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## **Reciprocating internal combustion engines — Exhaust emission measurement —**

### **Part 2: Measurement of gaseous and particulate exhaust emissions under field conditions**

*Moteurs alternatifs à combustion interne — Mesurage des émissions de gaz d'échappement —*

*Partie 2: Mesurage des émissions de gaz et de particules sur site*



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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.

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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC 8, *Exhaust gas emission measurement*.

This third edition cancels and replaces the second edition (ISO 8178-2:2008), which has been technically revised.

The main changes are as follows:

- [Clause 4](#) has been amended to update requirements applicable for discrete-mode steady-state tests in the field when it is intended to either conduct measurements at a single operating point or conduct a weighted cycle-based test, reflecting changes in other parts of the ISO 8178 series;
- [Clause 5](#) has been expanded to set out requirements for measurement of gaseous emissions performance of engines during typical in-service operation under field conditions using portable emission measurement systems (PEMS) and moving average window data evaluation.

A list of all parts in the ISO 8178 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](http://www.iso.org/members.html).

## Introduction

Evaluating emissions from non-road engines is more complicated than the same task for on-road engines due to the diversity of non-road applications. For example, on-road applications primarily consist of moving a load from one point to another on a paved roadway. The constraints of the paved roadways, maximum acceptable pavement loads and maximum allowable grades of fuel, narrow the scope of on-road vehicle and engine sizes.

Non-road engines and vehicles include a wider range of size, including size of the engines that power the equipment. Many of the engines are large enough to preclude the application of test equipment and methods that were acceptable for on-road purposes. In cases where a laboratory test using a dynamometer is not possible, testing at site or under appropriate conditions can be a viable alternative.

Where it is not possible to use a test bed or where information is required on the actual emissions produced by an in-service engine, the site test procedures and calculation methods specified in this document are appropriate. It should be recognized that data obtained under these circumstances may not agree completely with previous or future data, obtained in a laboratory or in the field, due to the variability and uncontrolled nature of testing in the field.