

Shop Manual

WA270-3

WA270PT-3

Wheel Loader

WA270-3

WA270PT-3

Serial-no.

WA270H20051 and up

WA270H30051 and up

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KOMATSU

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00 SAFETY

Safety Notice

Important Safety Notice

Proper service and repair is extremely important for safe machine operation. Some of the described service and repair techniques require the use of tools specially designed by Komatsu for the specific purpose.

To prevent injury to workers, the symbol  is used to mark safety precautions in this manual. The cautions accompanying these symbols must always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

General Precautions

Mistakes in operation are extremely dangerous. Read the OPERATION AND MAINTENANCE MANUAL carefully before operating the machine! Always follow the safety rules valid in your country carefully!

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
 - Always wear safety glasses when hitting parts with a hammer.
 - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Never smoke while working. Smoke only in the areas provided for smoking.

Preparations for Work

7. Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
8. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground and install the safety bar on the frame. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work..
10. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

Precautions during Work

11. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
12. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.
Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.
13. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned.
Wait for the oil and water to cool before carrying out any work on the oil or water circuits.
14. Before starting work, remove the leads from the battery. Always remove the lead from the negative (-) terminal first.
15. When raising heavy components, use a hoist or crane.
Check that the wire rope, chains and hooks are free from damage.
Always use lifting equipment which has ample capacity.
Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part.
Do not work with any part still raised by the hoist or crane.
16. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.
17. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
18. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.
19. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts. Do not smoke!
20. Be sure to assemble all parts again in their original places.
Replace any damaged parts with new parts.
 - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.
21. When installing high pressure hoses, make sure that they are not twisted.
Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also, check that connecting parts are correctly installed.
22. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
23. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

Foreword

General

This shop manual has been prepared as an aid to improve the quality of repairs by giving the service personnel an accurate understanding of the product and by showing them the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following chapters; these chapters are further divided into the each main group of components:

Structure and Function

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

Testing and Adjusting

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs. Troubleshooting charts correlating "Problems" to "Causes" are also included in this section.

Disassembly and Assembly

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

Maintenance Standard

This section gives the judgement standards when inspecting disassembled parts.

NOTE: The specifications contained in this shop manual are subject to change at any time and without any advance notice. Use the specifications given in the book with the latest date.

How to Read the Shop Manual

Volumes

Shop manuals are issued as a guide to carrying out repairs.

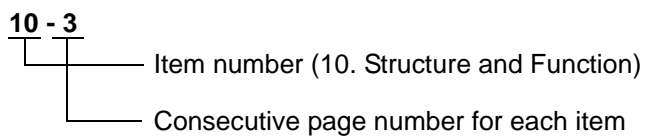
Distribution and Updating

Any additions, amendments or other changes will be sent to Komatsu distributors. Get the most up-to-date information before you start any work.

Filing Method

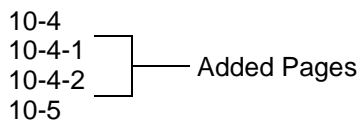
1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number.

Example 1 (Chassis volume):



3. Additional pages: Additional pages are indicated by a hyphen (-) and number after the page number. File as in the example.

Example:



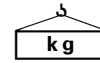
Symbols

So that the shop manual can be of ample practical use, important safety and quality portions are marked with the following symbols:

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts of systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants, etc.
	Oil, water	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

Hoisting Instructions

! Heavy parts (25kg or more) must be lifted with a hoist, etc. In the DISASSEMBLY AND ASSEMBLY section, every part weighing 25 kg or more is indicated clearly with the symbol:



If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:

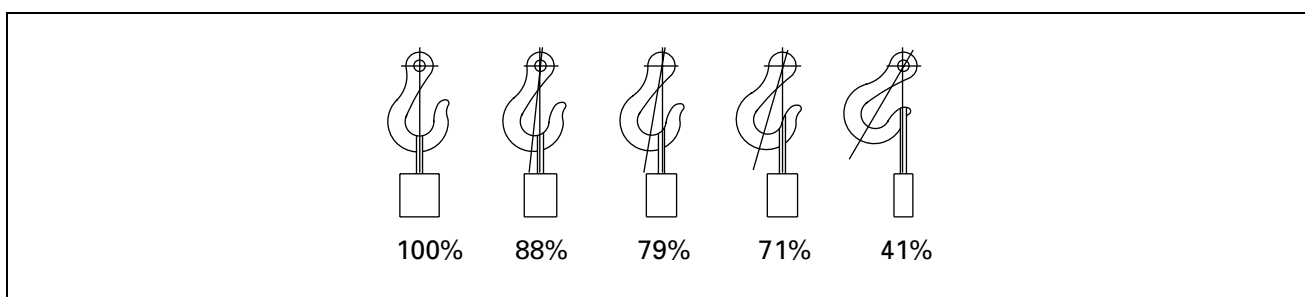
1. Check for removal of all bolts fastening the part to the relative parts.
2. Check for existence of another part causing interference with the part to be removed.

Wire Ropes

1. Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:
 - ★ The allowable load in tons, is given by vertical tensile force.
 - ★ The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

Wire ropes: (Standard "Z" or "S" twist ropes without galvanizing)	
Rope diameter (mm)	Allowable load (tons)
10	1.0
11.2	1.4
12.5	1.6
14	2.2
16	2.8
18	3.6
20	4.4
22.4	5.6
30	10.0
40	18.0
50	28.0
60	40.0

2. Sling wire ropes from the middle portion of the hook.
Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



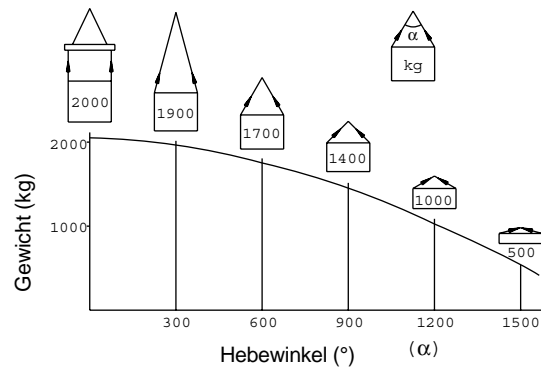
3. Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.

⚠ Slings with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.

4. Do not sling a heavy load with ropes forming a wide hanging angle from the hook.
When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles.

The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles.

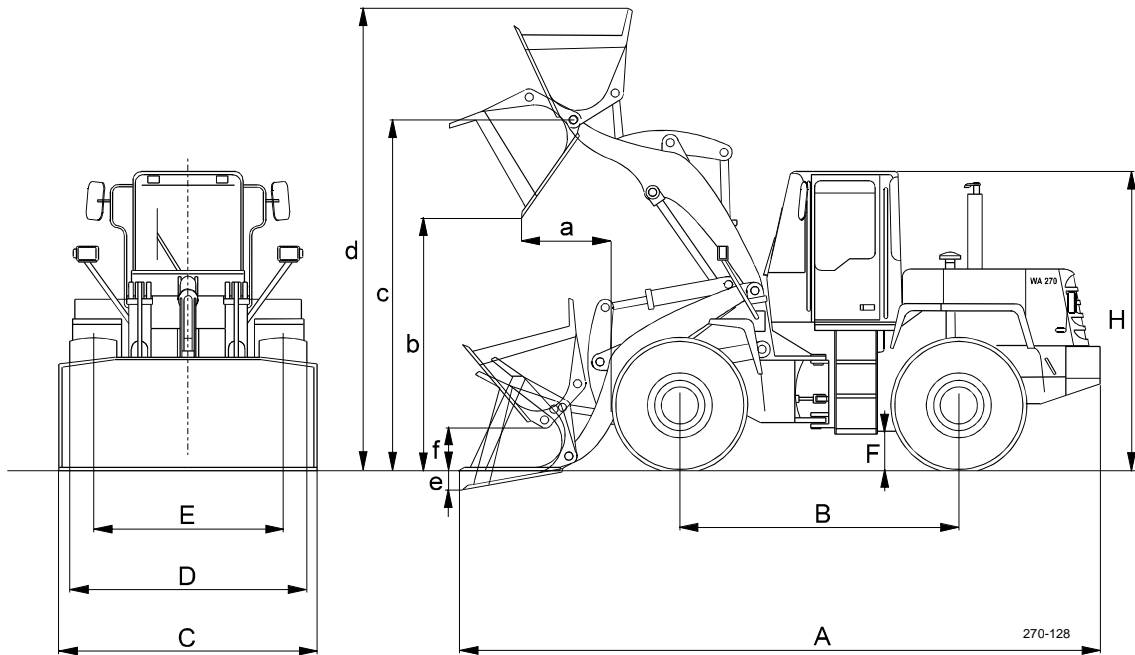
When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°.



01 GENERAL

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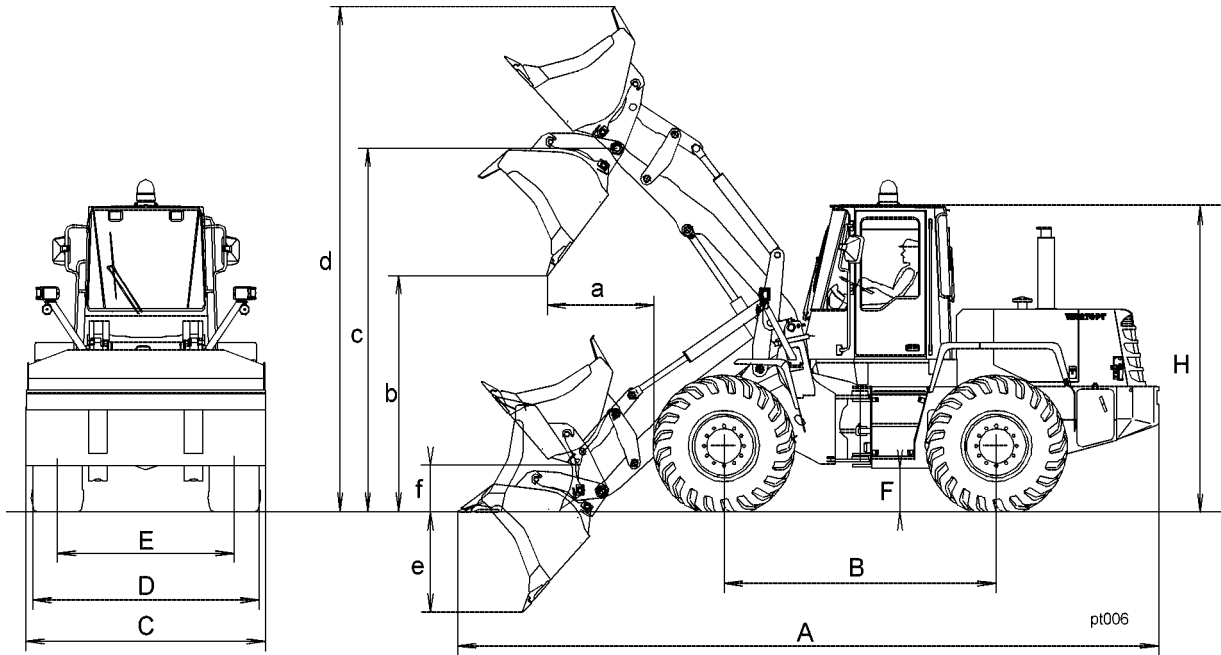
WA270-3



Dimensions, Operating Data				
Buckets (capacities in accordance with ISO 7546)	m³	2.1	2.4	
Specific density	t/m ³	1.8	1.6	
Bucket weight without teeth	kg	950	1,050	
Static tipping weight, straight	kg	9,800	9,600	
Stat. tipping weight, 40° articulated	kg	8,600	8,500	
Breakout force, hydraulic	kN	107	101	
Hydraulic lifting capacity, on ground	kN	112	110	
Operating weight	kg	12,300	12,350	
a Reach at full lift at 45°	mm	950	1.000	
b Dumping height at 45°	mm	2,900	2,860	
c Lift height, hinge pin	mm	3,78	3,782	The 2.1/2.4 m ³ standard buckets shown in the table can also be delivered with bolt-on cutting edges, 2.2/2.5 m ³ .
d Height at bucket upper edge	mm	5,075	5,075	
e Digging depth, 0°	mm	27	27	
f Carry height, hinge pin	mm	460	460	
A Overall length	mm	7,060	7,120	
B Wheelbase	mm	2,900	2,900	Special buckets: 3.4 m ³ light material bucket
C Bucket width	mm	2,550	2,550	These values refer to 20,5 R25 tyres.
D Width over tyres	mm	2,440	2,440	
E Track width	mm	1,880	1,880	
F Ground clearance	mm	460	460	Machine without additional counterweight
H Overall height	mm	3,250	3,250	

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WA270PT-3



Dimensions, Operating Data

Buckets (capacities in accordance with ISO 7546)	m³	2,0		
Specific density	t/m ³	1.75		
Bucket weight without teeth	kg	800		
Static tipping weight, straight	kg	8200		
Stat. tipping weight, 40° articulated	kg	7400		
Breakout force, hydraulic	kN	96		
Hydraulic lifting capacity, on ground	kN	99		
Operating weight *)	kg	12700		
a Reach at full lift at 45°	mm	1188		
b Dumping height at 45°	mm	2726		
c Lift height, hinge pin	mm	3838		
d Height at bucket upper edge	mm	5385		
e Digging depth, 0°	mm	126		
f Carry height, hinge pin	mm	332		
A Overall length	mm	7060		
B Wheelbase	mm	2900		
C Bucket width	mm	2500		These values refer to machines with 20,5 R25 tyres.
D Width over tyres	mm	2440		
E Track width	mm	1880		
F Ground clearance	mm	460		*) Machine without additional counterweight
H Overall height	mm	3250		

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SPECIFICATIONS

Machine model		WA270-3	WA270PT-3
From Serial No.		WA270H20051	WA270H30051
Engine	Model	Komatsu S6D102E-1	
	Type	4-cycle, water-cooled, in-line, 6-cylinder, direct injection, with turbocharger	
	No. of cylinders – bore x stroke (mm)	6 – 102 x 120	
	Piston displacement (cm ³)	5.900	
	Flywheel horsepower (kW (PS))	103,5 (141)	
	Maximum torque (Nm / rpm)	566 / 1,600	
	Starting motor	24 V	
	Alternator	24 V	
Power train	Battery	12 V x 2 / 105Ah	
	Rim pull	108 kN	
	Torque converter	3-element, 1-stage, single-phase (30H046)	
	Transmission	Automatic 4-gear (Full-power-shift) with kick-down	
	Reduction gear	Spiral bevel gear	
	Differential	Limited slip differential	
	Final drive	Planetary gear single stage	
	Drive type	Front-, rear-wheel drive	
Axle, wheel	Tire	20.5R25	
	Turning circle	Inside tire 5243 mm Outside Bucket 5757 mm	
Brakes	Main brake	Hydraulic operated brake with accumulator Wet type disc brakes	
	Parking brake up to serial-no. WA270H21037 from serial-no. WA270H21038	Mechanical operated drum brake Mechanical operated disc brake	

Machine model		WA270-3		
Serial No.		WA270H20051 and up		
Steering system	Type	Articulated steering		
	Structure	Hydrostatic		
Hydraulic pumps		Work- and Steering-/Switch/Brake- and Servo pump		
Delivery (l/min.)		110 / 94 / 21		
Hydraulic system	Control valve	Set pressure for work equipment (bar)	3-spool type 210	
		Cut-off pressure (bar)	165	
		Set pressure for steering (bar)	Orbit-roll valve type 200	
	Cylinder	Boom cylinder No. – bore x stroke (mm)	Reciprocating piston 2 – 130 x 723	
		Bucket cylinder No. – bore x stroke (mm)	Reciprocating piston 1 – 150 x 507	
		Steering cylinder No. – bore x stroke (mm)	2 – 75 x 337	
Work equipment	Work equipment lever type	Single lever		
Travel speed	Travel speed	FORWARD	1. 7,2 km/h 2. 12,7 km/h 3. 27,2 km/h 4. 41,8 km/h	
		REVERSE	1. 7,2 km/h 2. 12,7 km/h 3. 27,2 km/h	
Weights	Operating weight	11.900 kg		

Machine model		WA270PT-3		
Serial No.		WA270H30051 and up		
Steering system	Type	Articulated steering		
	Structure	Hydrostatic		
Hydraulic system	Hydraulic pumps	Work hydraulic pump / Servo pump		
	Delivery (l/min.)	175 / 23		
	Control valve	Set pressure for work equipment (bar)	210	
		Set pressure for steering (bar)	180	
	Cylinder	Boom cylinder No. – bore x stroke (mm)	Reciprocating piston 2 – 120 x 714	
Bucket cylinder No. – bore x stroke (mm)		Reciprocating piston 2 – 110 x 800		
Steering cylinder No. – bore x stroke (mm)		2 – 75 x 337		
Work equipment	Work equipment lever type	Single lever Two lever Multi function lever		
Travel speed	Travel speed	FORWARD	1. 7,2 km/h 2. 12,7 km/h 3. 27,2 km/h 4. 41,8 km/h	
		REVERSE	1. 7,2 km/h 2. 12,7 km/h 3. 27,2 km/h	
Weights	Operating weight	12,700 kg		

WEIGHT TABLE WA270-3


 This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model	WA270-3
From Serial No.	WA270H20051
Engine	453
Radiator	
Transmission	285
Center drive shaft	10.5
Front drive shaft	12.3
Rear drive shaft	22.0
Front axle	672
Rear axle	680
Axle pivot	67.0
Wheel (each)	
Tire (each)	
Orbit-roll valve	10.0
Priority valve	7.5
Steering cylinder (each)	
Hydraulic tank	116.5
Main control valve	

Machine model	WA270-3
From Serial No.	WA270H20051
Boom cylinder (each)	
Bucket cylinder	
Engine hood	85.0
Front frame	990
Rear frame	707.5
Bucket link	46
Bellcrank	257
Boom (including bushing)	854
Bucket (with BOC)	910
Counterweight	1238
Fuel tank	180
Battery (each)	29.0
Cab	410
Operator's seat	45
Hydraulic pump	

WEIGHT TABLE WA270PT-3

 This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model	WA270PT-3
From Serial No.	WA270H30051
Engine	460
Radiator	
Transmission	380
Center drive shaft	10.5
Front drive shaft	12.3
Rear drive shaft	22.0
Front axle	672
Rear axle	680
Axle pivot	67.0
Wheel (each)	
Tire (each)	
Orbit-roll valve	10.0
Priority valve	7.5
Steering cylinder (each)	
Hydraulic tank	116.5
Main control valve	

Machine model	WA270PT-3
From Serial No.	WA270H30051
Boom cylinder (each)	85.0
Bucket cylinder	67.5
Engine hood	85.0
Front frame	990
Rear frame	707.5
Bucket link	30.0
Bellcrank	46.1
Boom	532
Bucket 2.0 m ³	910
Counterweight	1238
Fuel tank	180
Battery (each)	29.0
Cab	410
Operator's seat	45
Quick coupler	300
Hydraulic pump	

LUBRICANTS AND OPERATING EQUIPMENT

WA270-3 WA270PT-3	LUBRICANTS AND OPERATING EQUIPMENT BI abbreviations *), specifications and filling quantities					
	Lubricants and operating equipment	BI abbreviation	Quality class	Temperature range	Viscosity class	Filling quantity in litres (approx.)
Engine	EO engine oil	EO 1540 A EO 1030 A NRS	CCMC D4 or, if not available, API CE or API CF -4 ²⁾	-10° to 50°C -25° to 20°C -40° to 20°C	SAE 15W-40 ¹⁾ SAE 10W-30 SAE 05W-30	16
Transmission	EO engine oil	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	17
Axles with multi-disc locking differential	GO gearbox oil	GO 90 LS	API GL5+LS	-	SAE 90 ¹⁾ SAE 85W-90 SAE 80W-90	2x25.5
Hydraulic system, steering, brakes	HYD hydraulic oil	HYD 0530	HVLP, HVLP D	-35° to 50°C	ISO VG 46 ¹⁾	120
	or EO engine oil	EO 10	CCMC D4 or, if not available, API CD	-35° to 40°C	SAE 10W	
	or BIO-E-HYD hydraulic oil	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° to 50°C	ISO VG 46	
Cooling system	SP-C long-term coolant with anti-frost and rust protection	SP-C	Anti-frost and rust protection			56
Fuel tank	Diesel fuel ³⁾	CFPP class B CFPP class D CFPP class E CFPP class F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to -20°C		185
Grease nipples, central lubrication	Multi-purpose grease on a lithium basis	MPG-A	KP2N-20	-	NLGI 2	
Air-conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (Polyalcohol glycol oil)			1000 g 150 cm ³

The specified filling capacities are approximate guidelines; test specifications are binding. The selection of the viscosity class depends on the predominantly existing outside temperature. The temperature limits are to be regarded as guidelines which can be exceeded up or down for a brief period.

*) Works filling ***) Top-up quantity

²⁾ If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

³⁾ If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal. With a sulphur content of more than 1.0 %, the oil change interval must be 1/4 normal.

****) BI codes are the "standard lubricants" for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V. (BI). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (Standard Lubricants for Construction Machinery and Vehicles" can be obtained from bookstores or Bauverlag GmbH, Wiesbaden and Berlin, under the ISBN no. 3-7625-3102-1.

MAINTENANCE SCHEDULE

CHECKLIST PRIOR TO STARTING UP

Checking coolant level, top up
 Checking engine oil level, top up
 Water separator, drain water and dirt deposits
 Fuel filter, drain water
 Checking drive belts
 Checking fan
 Checking electrical connections
 Checking fuel level, top-up
 Checking control panels
 Checking parking brake
 Checking service brake
 Checking horn and reversing horn
 Checking lighting for function, dirt and damage
 Checking exhaust, exhaust gas colour and exhaust noise
 Checking measuring instruments
 Checking steering wheel play and function
 Checking rear-view mirror for alignment, dirt and damage

INITIAL MAINTENANCE

AFTER THE FIRST 100 OPERATING HOURS

Transmission, change oil and filters
 Service brake, change oil filter

AFTER THE FIRST 250 OPERATING HOURS

Fuel tank, drain water
 Fuel filter, change cartridges
 Hydraulic system, change oil filter elements

AFTER THE FIRST 500 OPERATING HOURS

Axles, oil change

REGULAR MAINTENANCE

EVERY 100 OPERATING HOURS

Hydraulic system, checking oil level, top up
 Cleaning fresh-air filter elements
 Lubrication: Rear axle bolts (2 points)

EVERY 250 OPERATING HOURS

Engine, change oil and oil filter cartridge
 (at least every 6 months)
 Checking air induction system
 Air-conditioning, check tension of the compressor
 Van-belt
 Batteries, check
 Axles, check oil levels
 Wheel nuts, check, retighten
 Lubrication:

1. Bucket bolts (2 points)
2. Tilt rod bolts (2 points)
3. Tilt cylinder bolts (2 points)
4. Lift cylinder bolts (4 points)
5. Boom bolts (2 points)
6. Bucket tilt lever bolts(1point)
7. Steering cylinder bolts (4 points)

EVERY 500 OPERATING HOURS

Fuel filter, change filter cartridges
 Cooling system, check antifreeze in coolant

EVERY 1000 OPERATING HOURS

Transmission, change oil and oil filter
 (at least every 12 months)
 Engine, check valve clearance
 Service brake, change oil filter
 Drive belts, check tension pulley and fan bearing
 Turbocharger, check mounts and play
 Axles, oil change (at least every 12 months)

Lubrication:

1. Pivot steering (2 points)
2. Propeller shaft intermediate bearing (1 point)
3. Universal joint on front cardan shaft (5 points)

EVERY 2000 OPERATING HOURS

Cooling system, changing coolant and cleaning interior (at least every 24 months)
 Check vibration absorber
 Check turbocharger and clean
 Check three-phase generator and starter
 Air-conditioning, change filter elements
 Pressure tank, check gas pressure
 Hydraulic system, oil change, change filter element (at least every 12 months)

EVERY 4000 OPERATING HOURS

Check water pump

MAINTENANCE AS REQUIRED

Air filter: Installation and removal of filter elements, cleaning filter elements, changing safety filter
 Dust pre-extractor "turbo II": check, clean
 Cleaning the radiator
 Windscreen washer, checking fluid level, top up
 Transmission, checking oil level, top
 Replacing bucket teeth
 Fuel tank, draining water and dirt deposits
 Tyres, checking air pressure
 Air-conditioning, cleaning condenser
 Checking air-conditioning
 Checking the coolant level

OUTLINES OF SERVICE

OIL:

- The oil in the engine and the hydraulic system is subject to extreme conditions (high temperatures, high pressure). The quality decreases, therefore, as operation increases.
Always use oil types complying with the operation and temperature specifications in the operation and maintenance manual. Always observe prescribed oil change intervals.
- Special attention must be paid when storing, handling and, in particular, topping up oil and grease to prevent these from becoming soiled. The majority of functional faults are caused by unclean oil.
- Never mix different types or brands of oil.
- Always top up the prescribed oil quantities.
Functional disturbances can be caused by too much or too little oil.
- If the oil in the work hydraulic system is not clear (milky), oil or air is probably penetrating the circuit. In this case, contact you local Komatsu dealer.
- If changing oil, change corresponding oil filter as well.
- We recommend having a regular oil analysis carried out by your local Komatsu dealer in order to establish the condition of the machine.

GREASE:

- Grease is used to prevent wear and build-up of noise.
- Grease nipples not mentioned in the service section are for overhaul purposes; for this reason, they do not need to be greased.
- If a part becomes sluggish after long use, lubricate with grease.
- Wipe off any old grease which is pressed out when lubricating.
Any sand or dirt in the grease causes considerable wear.