INTERNATIONAL STANDARD

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Earth-moving machinery — Electrical wires and cables — Principles of identification and marking

Engins de terrassement — Fils et câbles électriques — Principes d'identification et de marquage

Reference number
ISO 9247:1990(E)

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 9247 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

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Introduction

The code identification system presented in this International Standard is a means of facilitating assembly, servicing, trouble-shooting and restoration of electrical circuits within earth-moving machines.

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Earth-moving machinery — Electrical wires and cables — Principles of identification and marking

1 Scope

This International Standard specifies the fundamental items of an identification code system and marking for electrical wires and cables used to connect components in the electrical circuits of earth-moving machines.

It does not cover the wires and cables located within electrical components, e.g. alternator (a.c. generator), relay instrument.

This International Standard applies to earth-moving machinery as defined in ISO 6165.

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 6165:1987, *Earth-moving machinery — Basic types — Vocabulary*.

ISO 6749:1984, *Earth-moving machinery — Preservation and storage*.

3 Definitions

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

3.1 electrical circuit: Number of electrical components connected by cables, leading from the electrical energy source to the functional component(s) and back to the energy source.

3.2 electrical component: Self-contained element intended to store, generate, distribute, alter or consume electrical energy or effect an electrical junction.

3.3 electrical cable: Insulated stranded electrical conductor used to establish a single current path.

3.4 electrical wire: Insulated non-stranded electrical conductor used to establish a single current path.

4 Coding system of electrical wires and cables

Wires and cables shall be identified by numbers, colour, letter symbols or combinations of these, as specified in 4.1 to 4.4.

4.1 Identification numbering

Identification of wires and cables may be by the use of numbers, i.e. numerals and letters. For additional identification, a capital letter shall be combined with the numerals. Letters which could cause possible misreading with numerals shall be omitted, i.e. B, D, I, O, Q.

The identification shall be identical at both ends of each one wire or cable, but each number — or combination of letter and numerals — shall be used only once for a machine. The identification shall be changed either as to the number or letter when an electric wire or cable is routed through an electrical component.

4.2 Identification colour

4.2.1 Identification of wires and cables may be by the use of coloured insulation over the whole length or by coloured banding at each end of the wire or cable. Different colours shall be used for proper identification. If additional identification is required, a colour trace, non-conductive banding or tags, in

contrast to the base colour, shall be used. Colours which are not permanent under environmental conditions, or may possibly cause misinterpretation according to colour or brightness of illumination, shall be omitted.

4.2.2 The identification of the ground negative side (battery negative) is exempted from 4.1 and 4.2.1: the numeral 0, the symbol ⏚ or the colour black should be used. The identification shall be uniform and only be used for negative and grounded conductors.

4.2.3 For wires and cables which carry voltage permanently (live wires) red shall be used as the identification colour. For example, connections from battery to the main switch, main fuse, alternator (a.c. generator), starter motor, a second battery negative terminal, shall be red.

4.3 Identification location

Placement of identification shall be such that bands, tags and colours are readily visible, not confusing, and located in an area within 150 mm of each end of any wire and cable. Bands and tags may be duplicated over the length of the wire and cable, if required.

4.4 Identification durability

The coding shall be an integral part of the insulation or fixed securely to the insulation.

Cable and wire identification shall be protected during painting, maintenance or servicing of machinery so as to ensure legibility, in accordance with ISO 6479.

5 Marking of electrical circuits and/or functional groups

In addition to the identification of wires and cables by the methods given in 4.1 to 4.4, the ease of recognizing electrical circuits and/or functional groups can be improved by the use of the following markings.

Marking of electrical circuit or functional group	Identification of individual wire or cable
First part of number	Second part of number
Capital letter	Number
Identical basic colour	Contrasting colour trace, banding or tag
Identical basic colour	Number and/or capital letter

The marking and coding of wires and cables shall be harmonized with the wiring diagrams provided with each machine. Such diagrams shall show the electrical circuits, identifications of wires, cables and their corresponding connections, nominal cross-section of the conductor of wires and cables, circuit voltage and grounded polarity.

NOTE 1 Graphical symbols relating to electrical components are given in IEC 617, *Graphical symbols for diagrams*.