INTERNATIONAL STANDARD ISO 6012

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Earth-moving machinery — Service instrumentation

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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 6012 was developed by Technical Committee ISO/TC 127, *Earth-moving machinery*, and was circulated to the member bodies in June 1977.

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

Australia	France	South Africa, Rep. of
Austria	Germany	Spain
Belgium	Israel	Sweden
Brazil	Italy	United Kingdom
Canada	Japan	U.S.A.
Chile	Korea, Rep. of	U.S.S.R.
Czechoslovakia	Mexico	Yugoslavia
Egypt, Arab Rep. of	Poland	
Finland	Romania	

No member body expressed disapproval of the document.

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Earth-moving machinery — Service instrumentation

1 SCOPE

This International Standard sets forth, for guidance, a list of diagnostic instruments to check earth-moving machinery at the work site.

The main purpose of this International Standard is to ensure that earth-moving machines be designed with proper accessibility and necessary connections in order to make it possible to perform these checks in an easy way, using portable instruments.

NOTES

1 Service instruments whose utilization involves major machine disassemblies or which are more suitable for use in the workshop are purposely excluded from this list.

2 Diagnostic checks are intended to be carried out by qualified personnel. Relevant specifications and instructions should therefore be included, preferably, in the service manual, rather than in the operator's manual.

2 FIELD OF APPLICATION

This International Standard applies to crawler and wheel tractors, crawler and wheel loaders and hydraulic excavators, but can be easily extended to apply to other basic earth-moving machines such as graders, tractor scrapers and dumpers.

3 TYPES OF CHECKS, INSTRUMENTS AND SCALES

The table specifies for each check the corresponding instruments. The letters in the table have the following meanings :

A = definitely required (when the machine uses these basic elements),

B = desirable, but not definitely required.

The instrument specified for each type of check has been selected from among those most commonly used. Other more sophisticated devices or instruments, if any, can be used as an alternative.

The instrument values or ranges presented in the table are intended to be indicative only and may change with technological progress.

TABLE — **Guide list of diagnostic instruments to check earth-moving machinery at the work site**

Check	Manometer						Tyre manometer	Vacuum meter		Thermometer			Pyro-meter	Timing electronic tester	Flow meter
	bar[1]					bar or mmHg	bar	bar or mH_2O	bar or mmHg	°C			°C		l/s (l/min)
	3	10	50 100	250	400	2 bar or 1 520 mmHg	3 to 10	0,1 bar or 1 mH_2O	1 bar or 760 mmHg	−40 to 100	50 to 130	50 to 200	900		3,3 (200) 8,3 (500)
Engine Valve clearance															
Diesel timing														B	
Cylinder compression															
Engine oil pressure		A													
Intake manifold pressure (supercharged engines)						A									
Exhaust manifold pressure before and after turbine (supercharged engines)						A									
Exhaust manifold temperature before and after turbine (supercharged engines)													A		
Depression after the air cleaner								A							
Cooling fluid temperature											A				
Antifreeze concentration in cooling fluid															
Cooling system sealing															
Engine rotational frequency															
Cold starting cooling fluid temperature										B					
Power train Oil bath clutch luboil pressure	B														
Transmission luboil pressure		B													
Hydraulic reverser control oil pressure			A												
Torque converter oil pressure		A													
Power shift clutch control oil pressure			A												
Engine clutch control oil pressure			A												

1) 1 bar = 10^5 Pa

Engine tachometer	Feeler gauge	Dyna-mometer	Steel tape	Steel rule	Cylinder compressor recorder	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Test pump gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Micrometer	Vernier caliper	Electrical tester 40 V – 500 A – 5 000 Ω	Torque wrenches	Combined template	Outside caliper
min^{-1}		N	m	m	bar			bar				mm		N·m		
5 000		300	10	1	10 to 40			1,6				160		140 420 750		
	A															
					B											
										A						
								B								
A																

TABLE — **Guide list of diagnostic instruments to check earth-moving machinery at the work site** (*continued*)

Check	Manometer						Tyre manometer	Vacuum meter		Thermometer			Pyro-meter	Timing electronic tester	Flow meter
	bar[1]					bar or mmHg	bar	bar or mH_2O	bar or mmHg	°C			°C		l/s (l/min)
	3	10	50 100	250	400	2 bar or 1 520 mmHg	3 to 10	0,1 bar or 1 mH_2O	1 bar or 760 mmHg	−40 to 100	50 to 130	50 to 200	900		3,3 (200) 8,3 (500)
Hydrostatic transmission oil pressure			A	A	A										
Oil flow (applicable to all preceding items)															B
Torque converter oil temperature												A			
Oil bath clutch luboil temperature											B				
Hydraulic reverser oil temperature											A				
Transmission oil temperature											A				
Bevel gear oil temperature											B				
Hydrostatic transmission oil temperature											A				
Brakes Brake control oil pressure			A	A											
Braking servosystem control air pressure		A													
Vacuum boosted brake system underpressure									A						
Steering Steering clutches control oil pressure			A												
Steering power assist control oil pressure				A											
Oil flow (applicable to preceding items)															B
Undercarriage Wear of track components (links, rollers, idlers, etc.)															
Equipment Operation pressure and relief valve setting			A	A	A										
Pressure inside the oil tank		A													

1) 1 bar = 10^5 Pa

	Engine tachometer	Feeler gauge	Dyna-mometer	Steel tape	Steel rule	Cylinder compressor recorder	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Test pump gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Micrometer	Vernier caliper	Electrical tester 40 V – 500 A – 5 000 Ω	Torque wrenches	Combined template	Outside caliper
	min^{-1}		N	m	m	bar			bar				mm		N·m		
	5 000		300	10	1	10 to 40			1,6				160		140 420 750		
				A	A			A								A	A

TABLE – **Guide list of diagnostic instruments to check earth-moving machinery at the work site** (*concluded*)

Check	Manometer						Tyre manometer	Vacuum meter		Thermometer			Pyro-meter	Timing electronic tester	Flow meter
	bar[1]					bar or mmHg	bar	bar or mH_2O	bar or mmHg	°C			°C		l/s (l/min)
	3	10	50 100	250	400	2 bar or 1 520 mmHg	3 to 10	0,1 bar or 1 mH_2O	1 bar or 760 mmHg	−40 to 100	50 to 130	50 to 200	900		3,3 (200) 8,3 (500)
Oil temperature											B				
Oil flow															B
Wheels Tyre pressure[2]							A								
Tyre tread depth															
Electrical plant Battery electrolyte density															
Various tests															
General Bolts and nuts torque															
Various dimensions															
Effort required on the control levers															
Various clearances															

1) 1 bar = 10^5 Pa

2) A tyre inflator can have the same range of 3 to 10 bar as the tyre pressure manometer.

	Engine tachometer	Feeler gauge	Dyna-mometer	Steel tape	Steel rule	Cylinder compressor recorder	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Test pump gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Micrometer	Vernier caliper	Electrical tester 40 V – 500 A – 5 000 Ω	Torque wrenches	Combined template	Outside caliper
	min^{-1}		N	m	m	bar			bar				mm		N·m		
	5 000		300	10	1	10 to 40			1,6				160		140 420 750		
							B	A									
										A							
														A			
															A		
				A	A								A				
			A														
												B					