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Earth-moving machinery — Functional safety

Part 5: Tables of performance levels

bsi.

National foreword

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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).

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).

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.

This document was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety, ergonomics and general requirements*.

This first edition, together with ISO 19014-1, ISO 19014-2, ISO 19014-3 and ISO 19014-4, cancels and replaces the first editions (ISO 15998:2008 and ISO/TS 15998-2:2012), which have been technically revised.

The main changes are as follows:

— complete reassessment and associated rewriting of the document, following the process according to ISO 19014-1;

— added detail to assist users in determining if the assessments contained herein are applicable to their product;

— added detail to assist system designers in understanding what hazards and failure types apply to what machine performance level requirements.

A list of all parts in the ISO 19014 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.

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Introduction

This document addresses functional safety of all types of energy systems utilized by earth-moving machinery.

The structure of safety standards in the field of machinery is as follows:

Type-A standards (basis standards) give basic concepts, principles for design and general aspects that can be applied to machinery.

Type-B standards (generic safety standards) deal with one or more safety aspects, or one or more types of safeguards that can be used across a wide range of machinery:

— type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);

— type-B2 standards on safeguards (e.g. two-hands controls, interlocking devices, pressure sensitive devices, guards).

Type-C standards (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

This document is a type C standard as stated in ISO 12100.

This document contains a list of Machine Performance Level requirements (MPL_r) by function and earth-moving machinery type, determined through the process outlined in ISO 19014-1.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e. g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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Earth-moving machinery — Functional safety —

Part 5: Tables of performance levels

1 Scope

This document provides normative tables of machine performance levels required (MPL_r) by common function and type for earth-moving machinery (EMM) as defined in ISO 6165. These MPL_r can then be mapped or applied to safety control systems (SCS) used to control or that affect the functions defined in the table.

The MPL_r in this document are determined through the machine control system safety analysis (MCSSA) process outlined in ISO 19014-1. A brief explanation of how the levels were derived and the associated assumptions are contained herein.

This document is not applicable to EMM manufactured before the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Earth-moving machinery — Basic types – Identification and terms and definitions*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 19014-1, *Earth-moving machinery — Functional safety — Part 1: Methodology to determine safety-related parts of the control system and performance requirements*

ISO 19014-2:2019, *Earth-moving machinery — Functional safety – Part 2: Design and evaluation of hardware and architecture requirements for safety-related parts of the control system*

ISO 19014-3, *Earth-moving machinery — Functional safety — Part 3: Environmental performance and test requirements of electronic and electrical components used in safety-related parts of the control system*

ISO 19014-4, *Earth-moving machinery — Functional safety — Part 4: Design and evaluation of software and data transmission for safety-related parts of the control system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6165, ISO 12100, ISO 19014–1, ISO 19014-2, ISO 19014-3, ISO 19014-4 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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