

Standard ECMA-160

Determination of Sound Power Levels of Computer and Business Equipment using Sound Intensity Measurements; Scanning Method in Controlled Rooms

2nd edition (December 1992)

This ECMA Standard specifies a procedure for the determination of sound power levels of computers and business equipment under its normal operating conditions (see [ECMA-74](#)), by using sound intensity measurements in rooms other than dedicated acoustical laboratories. The sound intensity distribution is measured on a surface enclosing the equipment under test.

The measurement procedure is based on a scanning technique, i.e. continuously moving the intensity probe across the measurement surface following a pre-defined pattern while the instrument is integrating. The measurements give the total radiated airborne sound power from a noise source.

The basic emission quantity for computer and business equipment is the A-weighted sound power level (sound power levels may also be determined in one-third octave or octave bands). The sound power levels may be used for declaration and comparison purposes (see Standard [ECMA-109](#)) for equipment of the same type but from different manufacturers, or of different types. They are not to be considered as installation noise immission levels; however they may be used for installation planning (see ECMA [TR/27](#)).

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The purpose of this measurement procedure is to obtain sound power levels in "controlled" environments using sound intensity procedures with an engineering grade accuracy that is comparable to that of the methods of clauses 5 and 6 of Standard **ECMA-74**. The measurements performed using this Standard are made in less restrictive environments than special acoustical rooms; however, if the source is closer to a wall than specified in Standard **ECMA-74**, the sound power emitted from the source may be different from that emitted in a reverberation room or in an hemi anechoic room, although this difference is not expected to be significant.

The scanning sound intensity technique in this Standard to determine sound power levels is an alternative to the two procedures in **ECMA-74**; however, Standard **ECMA-74**, clause 7 must be used to determine the A-weighted sound pressure level at the bystander or operator position.

This scanning method can be used for checking whether the declared noise emission values reported in specification sheets, for example, according to ISO/IEC 11159 and ISO/IEC 11160 are, indeed, met by installed equipment. The advantage of this method is that this check can be made in ordinary rooms, which reduces the time and cost involved considerably.

This measurement procedure is not intended for the identification of noise sources within the equipment under test.

This standard gives requirements for the acoustical environment, extraneous noise, measurement surface, and scanning technique for the intensity measurement. The procedure for calculating sound power from sound intensity is given. The noise of the equipment under test has to be stationary so that proper time and spatial integration is obtained while scanning over the measurement surface. The measurement of isolated

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bursts of sound energy is thus not covered by the method, unless the isolated bursts are repeatable and special precautions are utilized during the scanning.

Surface integration of the intensity component normal to the measurement surface is approximated by subdividing the measurement surface into contiguous segments, and scanning the probe over each segment along a continuous path which covers the extent of the segment. The measurement instrument continuously time-integrates the normal intensity component and squared sound pressure over the duration of each scan. The scanning operation may be performed either manually or by means of a mechanical system.

The one octave, one-third octave or band-limited weighted sound power level is calculated from the measured values. The method is applicable to any computer and business equipment for which a physically stationary measurement surface can be defined, and on which the noise generated by the source is stationary in time, as defined in 4.12.

This Standard specifies certain ancillary procedures, described in annex B, to be followed in conjunction with the sound power determination. The results are used to indicate the quality of the determination, and hence the grade of accuracy. If the indicated quality of the determination does not meet the requirements of the Standard, the test procedure must be modified in the manner indicated in this Standard.

The following files are provided in this set of CD-ROMs:

File name	Size (Bytes)	Content
ECMA-160.PDF	2'647'291	Acrobat PDF file
ECMA-160.PSC	2'576'957	Corresponding PostScript file

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