INTERNATIONAL STANDARD

ISO 6012

Third edition
1989-11-01

Earth-moving machinery — Service instrumentation

Engins de terrassement — Instruments pour l'entretien

Reference number
ISO 6012 : 1989 (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 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 6012 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

This third edition cancels and replaces the second edition (ISO 6012: 1982), and incorporates draft Addendum 1: 1986.

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Printed in Switzerland

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 use of which 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.

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

Table 1 specifies the corresponding instruments for each check. The letters in table 1 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 alternatives.

The instrument values or ranges presented in table 1 are intended to be indicative only and may change with technological progress.

Table 1 — Guide list of diagnostic instruments to check

Check	Pressure gauge						Tyre pressure gauge	Vacuum meter		Thermometer			Pyro-meter	Timing electronic tester	Flow meter
	MPa[1]					MPa or mmHg	MPa	MPa or mH_2O	MPa or mmHg	°C			°C		l/s (l/min)
	0,3	1	5 10	25	40	0,2 MPa or 1 520 mmHg	0,1 to 1	0,01 MPa or 1 mH_2O	0,1 MPa 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															
Fuel injection pressure															
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)													B		
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												

1) 1 MPa = 10 bar

earth-moving machinery at the work-site

Engine tacho-meter	Feeler gauge	Spring scale	Steel tape	Steel rule	Cylinder com-pression gauge	Fuel nozzle tester	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Pump and gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Vernier caliper	Electrical tester 40 V/500 A/5 000 Ω	Torque wren-ches	Combined template	Outside caliper
min^{-1}		N	m	m	MPa	MPa			MPa			mm		N·m		
5 000		300	10	1	1 to 4	25 to 40			0,16			160		140 420 750		
	A															
					B											
						B										
											A					
									B							
A																

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Check	Pressure gauge						Tyre pressure gauge	Vacuum meter		Thermometer			Pyro-meter	Timing electronic tester	Flow meter
	MPa[1]					MPa or mmHg	MPa	MPa or mH_2O	MPa or mmHg	°C			°C		l/s (l/min)
	0,3	1	5 10	25	40	0,2 MPa or 1 520 mmHg	0,1 to 1	0,01 MPa or 1 mH_2O	0,1 MPa or 760 mmHg	−40 to 100	50 to 130	50 to 200	900		3,3 (200) 8,3 (500)
Engine clutch control oil pressure			A												
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 oil control pressure			A	A											
Braking servosystem control air pressure		A													
Vacuum boosted brake system under pressure									A						
Steering															
Steering clutches control oil pressure			A												
Steering power assistance control oil pressure				A											
Oil flow (applicable to preceding items)															B
Undercarriage															
Wear of track components (links, rollers, idlers, etc.)															

1) 1 MPa = 10 bar

earth-moving machinery at the work-site (*continued*)

Engine tacho-meter	Feeler gauge	Spring scale	Steel tape	Steel rule	Cylinder com-pression gauge	Fuel nozzle tester	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Pump and gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Vernier caliper	Electrical tester 40 V/500 A/5 000 Ω	Torque wren-ches	Combined template	Outside caliper
min^{-1}		N	m	m	MPa	MPa			MPa			mm		N·m		
5 000		300	10	1	1 to 4	25 to 40			0,16			160		140 420 750		
			A	A				A							A	A

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	MPa[1]					MPa or mmHg	MPa	MPa or mH_2O	MPa or mmHg	°C			°C		l/s (l/min)	
	0,3	1	5 10	25	40	0,2 MPa or 1 520 mmHg	0,1 to 1	0,01 MPa or 1 mH_2O	0,1 MPa or 760 mmHg	−40 to 100	50 to 130	50 to 200	900		3,3 (200) 8,3 (500)	
Equipment																
Operation pressure and relief valve setting			A	A	A											
Pressure inside the oil tank		A														
Oil temperature											B					
Oil flow															B	
Wheels																
Tyre pressure[2]							A									
Tyre tread depth																
Electrical plant																
Battery electrolyte density																
Battery voltage and various tests																
General																
Bolts and nuts torque																
Various dimensions																
Effort required on the control levers																
Various clearances																

1) 1 MPa = 10 bar

2) The tyre pressure gauge may have a dual gauge, for example MPa and bar or psi, reflecting the local units. A tyre inflator can have the same range as 0,3 MPa to 1 MPa as the tyre pressure gauge.

earth-moving machinery at the work-site (*concluded*)

Engine tacho-meter	Feeler gauge	Spring scale	Steel tape	Steel rule	Cylinder com-pression gauge	Fuel nozzle tester	Tyre tread depth gauge	Depth gauge 180 mm with 1/20 scale slider	Pump and gauge	Battery hydrometer	Hydrometer-thermometer for fluid concentration	Vernier caliper	Electrical tester 40 V/500 A/5 000 Ω	Torque wren-ches	Combined template	Outside caliper
min^{-1}		N	m	m	MPa	MPa			MPa			mm		N·m		
5 000		300	10	1	1 to 4	25 to 40			0,16			160		140 420 750		
							B	A								
										B						
													A			
														A		
			A									A				
		A														
	B											A				