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Acoustics — Measurement of noise emitted by two-wheeled mopeds in motion — Engineering method

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Acoustique — Mesurage du bruit émis par les cyclomoteurs à deux roues en mouvement — Méthode d'expertise

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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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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International Standard ISO 9645 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

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Acoustics — Measurement of noise emitted by two-wheeled mopeds in motion — Engineering method

1 Scope

This International Standard specifies an engineering method for measuring the noise emitted by two-wheeled mopeds in motion [as defined in ISO 3833[1)]].

The method is designed to meet the requirement of simplicity as far as it is consistent with reproducibility of results and realism in the operating conditions of the moped.

The specifications are intended to reproduce the noise level in urban traffic flow of irregular character, with full use of the engine power available.

NOTE — The test method calls for an acoustical environment which can only be obtained in an extensive open space. Such conditions can usually be provided for

- type approval measurements of mopeds,
- measurements at the manufacturing stage, and
- measurements at official testing stations.

It should be noted that spot checking on the road of mopeds in use can rarely be made in an ideal acoustical environment. If measurements have to be carried out on the road in an acoustical environment which does not fulfil the requirements stated in this International Standard, it should be recognized that the results obtained may deviate appreciably from the results obtained using the specified conditions. A method better fitted to the spot checking on road of mopeds in use will be specified in a future International Standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4164 : 1978, *Road vehicles — Mopeds — Engine test code — Net power.*

ISO 6726 : 1988, *Mopeds and motorcycles with two wheels — Masses — Vocabulary.*

ISO 7116 : 1981, *Road vehicles — Measurement method for the maximum speed of mopeds.*

IEC 651 : 1979, *Sound level meters.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 moped in kerb weight condition : Moped in the condition defined as vehicle kerb mass in ISO 6726.

3.2 maximum design speed: The speed which the moped cannot exceed, measured in accordance with ISO 7116, and stated by the manufacturer.

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4 Interpretation of results

The results obtained by this method give an objective measure of the noise emitted under the conditions of test. However, it is necessary to consider the fact that the subjective appraisal of the annoyance of different classes of motor vehicles is not simply related to the indications of a sound level meter.

The uncertainty of determination of noise emitted by mopeds measured in accordance with this International Standard is within ± 1 dB.

5 Instrumentation

5.1 Instrumentation for acoustical measurements

The sound level meter (or the equivalent measuring system) shall at least meet the requirements of a type 1 instrument in accordance with IEC 651.

The measurements shall be made using the frequency-weighting characteristic A and the time-weighting characteristic F.

The calibration of the sound level meter shall be checked and adjusted in accordance with the manufacturer's instructions or with a standard sound source (for example a pistonphone) at

1) ISO 3833 : 1977, *Road vehicles — Types — Terms and definitions.*

the beginning of the measurements and rechecked and recorded at the end of them. Any deviation shall be recorded in the test report. If this deviation is greater that 1 dB during a series of measurements, the test shall be considered invalid.

If a windscreen is used, it shall be of a type specified by the manufacturer as suitable for the particular microphone. It shall be ascertained from the manufacturer that the use of the windscreen does not influence the accuracy of the sound level meter perceptibly under the conditions of test.

5.2 Instrumentation for speed measurements

The engine speed and the vehicle speed during the approach shall be measured to an accuracy of 3 % or better.

6 Acoustical environment, meteorological conditions and background noise

6.1 Test site

The test site shall be substantially level; the surface of the test track shall be dry and its texture such that it does not cause excessive tyre/road contact noise.

The test site shall be such that, when a small omnidirectional noise source is placed in its surface at point 0 in figure 1, deviations from hemispherical divergence shall not exceed ±1 dB.

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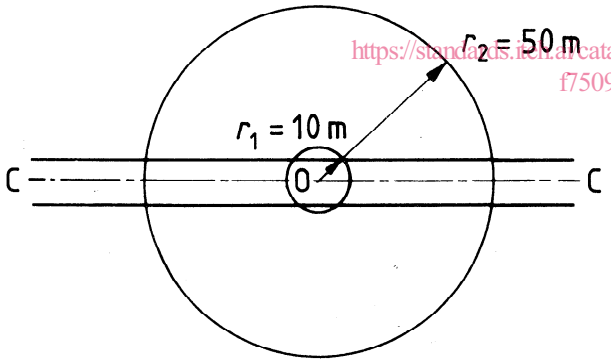


Figure 1 — Test site

This condition is deemed to be satisfied if the following requirements are met:

a) within a radius of 50 m around the centre of the track, the space shall be free of large reflecting objects such as fences, rocks, bridges or buildings;

b) the test track and the surface of the site up to 10 m from the centre 0 of the track shall consist of concrete, asphalt or similar hard material and shall be free from absorbing materials, such as powdery snow, long grass or ashes;

c) in the vicinity of the microphone, there shall be no obstacle that could influence the acoustical field and no person shall remain between the microphone and the noise source. The meter observer shall be positioned so as not to influence the meter reading.

6.2 Meteorological conditions

The measurements shall not be made in adverse weather conditions.

Measurements shall not be carried out if the wind is gusty. Measurements carried out at average wind speeds exceeding 5 m/s at microphone height shall be considered invalid.

6.3 Background noise

The background noise (including any wind noise) shall be at least 10 dB below that produced by the moped under test.

7 Test procedure

7.1 Microphone positions

The distance from the microphone positions to the reference line CC (see figure 2) on the test track shall be 7,5 m ± 0,2 m.

The microphone shall be located 1,2 m ± 0,1 m above ground level. Unless otherwise indicated by the manufacturer of the sound level meter, its reference axis for free field conditions (see IEC 651) shall be horizontal and directed perpendicularly towards the path of the moped (line CC).

Dimensions in metres

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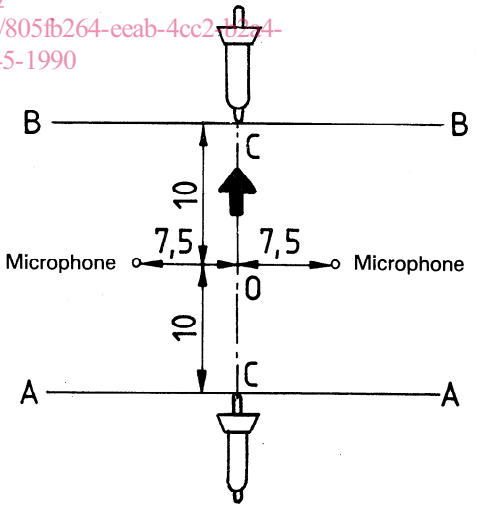


Figure 2 — Microphone positions for measurements

7.2 Number of measurements

At least three measurements shall be made on each side of the moped.

7.3 Readings to be taken

The maximum A-weighted sound pressure level indicated with the time weighting characteristic F during each passage of the moped between the two lines AA and BB (see figure 2) shall

be noted. If a sound peak obviously out of character with the general sound level is observed, the measurement shall be discarded.

The results shall be considered valid if the difference between the extreme values of three consecutive measurements made on the same side of the moped does not exceed 2 dB.

The average of the valid readings for each side of the moped shall be calculated. The higher of the two average values rounded to the nearest half shall constitute the test result.

7.4 Condition of the moped

The moped shall be in kerb mass condition. The total mass of the rider, the instrumentation and, if necessary, the ballast shall be between 70 kg and 80 kg.

The tyres of the moped shall be of the type normally fitted by the manufacturer and shall be inflated to the pressure(s) recommended by the manufacturer for the moped in its test condition.

Before the measurements are started, the engine shall be brought to its normal operating temperature and tuning. It shall be supplied with fuel, sparking plug(s), carburettor(s), as recommended by the manufacturer.

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8 Operating conditions

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8.1 Mopeds with maximum design speed below or equal to 30 km/h

8.1.1 General conditions

The moped shall approach the line AA with its wheels following the line CC as closely as possible, as specified in 8.1.2.1 to 8.1.2.3.

It shall approach the line AA and shall cover the entire distance AA-BB at a uniform speed equal to its maximum design speed.

8.1.2 Special conditions

8.1.2.1 Mopeds without gearbox or with automatic variable transmission without selector

No specific requirement.

8.1.2.2 Mopeds with automatic transmission with selector

The position of the selector recommended by the manufacturer to reach the maximum design speed shall be used.

8.1.2.3 Mopeds with non-automatic gearbox

The highest gear shall be used.

8.2 Mopeds with maximum design speed higher than 30 km/h

8.2.1 General conditions

The moped shall approach the line A with its wheels following the line CC as closely as possible, as specified in 8.2.2.1 to 8.2.2.3.

It shall approach the line AA at a uniform speed of 30 km/h.

When the front of the moped reaches the line AA, the throttle shall be fully opened as rapidly as possible and held fully open until the rear of the moped reaches line BB; the throttle shall then be closed as rapidly as possible.

8.2.2 Special conditions

8.2.2.1 Mopeds without gearbox or with automatic variable transmission without selector

No specific requirement.

8.2.2.2 Mopeds with automatic transmission with selector

The position of the selector recommended by the manufacturer to reach the speed specified in 8.2.1 shall be used.

8.2.2.3 Mopeds with non-automatic gearbox

The highest gear enabling the moped to pass over line AA with an engine speed higher than or equal to 1/2 of the engine speed, n, at which the engine produces its net maximum power, determined in accordance with ISO 4164, shall be selected.

9 Test report

The test report shall include the following information:

a) reference to this International Standard;

b) details of the test site, the testing ground conditions and meteorological conditions;

c) the measurement equipment (including windscreen, if used), and the calibration values obtained before and after the measurements;

d) the A-weighted sound pressure level of the background noise;

e) the identification of the moped, its transmission system and its engine;

f) the maximum design speed of the moped;

g) the engine speed, n, at which the engine produces its net maximum power, determined according to ISO 4164,

h) the transmission gear or the position of the selector used during the test;

i) the vehicle and engine speeds at the line AA;

j) the number of measurements and the A-weighted sound pressure levels recorded, in decibels;

k) the test result.

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