INTERNATIONAL STANDARD

ISO 6011

Third edition
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Earth-moving machinery — Visual display of machine operation

Engins de terrassement — Affichage visuel des fonctions de l'engin

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Contents

Page

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 6011 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 3, *Operation and maintenance*.

This third edition cancels and replaces the second edition (ISO 6011:1987), which has been technically revised.

Earth-moving machinery — Visual display of machine operation

1 Scope

This International Standard specifies the machine operation functional information to be presented by the visual displays of earth-moving machinery for a seated operator. It is applicable to earth-moving machinery as defined in ISO 6165.

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 5006-1:1991, *Earth-moving machinery — Operator's field of view — Part 1: Test method*

ISO 6165:2001, *Earth-moving machinery — Basic types — Vocabulary*

ISO 6405-1:1991, *Earth-moving machinery — Symbols for operator controls and other displays — Part 1: Common symbols*

3 Terms and definitions

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

3.1
visual display
device that provides readable information to the operator relevant to the status of specific machine functions and operational characteristics

EXAMPLE Gauge, meter, liquid crystal display, light emitting diode.

3.2
sector of vision
SV
geometric shape that is defined from the eye position specified in ISO 5006-1:1991

NOTE The sector is defined forward along the longitudinal axis of the machine, bounded by planes intersecting at the eye point at 23° to the right and left of the longitudinal axis, and by a plane passing through the eye point and radiating forward at 15 ° above the longitudinal axis and a plane passing through the eye point and radiating forward at 40° below the longitudinal axis.

4 Visual display location

4.1 Visual displays

Visual displays shall be distinguishable and should identify the relevancy of the information for continued operation of the machine.

Visual displays to which the operator refers while the machine is being driven shall be located in the operator's sector of vision, as indicated in Table 1 by R-SV (required to be within the sector of vision). If a warning light or audible alarm is used to direct the operator's attention to these visual displays when the functions being monitored are not in the normal operating range (e.g. engine over-speed or low brake stored energy pressure), then the 23° plane location to the right or left of the longitudinal axis of the machine may be increased to 60°.

4.2 Other displays

Other visual displays may be located outside of the sector of vision, but shall be readable from the seated operator position.

5 Visual display information

Visual displays shall provide the information identified by the designation R (required) or R-SV according to Table 1. Visual displays may provide information with the designation O (optional) given in Table 1.

NOTE Should information not be appropriate for a given machine, that information is not required; for example, brake-stored energy pressure for crawler type hydraulic excavators on which braking effort is obtained by blocking the hydraulic line at the hydraulic drive motor.

6 Visual display characteristics

6.1 Characters

The visual display shall provide characters or markings of a size large enough to be read by the seated operator.

Where the visual display is a range, it may be divided into sections by graduations. The number of graduations used should be commensurate with the accuracy required.

6.2 Identification

All visual displays shall be identified by an appropriate method. See ISO 6405-1:1991 for symbols to be used for visual displays in order to identify their function and the units or indication of the function being displayed.

6.3 Illumination

Visual displays shall be sufficiently illuminated for night-time viewing and shall be bright enough to be viewed under sunlight operating conditions. Appropriate shielding may be used to reduce the effect of direct sunlight onto the visual display unit.

7 Colour distinction of visual displays

7.1 Colours

The choice of colours for the background, identification symbols, labelling, graduations and analog pointers shall provide high contrast to facilitate ease of viewing.

7.2 Distinctive colour

Visual displays shall use a distinctive colour based on the function.

7.2.1 Green

Green shall be used to indicate the normal operating range for the function displayed by the visual display.

7.2.2 Red

Red shall be used to indicate abnormal operation of the function displayed by the visual display. A red indication is intended to cause the operator to take corrective action, including stopping the function operation indicated in the display.

7.2.3 Yellow

Yellow may be used for a zone between green and red, if appropriate, to provide this added detail of information, or may be used for visual displays that inform the operator to take action when convenient.

Table 1 — Visual display information

Information displayed	Crawler and wheel loaders	Tractor-dozers	Graders	Scrapers	Rollers/ Landfill compactors	Excavators	Dumpers	Trenchers	Backhoe loaders	Skid-steer loaders
Machine speed (for machines with a travelling speed $\geqslant$ 20 km/h)	O	O	R-SV	R-SV	O	O	R-SV	O	O	O
Engine rotational speed	O	O	O	R-SV	O	O	R-SV	O	O	O
Engine oil pressure	R	R	R	R	R	R	R	R	R	R
Engine coolant temperature	R	R	R	R	R	R	R	R	R	R
Engine fuel level	O	O	O	O	O	O	O	O	O	O
Charging system voltage/amperage	R	R	R	R	R	R	R	R	R	R
Torque converter oil pressure	O	O	O	O	O	O	O	O	O	O
Torque converter oil temperature	R	R	R	R	R	O	R	O	R	O
Transmission oil pressure	O	O	O	O	O	O	O	O	O	O
Transmission oil temperature	O	O	O	O	O	O	O	O	O	O
Brake stored energy pressure	R	R	R-SV	R-SV	R	R	R-SV	O	R	O
Hydraulic oil pressure	O	O	O	O	O	O	O	O	O	O
Hydraulic oil temperature	O	O	O	O	O	O	O	O	O	O
Operating hours	O	O	O	O	O	O	O	O	O	O

For types of earth-moving machinery, see ISO 6165:2001.

Key

R required

R-SV required to be within sector of vision

O optional

ICS 53.100

Price based on 3 pages