
**Measurement of noise emitted by
accelerating road vehicles — Engineering
method —**

**Part 1:
M and N categories**

*Mesurage du bruit émis par les véhicules routiers en accélération —
Méthode d'expertise —*

Partie 1: Catégories M et N



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 362-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This first edition of ISO 362-1, together with ISO 362-2, cancels and replaces ISO 362:1998 and ISO 7188:1994, which have been technically revised.

ISO 362 consists of the following parts, under the general title *Measurement of noise emitted by accelerating road vehicles — Engineering method*:

- *Part 1: M and N categories*
- *Part 2: L category*

Introduction

An extensive review was conducted of actual in-use vehicle operations, beginning with data from the TUV Automotive study in the early 1990s, and continuing with data developed through other committee members from 1996 through 2000. It includes nearly 100 vehicles operated on a variety of urban roads in Europe and Asia. The primary focus of the in-use measurements was to determine how vehicles are driven with a variety of vehicles, driving behaviours and traffic situations. The in-use behaviour determined from these studies was successfully correlated to urban traffic use in the United States by evaluation of the fuel economy test cycles used by the United States Environmental Protection Agency (USEPA). The resulting test specifications are therefore valid for all global urban use conditions.

The procedure defined here provides a measure of the sound pressure level from vehicles under controlled and repeatable conditions. The definitions have been made according to the needs of vehicle categories. In cases of vehicles other than very heavy trucks and buses, the working group found that attempts to conduct a partial load test as in actual use resulted in considerable run-to-run variability that significantly interfered with the repeatability and reproducibility of the test cycle. Therefore, two primary operating conditions (i.e. a wide-open-throttle acceleration phase, and a constant speed phase) were used to guarantee simplicity. The combination was found to be equivalent to the partial throttle and partial power (engine load) actually used.

As a further consequence of the investigation of the needs for an efficient test, it was decided to design a test which is independent of vehicle design and therefore safe and adaptable for future technologies, as well as for future traffic conditions. The test guarantees an excitation of all relevant noise sources, and the final test result will reflect a combination of these sources as a compromise between normal urban use and “worst case”.

In 2004, the given test for M and N category vehicles was evaluated for technical accuracy and practical considerations by test programmes carried out by the Japan Automobile Standards Internationalization Center (JASIC), the European Automotive Manufacturers Association (ACEA), and the Society of Automotive Engineers, Inc. (SAE) in the United States. Over 180 vehicles were included in these tests. The reports of these test programmes were considered prior to preparation of this part of ISO 362.

This part of ISO 362 was developed following demands for a new test procedure:

- “The test procedure (ISO 362) doesn't reflect realistic driving conditions” (1996 EU Green Paper).
- “In the case of motor vehicles, other factors are also important such as the dominance of tyre noise above quite low speeds (50 km/h)” (1996 EU Green Paper).
- “A new measurement procedure should require that the major noise sources of a vehicle be measured” (2001 Noise Emission of Road Vehicles – I-INCE).

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Measurement of noise emitted by accelerating road vehicles — Engineering method —

Part 1: M and N categories

1 Scope

This part of ISO 362 specifies an engineering method for measuring the noise emitted by road vehicles of categories M and N under typical urban traffic conditions. It excludes vehicles of category L1 and L2, which are covered by ISO 9645, and vehicles of category L3, L4 and L5 covered by ISO 362-2.

The specifications are intended to reproduce the level of noise generated by the principal noise sources during normal driving in urban traffic (see Annex A).

The method is designed to meet the requirements of simplicity as far as they are consistent with reproducibility of results under the operating conditions of the vehicle.

The test method requires an acoustical environment that is only obtained in an extensive open space. Such conditions are usually provided for

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

NOTE 1 The results obtained by this method give an objective measure of the noise emitted under the specified conditions of test. It is necessary to consider the fact that the subjective appraisal of the noise annoyance of different classes of motor vehicles is not simply related to the indications of a sound measurement system. As annoyance is strongly related to personal human perception, physiological human conditions, culture and environmental conditions, there is a large variation and it is therefore not useful as a parameter to describe a specific vehicle condition.

NOTE 2 Spot checks of vehicles chosen at random are rarely made in an ideal acoustical environment. If measurements are carried out on the road in an acoustical environment which does not fulfil the requirements stated in this International Standard, the results obtained can deviate appreciably from the results obtained using the specified conditions.

2 Normative references

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

ISO 1176:1990, *Road vehicles — Masses — Vocabulary and codes*

ISO 2416:1992, *Passenger cars — Mass distribution*

ISO 5725:1994 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 10844:1994, *Acoustics — Specification of test tracks for the purpose of measuring noise emitted by road vehicles*

ISO Guide 98:1995, *Guide to the expression of uncertainty in measurement (GUM)*

IEC 60942:2003, *Electroacoustics — Sound calibrators*

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1176, ISO 2416 and the following apply.

3.1 Vehicle mass

3.1.1

kerb mass

complete shipping mass of a vehicle fitted with all equipment necessary for normal operation plus the mass of the following elements for M1, N1 and M2 having a maximum authorized mass not exceeding 3 500 kg:

- lubricants, coolant (if needed), washer fluid;
- fuel (tank filled to at least 90 % of the capacity specified by the manufacturer);
- other equipment if included as basic parts for the vehicle, such as spare wheel(s), wheel chocks, fire extinguisher(s), spare parts and tool kit

NOTE The definition of kerb mass may vary from country to country, but in this part of ISO 362 it refers to the definition contained in ISO 1176.

3.1.2

maximum authorized mass

kerb mass plus the maximum allowable payload

3.1.3

target mass

actual vehicle mass used during test as determined by Table 3

NOTE Test mass for N2 and N3 vehicles can be lower than the target mass due to axle-loading limitations.

3.1.4

test mass

actual vehicle mass used during test as determined by Table 3

NOTE Test mass for N2 and N3 vehicles can be lower than the target mass due to axle-loading limitations.

3.1.5

unladen vehicle mass

nominal mass of a complete N2, N3 or M2 vehicle having a maximum authorized mass greater than 3 500 kg, or an M3 vehicle as determined by the following conditions:

- a) mass of the vehicle includes the bodywork and all factory-fitted equipment, electrical and auxiliary equipment for normal operation of the vehicle, including liquids, tools, fire extinguisher, standard spare parts, chocks and spare wheel, if fitted;
- b) the fuel tank is filled to at least 90 % of rated capacity and the other liquid-containing systems (except those for used water) are filled to 100 % of the capacity specified by the manufacturer