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Earth-moving machinery — Machine-control systems (MCS) using electronic components — Performance criteria and tests for functional safety

Engins de terrassement — Systèmes de contrôle-commande utilisant des composants électroniques — Critères et essais de performances de sécurité fonctionnelle

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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 15998 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 3, *Operation and maintenance*.

Introduction

Systems consisting of electrical and/or electronic components have been used for many years to perform safety functions in most application sectors. Computer-based systems, generically referred to as programmable electronic systems (PES), are at present being used in all application sectors to perform non-safety-related and, increasingly, safety-related functions. If computer system technology is to be effectively and safely exploited, it is essential that those responsible for making decisions have sufficient guidance on the safety aspects on which to base these decisions.

This International Standard addresses systems comprising electrical and/or electronic and/or programmable electronic components [electrical/electronic/programmable electronic systems (E/E/PES)] used for functional safety in earth-moving machinery.

In most situations, safety is achieved by a number of protective systems which rely on many technologies (e.g. mechanical, hydraulic, pneumatic, electrical, electronic, programmable electronic). Any safety strategy must therefore consider not only all the elements within an individual system, such as sensors, controlling devices and actuators, but also all the safety-related systems. Therefore, while this International Standard is concerned with safety-related E/E/PES, it could also provide guidance for safety-related systems based on other technologies.

This International Standard

— has been conceived with a rapidly developing technology in mind, with a framework sufficiently robust and comprehensive to meet the demands of that technology,

— provides a method for the development of safety requirement specifications necessary to define the required functional safety for E/E/PES, and

— presents a methodology for specifying the target level of safety integrity for the safety functions to be implemented by the E/E/PES, using a risk-based approach.

Earth-moving machinery — Machine-control systems (MCS) using electronic components — Performance criteria and tests for functional safety

1 Scope

This International Standard specifies performance criteria and tests for functional safety of safety-related machine-control systems (MCS) using electronic components in earth-moving machinery and its equipment, as defined in ISO 6165. The procedures of ECE R79, Annex 6, ISO 13849-1 or IEC 62061 can be used as an alternative, provided verification and testing is carried out by the manufacturer using Clause 7 of this International Standard.

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 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 13766, *Earth-moving machinery — Electromagnetic compatibility*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61508-4:1998, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 4: Definitions and abbreviations*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms, definitions and abbreviations given in IEC 61508-4 and the following apply.

3.1 Terms and definitions

3.1.1
earth-moving machinery
self-propelled or towed machine on wheels, crawlers or legs, having equipment or attachment (working tool), or both, primarily designed to perform excavation, loading, transportation, drilling, spreading, compacting or trenching of earth, rock and other materials

[ISO 6165:2006]