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Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria

*Machines agricoles et forestières — Compatibilité électromagnétique —
Méthodes d'essai et critères d'acceptation*



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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

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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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14982 was prepared by Technical Committee ISO/TC 23,
, Subcommittee SC 2, *Common tests*.

Annexes A to E form an integral part of this International Standard. Annexes F to H are for information only.

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Introduction

In the past years more and more electronic devices designed to control, supervise and indicate multiple functions have been used in agricultural machines and tractors. The electrical and electromagnetic environment in which these devices work needs to be taken into consideration.

Electrical and high frequency disturbances emerge during the normal operation of many parts of the machine devices. They are generated within a large frequency range with different electrical characteristics and, by conduction and/or radiation, can be imparted to other electronic devices and systems of the machine.

Narrowband signals generated by sources of interference inside or outside the agricultural machines and tractors can also be coupled in electrical and electronic systems where they can influence the normal function of electrical devices. Sources of narrowband electromagnetic disturbances are, for example, machines with integrated micro-processors.

The elaboration of this International Standard is based upon the Commission Directive 95/54/EC (31 October 1995) "Commission Directive 95/54/EC of 31 October 1995 adapting to technical progress Council Directive 72/245/EEC on the approximation of the laws of the Member States, relating to the suppression of radio interference produced by spark-ignition engines fitted to motor vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type approval of motor vehicles and their trailers". This procedure was chosen due to the large conformity of the disturbance phenomena in many domains (motor vehicles, tractors, self-propelled machinery), similar operation and ambient conditions and the possibility of using the same measuring rig and measuring apparatus. As far as possible, the measuring procedures described in Directive 95/54/EC have been replaced by equivalent internationally standardized measuring procedures. However, it was not possible to refer to International Standards for radiated broadband and narrowband electromagnetic disturbances from machines and for radiated broadband and narrowband electromagnetic disturbances of electrical/electronic sub-assemblies (ESA). Therefore the necessary procedures are described in detail in annexes B, C, D and E. International standardization of the measuring procedures for all types of machines would be desirable for the future.

The electrostatic discharge and the conducted transients are considered to be relevant for agricultural machines and tractors and therefore (in contrast with the Directive 95/54/EC) are included in this International Standard.

Electrostatic discharges are relevant because also control elements can be positioned outside the cabin and potential differences can emerge at contact. Conducted transients have to be taken into account because agricultural machines often represent open systems and several machines are combined with one another. Up to now, however, only conducted transients along supply lines in 12 V- and 24 V-onboard systems have been dealt with. The manufacturer is therefore responsible for ensuring that the equipment may withstand conducted transients which may occur at the switching under load and interactions between systems. Internal cabling and networks should comply with the state of the art. Conducted transients at signal lines have not yet been treated.

This International Standard has been established as a means of achieving conformity with the requirements of the EMC Directive (89/336/EEC) and the EMC requirements of the Machine Directive (89/392/EEC).

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Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria

1 Scope

This International Standard specifies test methods and acceptance criteria for evaluating the electromagnetic compatibility of tractors and all kinds of mobile (including hand-held) agricultural machinery, forestry machinery, landscaping and gardening machinery [referred to hereafter as machine(s)] as supplied by the machine manufacturer. It is applicable to machines and electrical/electronic sub-assemblies (ESA's) which are manufactured after the date of publication of this International Standard.

Electrical/electronic components or sub-assemblies intended for fitting in machines are also within the scope of this standard, except regarding immunity for those parts whose functions are not involved in the direct control and modification of the state of the functions of the machine.

This International Standard is not applicable to machines directly supplied with low voltage current from public electrical mains. Exceptions to machines or electrical/electronic systems or ESA's that may not require testing in accordance with this International Standard are given in clause 7.

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 7637-0:1990, *Road vehicles — Electrical disturbance by conduction and coupling — Part 0: Definitions and general.*

ISO 7637-1:1990, *Road vehicles — Electrical disturbance by conduction and coupling — Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage — Electrical transient conduction along supply lines only.*

ISO 7637-2:1990, *Road vehicles — Electrical disturbance by conduction and coupling — Part 2: Commercial vehicles with nominal 24 V supply voltage — Electrical transient conduction along supply lines only.*

ISO/TR 10605:1994, *Road vehicles — Electrical disturbance from electrostatic discharge.*

ISO 11451-1:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Vehicle test methods — Part 1: General and definitions.*

ISO 11451-2:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Vehicle test methods — Part 2: Off-vehicle radiation source.*

ISO 11452-1:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Component test methods — Part 1: General and definitions.*

ISO 11452-2:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Component test methods — Part 2: Absorber-lined chamber.*

ISO 11452-3:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Component test methods — Part 3: Transverse electromagnetic mode (TEM) cell.*

ISO 11452-4:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Component test methods — Part 4: Bulk current injection (BCI).*

ISO 11452-5:1995, *Road vehicles — Electrical disturbances by narrowband radiated electromagnetic energy — Component test methods — Part 5: Stripline.*

IEC 50-161:1990, *International electrotechnical vocabulary — Chapter 161: Electromagnetic compatibility.*

CISPR 12:1990, *Limits and methods of measurement of radio interference characteristics of vehicles, motor boats, and spark-ignited engine-driven devices.*

CISPR 16-1:1993, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1: Radio disturbance and immunity measuring apparatus.*

3 Definitions

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

3.1

electromagnetic compatibility

ability of a machine or components or a separate technical unit to function satisfactorily in its electromagnetic environment, without introducing intolerable electromagnetic disturbances to anything in that environment

[IEC 50-161:1990, 161-01-07]

3.2

electromagnetic disturbance

any electromagnetic phenomenon which may degrade the performance of a machine or component or separate technical unit

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

[IEC 50-161:1990, 161-01-05]

3.3

electromagnetic immunity

ability of a machine or component or separate technical unit to perform in the presence of specified electromagnetic disturbances without degradation of performance

[IEC 50-161:1990, 161-01-20]

3.4

electromagnetic environment

totality of electromagnetic phenomena existing at a given location

[IEC 50-161:1990, 161-01-01]

3.5

reference limit

limit value with which the production shall conform

3.6

reference antenna

⟨frequency range 30 MHz to 80 MHz⟩ shortened balanced dipole which is a half-wave resonant dipole at 80 MHz frequency [see CISPR 16-1:1993]