emission characteristics include A-weighted emission sound pressure values at the operator's station and the A-weighted sound power value. The determination of these quantities is necessary for the following:

— manufacturers to declare the noise emitted;

— comparing the noise emitted by machines in the family concerned;

— purposes of noise control at the source at the design stage.

NOTE For low-noise design, noise emission values in frequency bands are useful and the basic International Standards ISO 3744 and ISO 11201 can be used for determining noise emission quantities in frequency bands.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies..

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 6395:2008, *Earth-moving machinery — Determination of sound power level — Dynamic test conditions*

ISO 6396:2008, *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Dynamic test conditions*

ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

3 Emission sound pressure level determination at the operator's station

3.1 For the measurement of the A-weighted emission sound pressure levels, ISO 11201 shall be used.

3.2 The following emission sound pressure levels shall be determined at the operator's station:

— A-weighted time-averaged sound pressure level.

3.2.1 For operators, the microphone shall be mounted on an open-frame helmet worn on the operator's head or on a shoulder harness in such a way that the microphone axis is horizontal and its diaphragm is 200 mm ± 20 mm to the side of the centre plane of the operator's head, in the same vertical plane as his eyebrows and facing forwards.

For seated operators, the centre of the microphone shall be 700 mm ± 50 mm above the seat index point. The seat index point shall be determined in accordance with ISO 5353.

The standing operator shall be 1,75 m ± 0,1 m tall including shoes or as defined in ISO 6396:2008, 6.2 for ride-on machines and standing operator.

The side of the head chosen for the microphone shall be that for which the higher sound pressure level occurs.

3.2.2 The operator shall be positioned in the operator's position for normal operation of the machine. The actual position shall be recorded and reported. If the machine is processing during the measurement, the operator's position is facing the process. For forwarding machines, the operator shall be facing the forwarding direction. The operator shall continue to face in the prescribed direction during the noise measurement.

The operator can use a head-mounted open helmet or hearing protector or both if needed during the measurements. Their use shall be reported.

4 A-weighted sound power level determination

4.1 For the determination of the A-weighted sound power level, ISO 3744 shall be used. Background noise criteria shall be according to ISO 3744:2010, 4.2.

4.2 Six measurement positions shall be used on a hemispherical surface according to Figure 1 and Table 1.

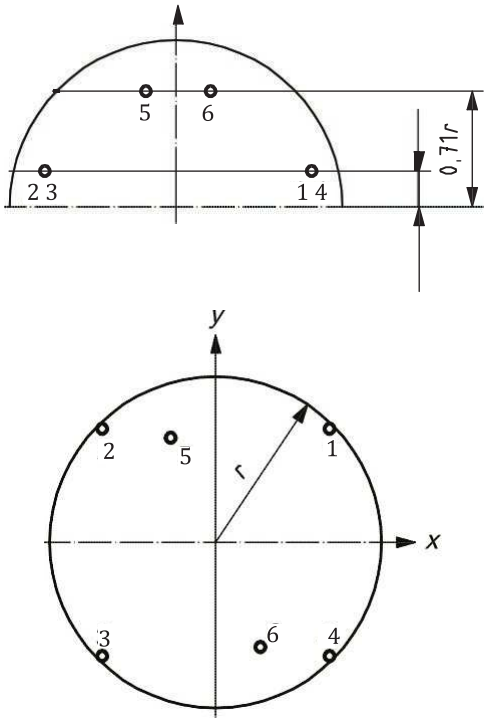

Figure 1 — Microphone array on the hemisphere

Table 1 — Coordinates of microphone positions

Microphone position	*x*/*r*	*y*/*r*	*z*
1	0,7	0,7	1,5 m
2	−0,7	0,7	1,5 m
3	−0,7	−0,7	1,5 m
4	0,7	−0,7	1,5 m
5	−0,27	0,65	0,71 *r*
6	0,27	−0,65	0,71 *r*

4.3 The hemisphere radius shall be 4 m or 10 m or 16 m. The radius shall be

— 4 m when the basic length, *l*, of the machine to be tested is less than 1,5 m, or

— 10 m when the basic length, *l*, of the machine to be tested is greater than or equal to 1,5 m but less than 4 m, or

— 16 m when the basic length, *l*, of the machine to be tested is greater than or equal to 4 m,

where the basic length, *l*, is total frame length, horizontal distance between the vertical planes perpendicular to the longitudinal axis passing through the farthest points on the front and rear frame of the machine, blade and loader excluded.

4.4 For machines equipped with a crane, the hemisphere radius may be the maximum reach of the crane boom plus 3 m rounded to the nearest even number.

4.5 The value to be determined is the A-weighted sound power level over a specified work cycle of the machine as stated in Clause 7.

5 Installation and mounting conditions

5.1 The machine installation and mounting conditions as specified by the manufacturer in the instruction handbook shall be applied.

5.2 For the purposes of this International Standard, the test environment specified in ISO 3744:2010, Clause 4 and Annex A, apply. Additional requirements are given in 5.3 to 5.6.

Humidity, air temperature, barometric pressure, vibration and stray magnetic fields shall be within the limits specified by the manufacturer of the instrumentation.

5.3 The test area shall be a hard reflective surface defined as an area bordered by the vertical projection of the microphones to the ground consisting of concrete or non-porous asphalt.

5.4 The requirements for background noise, as specified in ISO 3744, shall be fulfilled. Corrections for background noise shall be made as specified in ISO 3744:2010, 8.3.2.

5.5 Measurements shall not be carried out under the following conditions:

a) when there is precipitation, i.e. rain, snow or hail;

b) when the ground surface is covered with snow;

c) when the temperature is below −10 °C or above +35 °C;

d) when the wind speed exceeds 8 m/s; for wind speeds in excess of 1 m/s, a microphone windscreen shall be used and appropriate compensation for the effect of its use allowed for when calibrating.

5.6 For test-site measurement ground surfaces consisting of a hard reflecting plane, such as concrete or nonporous asphalt (5.3), and having negligible sound-reflecting obstacles within a distance from the source equal to three times the measurement hemisphere radius, it may be assumed that the absolute value of environmental correction, K2A, is less than or equal to 0,5 dB, and can therefore be disregarded. In this case, K2A shall be equal to 0 dB.

6 Operating conditions

6.1 The operating conditions shall be the same for the determination of both A-weighted emission sound pressure values at the operator's station and the exterior A-weighted sound power value at specified conditions unless otherwise stated below.

Unless otherwise specified, all machines shall be stationary with the tools operating, unloaded, idling at the 75 ± 5 % of manufacturer's rated maximum efficiency engine speed. The machine shall be properly warmed up and stabilized at the normal operating temperature before testing starts.

Adjustments shall be made to ensure that no tools cause additional noise through an unintentional mechanical contact.

If a cab is fitted, the sound pressure level shall be measured with all openings, doors, windows, hatches and windscreen closed.

Measurements shall be taken with the air-conditioning and/or ventilation system(s) in operation. If there is more than one operating speed available, the air conditioning and/or the pressurized ventilation system(s) shall be operated at the second speed for systems with up to four speeds.

For systems with more than four speeds, the third speed shall be used and, for systems with infinitely variable speeds, the mid-range speed.

If the air-conditioning and/or ventilation systems have a recirculate and outside air position control, the control shall be set for outside air.

Windscreen wipers and power take-off shall not be functioning.

6.2 If the engine of the machine or its hydraulic system is fitted with fan(s), they shall operate during the test. The fan speed shall be in accordance with one of the following three conditions, as ISO 6395:2008, 7.3 stated and set by the manufacturer of the machine.

a) If the fan drive is directly connected to the engine and/or hydraulic equipment (e.g. by belt drive), it shall operate during the test.

b) If the fan can work at several distinct speeds, the test shall be carried out

   — either at the maximum working speed of the fan, which is fan speed at which the fan provides maximum cooling performance for the machine under the most severe operating conditions or

   — in a first test with the fan set at zero speed and in a second test with the fan set at the maximum working speed; the resulting time-averaged A-weighted sound pressure level, $L_{pA,T}$, shall then be calculated by combining both test results using Formula (1):

$$L_{pA,T} = 10 \lg \left(0{,}3X10^{\,0{,}1L_{pA,0\%}} + 0{,}7X10^{\,0{,}1L_{pA,100\%}}\right) \text{ dB} \quad (1)$$

where

$L_{pA,0\,\%}$ is the time averaged A-weighted sound pressure level determined with the fan set at zero speed;

$L_{pA,100\,\%}$ is the time averaged A-weighted sound pressure level determined with the fan set at maximum speed.

c) If the fan can work at continuous variable speed, which is fan drive that varies the fan speed continuously throughout a variable range to minimize its speed for the needed cooling performance in relation to the heat load, the test shall be carried out either with accordance with b) or with the fan speed set by the manufacturer at no less than 70 % of the maximum working speed.

If machine is equipped with more than one fan, all fans shall run at the conditions specified in a), b) or c).

6.3 In the case of harvesters, tracked and drive to tree feller bunchers, processors, delimbers, mulchers, skidders and log loaders, the noise emission values shall be determined on a complete working cycle as stated in Clause 7. The work cycle shall be described in the test report and referenced in the noise declaration.

7 Working cycles

7.1 Measurement requirements

When measuring the sound power level and the emission noise pressure level, machine work cycles shall be as follows:

During the measurements, the centre line of the machine body shall be straight; tyres of the machine shall be directed onto straight line forward. The operator position shall be the same.

When defining the working positions operator is facing to 0° and the angle is increasing to the right hand side of the operator.

Special care must be taken concerning movements of the boom or other equipment not to interfere with microphones.

7.2 Harvesters

7.2.1 The noise of harvesters is measured with the tree processing work cycle only. A tree processing work cycle is simulated and it is performed without tree processing.

7.2.2 The tree processing work cycle is as follows:

a) The operator begins the processing work cycle with the closed head and the head shall remain closed during the work cycle. The tree is 25° ± 5° on the right hand side from the operator, when the operator is sitting in the operation position and the distance to the tree is 25 % ± 500 mm of the maximum reach of the boom. Distance between the ground level and the lowest part of the felling head is 250 mm ± 100 mm.

b) After that the operator makes the felling cut, and the head is turned into the debranching and bucking position which is 25° ± 5° on the right hand side from the operator and distance is 15 % ± 500 mm of maximum reach of the boom. During turning, the centre line of the saw blade is directed to be the same with the centre line of the machine body.

c) During the debranching and bucking procedure, the feeding rolls are run for 3 s ± 0,2 s at maximum feeding speed and after which the cutting sawing is done. Duration of each cutting sawing shall be 2 s ± 0,2 s at minimum. This is repeated three times.

d) Then the operator extends the harvester head to same direction as in a) to a distance which is 75 % ± 500 mm of the maximum reach of the boom. During extension the harvester head is turned into the felling position. Felling as in b) occurs.

e) After b), the debranching and bucking procedure as in c) is repeated three times. Finally, the harvester head is brought closer to a position as in a) by turning the head into felling position at the same time.

During sawing, the saw chain shall operate throughout its maximum range of movement. During felling, debranching and bucking procedure, the harvester head is operated manually.

7.2.3 The period of one noise measurement observation shall consist of at least three work cycles described in 7.2.2.

7.2.4 The movement speed of the boom shall be 75 % ± 5 % of maximum speed during the measurements and defined by the manufacturer. The work cycle time shall be measured and reported.

7.3 Feller bunchers

7.3.1 The noise of feller bunchers is measured with the tree felling bunching work cycle. The work cycle is simulated and it is performed without tree processing. For drive to tree feller-bunchers, see 7.3.5.1.

7.3.2 The tree felling work cycle is as follows:

a) The harvester head is prepositioned generally front and centre of the machine in the arms in the closed position and the arms remain in the closed position throughout the work cycle. The cutting device shall be activated and remain running throughout the work cycle. The operator begins the work cycle by moving the felling head into felling position around an imaginary tree. The tree is 25° ± 5° on the right hand side from the operator, when the operator is sitting in the operation position, and the distance to the tree is 25 % ± 500 mm of the maximum reach of the boom. Distance between the ground level and the lowest part of the felling head is 250 mm ± 100 mm.

b) After a), the operator makes the felling cut, and the head is turned into the piling position and the boom is turned to piling point which is 65° ± 5° on the left hand side from the operator and distance is 15 % ± 500 mm of the maximum reach of the boom.

c) Then the operator extends the felling head to same direction as in a) to a distance which is 75 % ± 500 mm of the maximum reach of the boom. During extension, the felling head is turned into the felling position. Felling and piling as in b) occurs.

7.3.3 The period of one noise measurement observation shall consist of at least three work cycles described in 7.3.2.

7.3.4 The movement speed of the boom shall be 75 % ± 5 % of maximum speed during the measurements and defined by the manufacturer. The work cycle time shall be measured and reported.

7.3.5 Tracked and drive to tree feller bunchers.

7.3.5.1 The noise of drive to tree feller-bunchers is measured and reported for the tree felling mode and for the travelling mode.

7.3.5.2 The travelling mode is as defined in ISO 6395:2008, D.4.2.

7.3.5.3 For the felling mode, start with the felling head closed at the 25 % position then raise head upward to 75 % and tilt the head forward 75 %. Return the felling head to the start position keeping the arms closed.

7.3.5.4 The period of one noise measurement observation shall consist of at least three work cycles described in 7.3.5.3.

7.4 Processors

7.4.1 The noise of processors is measured with the tree processing work cycle only. A tree processing work cycle is simulated and it is performed without tree processing.

7.4.2 The operator begins the processing cycle with the closed head. The head shall remain closed during the work cycle. The tree processing work cycle is as follows:

a) The operator begins the processing cycle with the head already closed. The head shall remain closed during the work cycle. The operator begins the processing cycle by steering the processing head to an imaginary tree. The tree is 25° ± 5° on the right hand side from the operator, when the operator is sitting in the operation position, and the distance to the tree is 25 % ± 500 mm of the maximum reach of the boom. The distance between the ground level and the lowest part of the processor head is 250 mm ± 100 mm.

b) After that, the operator swings the head into the debranching and bucking position which is 15 % ± 500 mm of maximum reach of the boom and 25° ± 5° on the right hand side from the operator. During turning, the centre line of the processing head is directed to be the same with the centre line of the machine body.

c) During the debranching and bucking procedure, the feeding rolls are run for 3 s ± 0,2 s at maximum feeding speed and after which the cutting sawing is done. The duration of each cutting sawing shall be 2 s ± 0, 2 s at minimum. This is repeated three times.

d) Then the operator extends the processing head to same direction as in a) to a distance which is 75 % ± 500 mm of the maximum reach of the boom.

e) After that, the debranching and bucking procedure as in c) is repeated three times. Then the processing head is brought closer to a position as in a).

f) During sawing, the saw shall operate throughout its maximum range of movement. During debranching and bucking procedure, the harvester head is operated manually.

7.4.3 The period of one noise measurement observation shall consist of at least three work cycles described in 7.4.2.

7.4.4 During the measurements, the movement speed of the boom shall be 75 % ± 5 % of maximum speed defined by the manufacturer. The work cycle time shall be measured and reported.

7.5 Delimbers

7.5.1 The noise of the stroke delimbers is measured with the delimbing work cycle only. A tree delimbing cycle is simulated and it is performed without tree handling.

7.5.2 The delimbing work cycle is as follows:

a) The operator begins the delimbing work cycle by closing the grapple around an imaginary tree. The distance to the tree is 75 % ± 500 mm of the maximum reach of the boom and the lowest part of the grapple is 250 mm ± 100 mm from the ground level.

b) The delimbing process is done in a way which is typical for the machine. The delimbing elements of the machines are operated at least for 5 s per each tree.

c) The processed tree is laid down and a new work cycle begins.

7.5.3 The period of one noise measurement observation shall consist of at least three work cycles described in 7.4.2.

7.5.4 During the measurements, the movement speed of the boom shall be 75 % ± 5 % of maximum speed defined by the manufacturer. The work cycle time shall be measured and reported.

7.6 Log loaders

7.6.1 The noise of log loaders is measured with the loading work cycle only. A tree loading cycle is simulated and it is performed without tree handling.

7.6.2 The loading cycle is as follows:

The loader is prepositioned generally front and centre of the machine with the grapple in the closed position and the grapple remaining in the closed position throughout the cycle. The timber is 90° ± 5° on the right hand side from the operator, when the operator is sitting in the operation position, and the distance to the timber is 75 % ± 500 mm of the maximum reach of the boom. Distance between the ground level and the lowest part of the grapple is 250 mm ± 100 mm from the ground level.

After that, the operator swings the boom into the loading position which is on the left hand side of the loader. The grapple is opened as it is 90° ± 5° on the left hand side from the machine and 2 000 mm ± 200 mm away from loader side. During turn, the grapple is evenly raised to the height of 4 500 mm ± 200 mm and the centre line of the grapple is directed to be the same with the centre line of the machine body.

In the left most position, lower the grapple vertically to the height of 2 000 mm ± 200 mm.

7.6.3 The period of one noise measurement observation shall consist of at least three work cycles described in 7.6.2. At the end of the third cycle, swing the boom to the right 90 degrees so it is positioned front and centre of the machine.

7.6.4 The movement speed of the boom shall be 75 % of maximum speed during the measurements and defined by the manufacturer. The work cycle time shall be measured and reported.

7.7 Mulchers

7.7.1 The noise of mulchers is measured with the mulching work cycle only. A tree mulching work cycle is performed without tree handling.

7.7.2 The mulching cycle is as follows:

a) In the beginning, the mulching head is kept for 10 s as close as possible to the ground level but no parts touching the ground. Rotating parts are functioning.

b) Then, the mulching head is elevated to maximum working height for 5 s. After that, the head is laid down to position as in a).

7.7.3 The period of noise measurement observation shall consist of three at least three work cycles as described in 7.7.2.

7.7.4 During the measurements, the movement speed of the boom shall be 75 % of the maximum speed defined by the manufacturer. The work cycle time shall be measured and reported.

7.8 Skidders

The noise of skidders is measured according to ISO 6395:2008, Annex G (grader cycle).

7.9 Forwarders

7.9.1 The noise of forwarders is the combined noise of the loading work cycle and the forwarding work cycle.

7.9.2 The loading work cycle is as follows:

When the loading work cycle begins, the grapple of loader is fully open in the middle point of the load bunk. From that point, the grapple is turned and extended towards a point which is 45° ± 5° to the right hand side of the operator and distance is 75 % ± 500 mm of the maximum reach of the boom. At the same time, the grapple is lowered to a height which is 250 mm ± 100 mm over the ground level measured from the lowest point of the grapple. At this point, the movement of the boom is stopped for a while and the grapple is closed. After that, the grapple is brought to the beginning point in the middle of the load bunk.

7.9.3 The period of one noise measurement observation shall consist of at least two work cycles as described in 7.9.2. The movement speed of the boom shall be 75 % ± 5 % of the maximum during the measurements and defined by the manufacturer. The work cycle times shall be measured and reported.

7.9.4 For forwarding noise value measurements, machines with pneumatic tyres shall be operated on a dry, concrete or tarmacadam surface (or other hard surface with no loose material), horizontal to within 2°, free from gravel, leaves, snow, etc. Tracked or metal-wheeled machines shall be operated on a smooth, horizontal grassland or soil surface free from long grass vegetation. The test track or course shall have a straight section long enough to ensure that the machine speed is stabilized for an adequate time for measurements to be made.

The machine shall be ballasted. Wheeled machines shall be fitted with typical pneumatic tyres, not more than 50 % worn. Before the noise measurements, it shall be established by a power take-off test or other means that the power of the machine is within 5 % of the manufacturer's rated value.

7.9.4.1 The measurement procedure applies whether or not the machine is fitted with a cab.

If a cab is fitted, the sound pressure level shall be measured with all openings, doors, windows, hatches and windscreen closed.

An additional optional set of measurements may be taken with all openings open, providing that they have been designed to operate in the open position and that they do not cause a hazard during normal use of the machine. The exception to this is that the windscreen shall remain closed.

When the measurements are being made, parts which normally operate at the same time as the engine (e.g. engine cooling fan) shall be functioning, but extra equipment powered by the engine or self-powered (e.g. windscreen wipers, heating and ventilating fans, power take-off) shall not be functioning.

7.9.4.2 Additional noise measurements may optionally be made with the engine running at maximum speed and all auxiliary air-conditioning equipment working. The heating or ventilating fans shall run at the maximum setting.

7.9.4.3 Additional noise measurements may optionally be made with the engine stopped and ventilating fans, defrosters and other electrical facilities, etc., working at maximum settings. It shall be confirmed that at least the nominal energy input of the auxiliary equipment is applied to the equipment terminals.

7.9.5 During sound pressure measurement at the operator's place, the microphone shall be placed at that side of the operator giving the higher sound pressure level.

The A-weighted sound pressure level and, optionally, octave-band pressure levels shall be measured and reported at the following modes of operation:

a) driving forwards in the highest gear at no load with the governor control lever fully open;

b) driving forwards at no load with the governor control lever fully open, in the gear giving a speed as near as possible to 4 km/h at the manufacturer's rated engine speed.

When, optionally, octave-band sound pressure levels are measured, it is recommended that the machine be operated under the mode of operation which gives the highest sound pressure level.

7.9.6 For the determination of forwarding sound, power measurements shall follow ISO 6395:2008, Clause 6.

8 Measurement uncertainties

8.1 Tests shall be repeated to attain the required grade of accuracy, and until three consecutive A-weighted results give values within 1 dB. The arithmetic average of these three values shall be taken as the final measured value.

8.2 Unless otherwise stated,

— the measurement uncertainty of the determination of A-weighted sound power levels using this document shall be that specified in ISO 3744;

— the measurement uncertainty of the determination of A-weighted emission sound pressure levels at operator's stations using this document shall be according to ISO 11201 (value of the standard deviation of reproducibility equal to 2,5 dB).

9 Information to be recorded and reported

9.1 The information to be recorded and reported is that required by the basic standards used for determining the noise emission quantities.

9.2 The data sheet according to 9.4 shall be used to report key data, in particular the relevance of the standards that have been used, the description of the mounting and operating conditions and possible deviations from the noise test code requirements. Operator station locations and the emission sound pressure level at this position shall be reported. The value of the sound power level shall be reported if determined. Associated uncertainties shall be reported.

9.3 The data sheet and the test report shall confirm that all requirements of this noise test code have been fulfilled or, alternatively, identify any deviations and list the justification for those necessary deviations.

9.4 The data sheet and test report form shall contain at least following information.

— Machine

— Model

— Type

— Dimensions: characteristic length “l”

— Rated speed, engine, tool, other

— Engine type

— Wheels/tracks: size, type

— Type of fan-drive system(s), test method(s) used as specified in 7.3 a), b) or c), including corresponding system maximum fan speed and fan speed(s) used during the test for each fan

— Measurement position — all workstations: Plan showing measurement position

— Emission sound pressure level at the operator’s station (to the nearest whole number)

— Measurement position — all workstations: Plan showing measurement position

— L_{pA} in dB: and the value of the associated uncertainty K =

— Sound power level (to the nearest whole number)

— Radius of hemispherical measurement surface: … m

— Microphone position

— L_{WA} in dB: and the value of the associated uncertainty K =

— Standards used:

  — basic standard for measuring the emission sound pressure level at the operator’s station (indicate ISO number);

  — basic standard for measuring the sound power level if determined (indicate ISO number);

  — number of this International Standard.

10 Noise declaration

The noise declaration shall be made according to ISO 4871, see Table 2 for declared dual-number noise emission values.

The noise declaration shall include a reference to this noise test code ant to the basic International Standard used (ISO 3744 and/or ISO 11201). Deviations, if any, from this test code and/or the basic standards shall also be indicated.

The uncertainties associated with the measurements shall be taken into account when deciding the declared noise emission values.

The uncertainty (K) to be associated with the declared noise level(s) is based on total standard deviation, δ_t, which is composed of the standard deviation of reproducibility, δ_R, and the standard deviation of production, δ_P.

Guidelines for determining uncertainties are given by the basic standards. The uncertainty determination of production should be done by the manufacturer, based on his experience of the production variation.

An example of a single-dual-number noise declaration is given below. The noise emission values and the operating mode descriptions are given only as an example as well.

The noise declaration shall include information about the operating conditions during the test.

Table 2 — Example of a dual-number noise declaration

Machine mode number, operating conditions and other identifying information [e.g. Tree harvester, Model A 1. Harvesting mode with engine speed 2 400 rpm, containing felling, debranching and bucking simulation, see 7.1]		
DECLARED DUAL-NUMBER NOISE EMISSION VALUES in accordance with ISO 4871		
	Travelling	Harvesting simulation
Measured A-weighted sound power level, L_{WAd} (ref.1 pW), in dB	88	96
Uncertainty, K_{wa}, in decibels		2
Measured A-weighted emission sound pressure level, L_{pAd} (ref. 20 µPa), at the operator's position, in dB	78	79
Uncertainty, K_{pa}, in decibels		2
NOTE 1 Values are determined according to the noise test code given in this International Standard using the basic International Standards, ISO 3744 and ISO 11201. NOTE 2 The sum of measured noise emission value and its associated uncertainty represents an upper boundary of the range of values which is likely to occur in measurements.		

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