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**INTERNATIONAL STANDARD**



**6011**

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

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## **Earth-moving machinery — Operating instrumentation**

*Engins de terrassement — Instruments de bord*

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

International Standard ISO 6011 was developed by Technical Committee ISO/TC 127, *Earth-moving machinery*, and was circulated to the member bodies in April 1977.

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It has been approved by the member bodies of the following countries :

Australia	Germany	Spain
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Canada	Mexico	U.S.A.
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France	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

U.S.S.R.

# Earth-moving machinery — Operating instrumentation

## 1 SCOPE

This International Standard specifies the information an operator shall be able to obtain from the instrumentation at the instrument panel and the arrangement 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.

For guidance, an annex sets forth specified space envelope, preferred dimensions and dial-face layout of some instruments which are frequently used today.

## 2 FIELD OF APPLICATION

This International Standard applies to the following types of operator-controlled machine :

- crawler loaders and dozers;
- wheel loaders and dozers;
- graders;
- tractor scrapers;
- self-propelled compactors;
- excavators;
- off-highway trucks.

## 3 INSTRUMENTATION

Instrumentation at the instrument panel shall provide information according to table 1.

In the table :

- A = mandatory (where applicable);
- B = optional.

TABLE 1 — Information obtainable

Information obtainable	Crawler loaders and dozers	Wheel loaders and dozers	Graders	Tractor scrapers	Self-propelled compactors	Excavators	Off-highway trucks
Engine speed (rotational frequency)	B	B	B	A	B	—	B
Machine speed	—	B	A	A	B	—	A
Amperage and/or voltage	A	A	A	A	A	A	A
Engine coolant temperature	A	A	A	A	A	A	A
Engine oil pressure	A	A	A	A	A	A	A
Brake air pressure	—	A	A	A	A	A	A
Torque converter oil pressure	B	B	B	B	B	B	B
Torque converter oil temperature	A	A	A	A	A	A	A
Transmission oil pressure	B	B	B	B	B	B	B
Transmission oil temperature	B	B	B	B	B	B	B
Engine fuel pressure	B	B	B	B	B	B	B
Hydraulic oil pressure	B	B	B	B	B	B	B
Hydraulic oil temperature	B	B	B	B	B	B	B

### NOTES

1 Information concerning fuel level and service time are not included in the above table, but are required and should be visible for maintenance purposes on all equipment having an engine. However, location is not required to be on the instrument panel. Information concerning service time is very useful for scheduling preventive maintenance of equipment, and should be provided for each engine.

2 In the event where information normally required, as given in the table, is not 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.

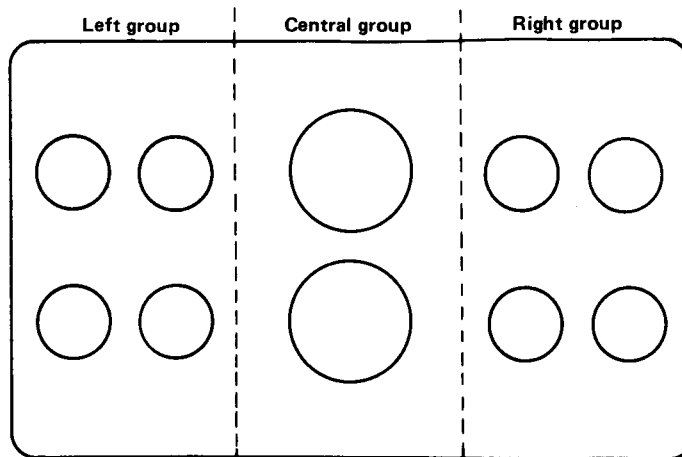
#### 4 ARRANGEMENT OF INSTRUMENTS

The instruments should be divided into groups on the panel as shown in figure 1.

**Left group** : for engines (for example engine water thermometer, oil pressure gauge, etc.)

**Central group** : for driving machines (for example speedometer, engine tachometer, etc.)

**Right group** : for power transmission (for example torque converter oil thermometer, torque converter oil pressure gauge, etc.)



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FIGURE 1 – Instrument arrangement

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ANNEX

SPACE ENVELOPE AND PREFERRED DIMENSIONS OF INSTRUMENTS

This annex sets forth the space envelope, preferred dimensions and dial-face layout of instruments frequently used today at the instrument panel of earth-moving machinery.

The specifications are only given for guidance. Manufacturers are free to use any instrument (for example control light, warning lamp) which gives the desired information in a useful way.

A.1 SPACE ENVELOPE AND PREFERRED DIMENSIONS

A.1.1 Engine tachometer and speedometer

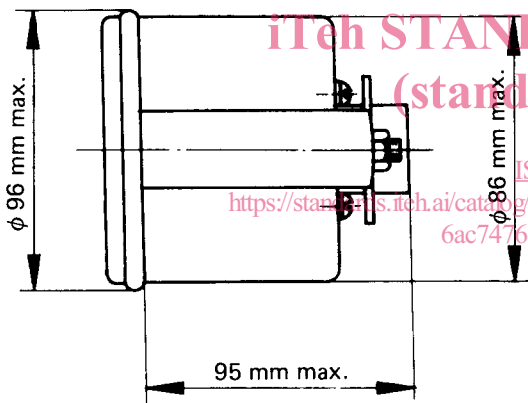


FIGURE 2 – Engine tachometer and speedometer

A.1.2 Instruments other than tachometer and speedometer

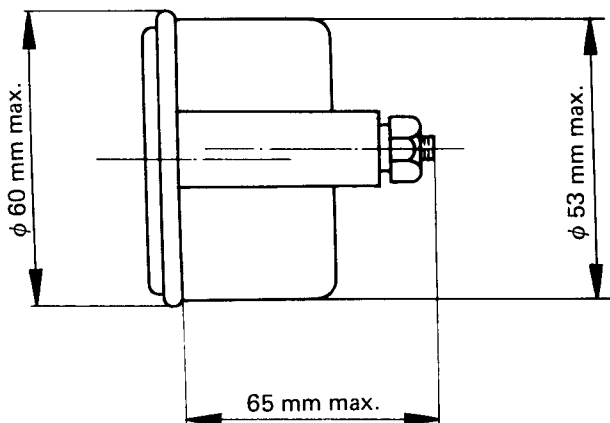


FIGURE 3 – Instruments other than tachometer and speedometer

A.2 DIAL-FACE LAYOUT

A.2.1 Engine tachometer

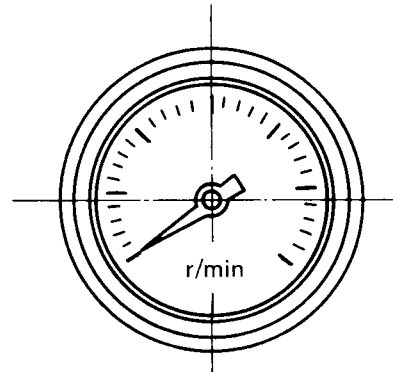


FIGURE 4 – Engine tachometer

A.2.2 Speedometer

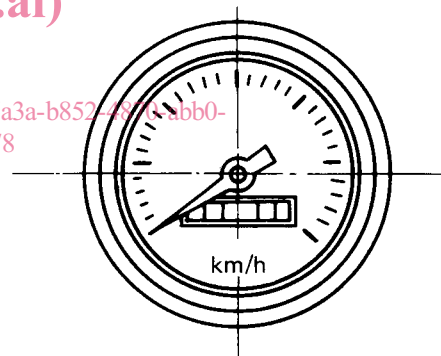


FIGURE 5 – Speedometer

NOTE – Provisionally mph may be shown in addition to Km/h.

A.2.3 Ammeter

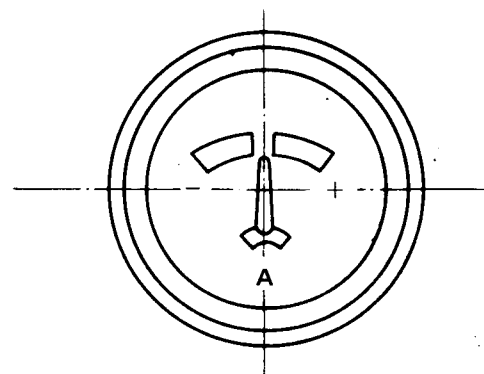


FIGURE 6 – Ammeter

**A.2.4 Voltmeter**

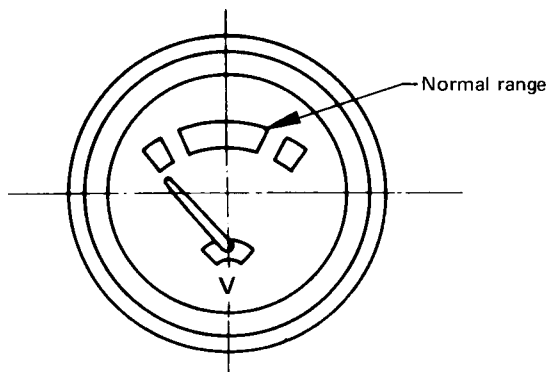


FIGURE 7 – Voltmeter

**A.2.5 Thermometer**

Type of fluid (for example coolant, engine oil) and temperature should be marked on the dial face.

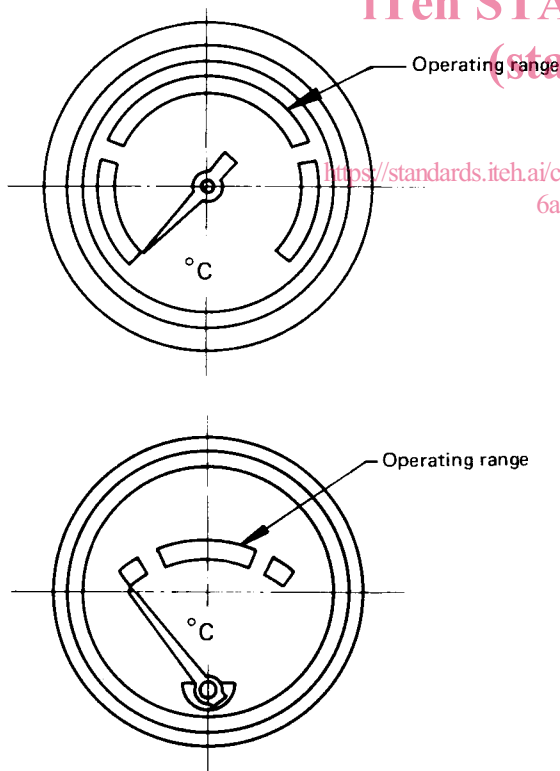


FIGURE 8 – Thermometers

NOTE – Provisionally °F may be shown in addition to °C.

**A.2.6 Pressure gauge**

Type of fluid (for example engine oil, air) and pressure should be marked on the dial face.

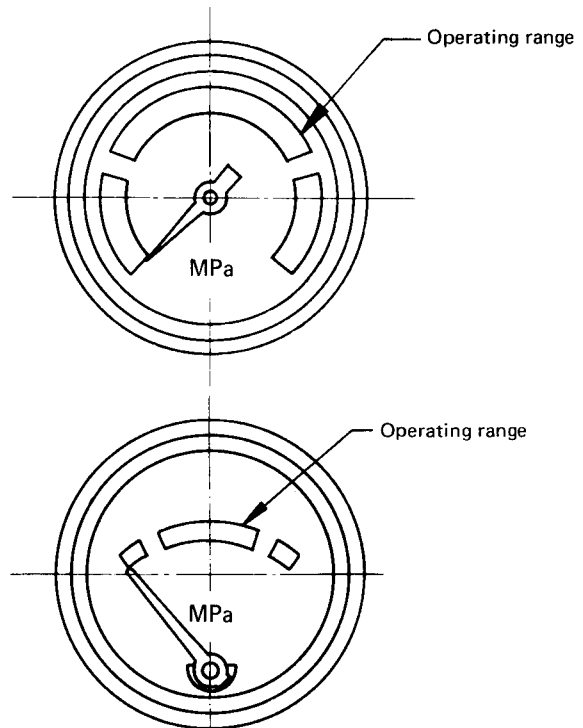


FIGURE 9 – Pressure gauges

NOTE – Provisionally psi may be shown in addition to MPa.

NOTE – When symbols are standardized by ISO/TC 127, the symbols should be used in place of the "type of fluid and temperature or pressure, etc." marked on the dial face.

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**A.3 MARKING – INSTRUMENT HOUSING**

Marking as shown in table 2 should be made on the engine tachometer, speedometer, ammeter, voltmeter, thermometer and pressure gauge intended for the instrument panel of earth-moving machinery.

TABLE 2 – Marking on meters

Meter	Marking	Positioning
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 surface
Ammeter and voltmeter	Symbols + and –	near the terminals on the housing surface
	Maximum capacity	on the housing surface
Thermometer and pressure gauge	Maximum capacity	on the housing surface

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