Third edition
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Acoustics — Engineering method for measurement of noise emitted by accelerating road vehicles —

Part 1:
M and N categories

Acoustique — Méthode d'ingénierie pour le mesurage du bruit émis par les véhicules routiers en accélération —

Partie 1: Catégories M et N

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Foreword

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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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 362-1:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Clarification on the measurement zone to provide equivalent results between hand held sound level meters and digital data acquisition systems.

— Clarification of original intent of ISO 362-1 on M1/N1 gear ratio selection to account for practical lessons learned.

— Clarification and examples of measures used to control vehicle operation so as to provide the specified accelerations of ISO 362-1

— Addition of and clarification of tolerances, measurement precision, vehicle operation, vehicle physical attributes, and calculation methods where multiple interpretations could be possible.

— Addition of a representative virtual vehicle for N3.

— Update to measurement uncertainty.

A list of all parts in the ISO 362 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 requirements 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 requirements for an efficient test, it was decided to design a test which was 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 reflects 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 document.

This document was developed following demands for a new test procedure considering the following:

— “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).

This document, while maintaining the same technical procedures as the previous edition, has been revised based on practical experience to provide additional clarification where multiple interpretations were possible, to provide additional equivalent test modes for heavy commercial vehicles, and to incorporate provisions for addressing and including in the measurement external sound systems for M1 and N1 category vehicles.