

INTERNATIONAL STANDARD

ISO
6011

Second edition
1987-05-01



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Earth-moving machinery — Operating instrumentation

Engins de terrassement — Instruments de bord

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Reference number
ISO 6011 : 1987 (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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6011 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

ISO 6011 was first published in 1978. This second edition cancels and replaces the first edition, the annex of which has been incorporated, in simplified form, into the body of the Standard.

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Earth-moving machinery — Operating instrumentation

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1 Scope

This International Standard specifies the information to be obtained from the instruments on the instrument panel by the operator in his normal position. It also specifies the arrangement and colour distinction of this instrumentation in order to make it possible to operate the machine in a safe and proper way and to maintain it in good operating condition.

Optional requirements in this International Standard are presented in notes to the text and tables.

2 Field of application

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

3 References

ISO 6011:1987

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

ISO 6405, *Earth-moving machinery — Symbols — Operator controls and others*.

4 Instrumentation

4.1 Instruments on the instrument panel shall provide the information specified in table 1. Table 2 presents the optional requirements.

Table 1 – Information obtainable on the instrumentation panel – Mandatory requirements

Information obtainable	Crawler loaders and tractors	Wheel loaders and tractors	Graders	Tractor scrapers	Self-propelled compactors	Excavators	Dumpers
Machine speed			○	○			○
Engine speed (rotational frequency)				○			○
Engine oil pressure	○	○	○	○	○	○	○
Engine coolant temperature	○	○	○	○	○	○	○
Engine fuel pressure							
Amperage and/or voltage	○	○	○	○	○	○	○
Torque converter oil pressure							
Torque converter oil temperature	○	○	○	○	○	○	○
Transmission oil pressure							
Transmission oil temperature							
Brake reservoir pressure		○	○	○	○	○	○
Hydraulic oil pressure							
Hydraulic oil temperature							
Operating hours							

Table 2 – Information obtainable on the instrumentation panel – Optional requirements

Information obtainable	Crawler loaders and tractors	Wheel loaders and tractors	Graders	Tractor scrapers	Self-propelled compactors	Excavators	Dumpers
Machine speed		○			○		
Engine speed (rotational frequency)	○	○	○		○		
Engine oil pressure							
Engine coolant temperature							
Engine fuel pressure	○	○	○	○	○	○	○
Amperage and/or voltage							
Torque converter oil pressure	○	○	○	○	○	○	○
Torque converter oil temperature							
Transmission oil pressure	○	○	○	○	○	○	○
Transmission oil temperature	○	○	○	○	○	○	○
Brake reservoir pressure							
Hydraulic oil pressure	○	○	○	○	○	○	○
Hydraulic oil temperature	○	○	○	○	○	○	○
Operating hours	○	○	○	○	○	○	○

NOTES

1 Information concerning fuel and oil levels, and service time is not included in tables 1 and 2, but this information is required and should be visible for maintenance purposes on all machines having an engine and hydraulic system. However, this information does not necessarily have to appear on the instrument panel.

Information concerning service time is very useful for scheduling preventive maintenance of machines, and it should be provided for each engine.

2 Should information, normally required according to tables 1 and 2, not be appropriate for a given machine, that information is not required; for example, engine coolant temperature for air-cooled engines, or air pressure for machines having no air system.

3 Any instruments (for example, gauges, control lights, warning lamps and tell-tale systems, etc.) which give the desired information practically and keep in step with technical advances may be used.

4.2 All instruments shall be so designed that the operator can read and understand the required information quickly.

4.2.1 The gauge dial size shall be large enough for the operator to read off the relevant information. Where a numerical scale is needed, the simplest scale should be used that will give sufficient information.

4.2.2 All instruments shall be identified by an appropriate method. See ISO 6405 for symbols to be used for instruments in order to identify their function (for example, type of fluid, pressures and temperatures, etc.).

4.2.3 Instruments shall be properly illuminated for night-time operation.

5 Instrument arrangement and marking

5.1 Instruments to which reference is to be made when the machine is being driven (e.g. speedometer, engine tachometer, servicemeter) shall be located in the operator’s direct field of vision (see group 2 in the figure).

5.2 Other instruments such as engine instruments (group 1) (for example, coolant temperature gauge, oil pressure gauge), and power oil transmission instruments (group 3) (for example, pressure gauge, torque converter oil temperature and pressure gauges) shall be located to the right or left of the panel, as illustrated in the figure, unless they are incorporated in combined or complex instruments and gauges with group 2.

5.3 Gauges intended for the instrument panel shall be marked as shown in table 3.

6 Colour distinction of instruments and lamps

The choice of colours for the background, labels, graduation and pointer shall facilitate ease of reading by providing high contrast.

Green shall be used for the normal operating range.

Red shall be used for the stop range.

NOTES

- 1 Green zones may be labelled “normal”.
- 2 Red zones may be labelled “stop”.
- 3 Yellow may be used for the zone before the normal operating range, and may be labelled “subnormal”, preferably within the coloured zone.
- 4 Warning lamps should preferably be the colour red.
- 5 “Service-required” lamps should preferably be yellow in colour.

Table 3 – Marking on gauges

Gauge	Marking	Location
Engine tachometer	Ratio of rotational frequency of the driving shaft to the specified rotational frequency	On the housing surface
Speedometer	Rotational frequency of the driving shaft against the specified speed	On the housing or the face surface of the gauge
Ammeter and voltmeter	Symbols + and -	Near the terminals on the housing or the face surface of the gauge
	Maximum capacity	On the housing surface
Temperature and pressure gauges	Maximum capacity	On the housing surface

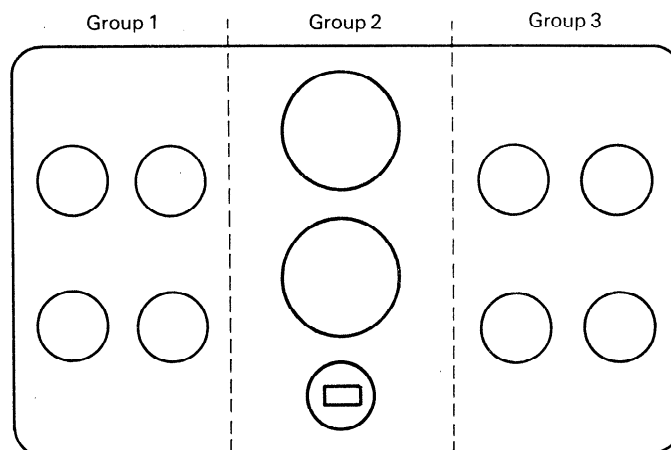


Figure – Example of instrument arrangement

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UDC 621.879-79

Descriptors : earth moving equipment, control equipment, control panels, tell-tales, instruments, specifications, marking.

Price based on 3 pages
