INTERNATIONAL STANDARD

ISO 13766

Second edition
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Earth-moving machinery — Electromagnetic compatibility

Engins de terrassement — Compatibilité électromagnétique

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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 13766 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety requirements and human factors*.

This second edition cancels and replaces the first edition (ISO 13766:1999), which has been technically revised.

Introduction

With the increasing use of electronic devices in areas where earth-moving machinery operates, there is a need to ensure that earth-moving machines are provided with adequate immunity to external electromagnetic fields. As more machines are fitted with electrical and electronic devices, it is necessary to ensure that the emissions of electromagnetic fields from the machines meets acceptable limits.

Electrical and high frequency interference emerge during the normal operation of many parts of an earth-moving machine's devices and systems. They are generated within a large frequency range, with different electrical characteristics and, by conduction and/or radiation, can be imparted to other of the machine's electrical/electronic devices and systems. Narrowband signals, generated by sources of interference inside or outside the machine, can also be coupled in electrical/electronic systems whereby they can influence the normal function of electrical/electronic devices.

Electrostatic discharges are relevant to earth-moving machinery because control elements can be positioned outside the operator's station and potential differences can emerge at contact points. Conducted transients in power supply wiring have to be taken into account because earth-moving machinery often represents open systems and several devices and/or components are combined with one another.

While there are many existing standards for a variety of products and systems, the test method presented in this International Standard provides for the specific test conditions of earth-moving machinery and the "electrical/electronic systems or electronic subassemblies" of earth-moving machines. The test method recognizes that because of the size and usage of earth-moving machinery, the arrangement of the machines in the test facility needs to be responsive to the operating characteristics of these types of machines. This International Standard provides test methods and criteria which are acceptable for earth-moving machinery, considering its unique characteristics and operating parameters.

Because earth-moving machines possess a number of systems that consist of components that can be used on a number of different types of machines, the approach of defining "electrical/electronic systems or electronic subassemblies" for these components is applied for the immunity and emissions test methods. This allows these components to be evaluated by the test method in existing laboratory facilities consisting of specially equipped shielded rooms. When electrical/electronic systems or electronic subassembly tests are conducted, it is necessary to consider the effects of the wiring systems used to connect the subassemblies into the earth-moving machinery. The tests may also be conducted on the machines.

This International Standard is intended to provide the necessary technical specifications for evaluating the electromagnetic performance of earth-moving machinery with respect to government electromagnetic performance laws, directives, rules and/or regulations. Such an example is the European Directive 2004/108/EC.

Earth-moving machinery — Electromagnetic compatibility

1 Scope

This International Standard provides test methods and acceptance criteria for the evaluation of the electromagnetic compatibility of earth-moving machinery as defined in ISO 6165. The following electromagnetic phenomena are evaluated:

— broadband and narrowband electromagnetic interference;

— electromagnetic field immunity test;

— broadband and narrowband interference of electrical/electronic subassemblies;

— electromagnetic field immunity test of electrical/electronic subassemblies;

— electrostatic discharge;

— conducted transients.

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 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 6165:2006, *Earth-moving machinery — Basic types — Vocabulary*

ISO 7637-1:2002, *Road vehicles — Electrical disturbance from conduction and coupling — Part 1: Definitions and general considerations*

ISO 7637-2:2004, *Road vehicles — Electrical disturbances from conduction and coupling — Part 2: Electrical transient conduction along supply lines only*

ISO 10605:2001, *Road vehicles — Test methods for electrical disturbances from electrostatic discharge*

ISO 11451-1:2005, *Road vehicles — Vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology*

ISO 11451-2:2005, *Road vehicles — Vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 2: Off-vehicle radiation sources*

ISO 11452-1:2005, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology*

ISO 11452-2:2004, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy —Part 2: Absorber-lined shielded enclosure*

ISO 11452-3:2001, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 3: Transverse electromagnetic (TEM) cell*

ISO 11452-4:2005, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 4: Bulk current injection (BCI)*

ISO 11452-5:2002, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 5: Stripline*

IEC 60050-161:1998, *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility*

CISPR 12:2004, *Vehicles, boats, and internal combustion engine driven devices — Radio disturbance characteristics — Limits and methods of measurement for the protection of receivers except those installed in the vehicle/boat/device itself or in adjacent vehicles/boats/devices*

CISPR 16-1-1:2006, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus*

CISPR 16-1-4:2004, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-4: Radio disturbance and immunity measuring apparatus — Ancillary equipment — Radiated disturbances*

CISPR 25:2002, *Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices — Limits and methods of measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply

3.1
electromagnetic compatibility
EMC
ability of earth-moving machinery, component, electrical/electronic system or electronic subassembly to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

NOTE Adapted from IEC 60050:1998, 161-01-07.

3.2
electromagnetic disturbance
any electromagnetic phenomenon which may degrade the performance of earth-moving machinery, components, electrical/electronic systems or electronic subassemblies

EXAMPLE An electromagnetic disturbance may be electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

NOTE Adapted from IEC 60050:1998, 161-01-05.

3.3
electromagnetic immunity
ability of earth-moving machinery, components, electrical/electronic systems or electronic subassemblies to perform without degradation in the presence of specific electromagnetic disturbances

NOTE Adapted from IEC 60050:1998, 161-01-20.