

JAPANESE INDUSTRIAL STANDARD

JIS A 8305:1988

Method for the measurement of Airborne noise emitted by
construction equipment intended for outdoor use

April, 1998

ERRATA

Page 6

Subclause 6.2.2

In line 9 from the bottom, replace " $c : 0.5l_3 + d(m)$ " with
" $c : l_3 + d(m)$ ".

Remarks : This errata is for correcting the first edition of this Standard.
Japanese Standards Association

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**Method for the Measurement of
Airborne Noise emitted by
Construction Equipment intended
for Outdoor Use**

JIS A 8305—1988

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

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Method for the Measurement of Airborne Noise
emitted by Construction Equipment intended
for Outdoor Use A 8305-19881. Scope

This Japanese Industrial Standard specifies the measuring method in outdoor for obtaining the A-weighted sound power level or octave band sound power level⁽¹⁾ of a sound source, and, if required, its directivity characteristics, regarding airborne noise emitted by construction machines, hereinafter referred to as the "machines". The measuring methods specified herein applies to the sound sources which radiate the steady sound⁽²⁾ or non-steady sound⁽³⁾, which is the broad band noise, narrow band noise, noise having discrete frequency component and combined noise thereof.

Notes (1) The objective central frequency range in general shall be 125 to 8000 Hz.

(2) That sound which continues nearly steadily at least over 30 sec or more.

(3) Excluding the singly emitted sounds or impulsive sounds which are repeated in the frequency of about 10 times per second or under, it means that non-steady sounds which are stable statistically within a measured time.

2. Definitions

For the purposes of this Standard, the following definitions apply:

- (1) sound pressure level Ten times the common logarithm of a value of the square of sound pressure divided by the square of the reference sound pressure (20 μ Pa). The unit is expressed in decibel and symbol dB. In particular, in the case of a sound pressure which has been weighted by A-characteristic specified in JIS C 1505 is taken as the subject, it is called as an A-weighted sound pressure level (noise level), and in the case where the sound pressure of each octave band specified in JIS C 1513 is taken as the subject, it is called as the octave band sound pressure level.
- (2) sound power level Ten times the common logarithm of a value of the total sound power (also called as the sound output) radiated from a sound source divided by the reference sound power (1 pW). The unit is expressed in decibel and symbol dB. In particular, in the case a sound power which has been weighted by A-characteristic specified in JIS C 1505 is taken as the subject, it is called as the A-weighted sound power level, and in the case where the sound power of each octave band specified in JIS C 1513 is taken as the subject, it is called as the octave band sound power level.

Applicable Standards, Corresponding International Standard and Reference Standards: See page 14.

- (3) measurement surface A hypothetical surface which envelopes the objective sound source for measurement and on which microphones are arranged.
- (4) background noise All other sounds than those emitted from the objective sound source for measurement in a measurement sound field.
- (5) reference sound source In a frequency range of measurement, the small sized sound source having an ample and stable output and flat frequency characteristics, and excellent omnidirectivity, of which sound power level has been calibrated, when it has been installed on a reflection surface in accordance with JIS Z 8732.

3. Measuring Instruments

3.1 Sound Pressure Level Measuring Instrument The sound pressure level measuring instrument to be used for measurements shall be that having the performances equal to the performances specified in JIS C 1505 or superior to these.

In addition, the A-weighted frequency circuit shall be the A-weighted frequency correction circuit specified in JIS C 1505.

3.2 Frequency Analyzer The frequency analyzer to be used in the measurement shall be the Type II (octave band) band frequency analyzer specified in JIS C 1513.

3.3 Calibration Method of Sound Pressure Level Measuring Instrument In carrying out the measurements, calibrate the sensitivity of the sound pressure level measuring instrument (including microphone) to be used in the measurements, at one of the frequency in the range of the objective frequencies or not less than that, by the calibrating instrument such as a pistonphone having the accuracy of ± 0.2 dB and others⁽⁴⁾.

Note ⁽⁴⁾ In addition to this, it is necessary to be subjected to a certification or inspection of an official certification organization and the like, as the periodical calibration of the sound pressure level measuring instrument.

4. Measuring Environment

The measuring environment shall be on the flat ground surface of outdoor satisfying the following conditions.

4.1 Acoustic Conditions of Measuring Environment On an acoustically perfect reflection surface, a measuring environment where semi-free sound field without acoustic reflecting substance other than the reflection surface can be obtained is ideal. The size of the reflection surface shall be not less than the dimensions including the bottom surface of the measurement surface which is to be established on that⁽⁵⁾. In the case where measuring environment fails to be ideal, it is necessary to carry out the correction of the measured value of sound power level in accordance with 8.2, obtaining the sound field correction value according to the method specified in Appendix 1.

Furthermore, sound field correction value on the measurement surface to be established for measuring the sound pressure level should preferably be ± 2 dB on all frequency band to carry out measurement.

Note (5) In the case where measurement is carried out in a region where the inverse square rule (see Appendix 1 of JIS Z 8732) has been assured to be effective, on a hard and flat surface of which ground surface is of asphalt or concrete and in outdoor of which surroundings are opened sufficiently, the sound field correction value shall be 0 dB.

4.2 Background Noise On the respective measurement points, where the difference between the sound pressure levels or A-weighted sound pressure levels, when the objective sound source for measurement is working and when it has been stopped, exceeds 10 dB, the influences of the background noise and the self noise of measuring system, hereinafter combination of these is referred to as the "background noise", may be neglected. In the case where this difference is intermediate value of from 6 dB to 10 dB, the sound pressure level which has been measured under the condition where the sound source is working is required to carry out correction as given in Table 1.

In addition, in the case where its difference is less than 6 dB, the measurement shall be considered to be impossible.

Table 1. Correction Values for Background Noises

Unit: dB

Difference between the sound pressure level and the background noise level measured while the machine is running	Correction value to be subtracted from the sound pressure level measured while the machine is running
Less than 6	Measured value shall be invalidated
6	1.0
7	1.0
8	1.0
9	0.5
10	0.5
Exceeding 10	0.0

4.3 Wind The wind velocity at the test site shall be less than 8 m/s. For the wind velocity exceeding 1 m/s, a windscreen shall be equipped to the microphone. In this case, sufficient attention shall be taken to the change on sensitivity due to use of the windscreen.

5. Installation and Running of Machine

Noises emitted from a machine, in many cases, depend not only its support or installing conditions, but also to the running conditions of the machine, so that the general standards regarding the installation and running shall be specified. Detailed matters relating to installation and running in respect to individual type of machine shall be in accordance with each testing method.

5.1 Auxiliary Equipment Regarding the specimen machine, parts which are inseparable with the sound source shall be distinguished from the parts which are considered to be auxiliary for the sound source.

During testing, all of the auxiliary equipments which do not constitute a part of the sound source, but are necessary for running, should preferably be so made that these are not influential to the test results, placing at outside of the test environment or separating acoustically, if possible.

In the case of a machine (for example, a pneumatic tool) having several interchangeable working equipments, it is necessary to carry out tests on the working equipment at least one of the principal use of the machine and on the equipment which produces the largest noise, if possible.

5.2 Running of Machine During measurement of the noises, the machine shall be run by a representative method which is usually used.

In addition, before starting of measurement, the machine shall have attained its stable running conditions.

Regarding detailed matters to be attended on the running of the machine during testing, the testing method corresponding to the machine concerned shall be referred to.

In the testing, it should be preferable to include the noise measurements under one or more of load running conditions. The load running may be carried out under either one of an actual running condition or a simulated one of that. In the case of the machine equipped with an engine, further, the test under no load running (idling) at the rated rotational speed of the engine shall be carried out.

6. Arrangement of Sound Pressure Level Measuring Points

6.1 Establishment of Reference Rectangular Parallelepiped For the reference of establishing the sound pressure level measuring points, firstly the reference rectangular parallelepiped⁽⁶⁾ circumscribing objective sound source for measurement shall be established. In this case, protrusions and the like which are not principal sound radiating bodies may be neglected. On the established reference rectangular parallelepiped, characteristic distance d_0 shall be calculated from the following formula:

$$d_0 = \sqrt{(0.5l_1)^2 + (0.5l_2)^2 + l_3^2} \dots\dots\dots (1)$$

where l_1 : longitudinal length of reference rectangular parallelepiped (m)
 l_2 : lateral length of reference rectangular parallelepiped (m)
 l_3 : height of reference rectangular parallelepiped (m)

Note ⁽⁶⁾ A rectangular parallelepiped to be established for representing the shape and dimensions of the objective sound source for measurement (see Fig. 1), of which bottom surface coincides with the reflection surface.