7. PLANNED MAINTENANCE AND LUBRICATION

1. INTRODUCTION

ONLY TRAINED AND AUTHORIZED PERSONNEL should perform planned maintenance. Local HYUNDAI dealers are prepared to help customers put in place a planned maintenance program for checking and maintaining their lift trucks according to applicable safety regulations.

⚠ Powered industrial trucks may becomes hazardous if maintenance is neglected.

As outlined in section 4, operator maintenance and care, the operator should make a safety inspection of the lift truck before operating it. The purpose of this daily examination is to check for any obvious damage and maintenance problems, and to have minor adjustments and repairs made to correct any unsafe condition.

In addition to the operator's daily inspection, HYUNDAI recommends that the owner set up and follow a periodic planned maintenance (PM) and inspection program. The PM identifies needed adjustments, repairs, or replacements so they can be made before failure occurs. The specific schedule(frequency) for the PM inspections depends on the particular application and lift truck usage.

Planned maintenance is the normal maintenance necessary to provide proper and efficient machines operation. To protect your investment and prolong the service life of your machine, follow the scheduled maintenance check list.

This section recommends typical planned maintenance and lubrication schedules for items essential to the safety, life, and performance of the truck. It also outlines safe maintenance practices and gives brief procedures for inspections, operational checks, cleaning, lubrication, and minor adjustments.

Specifications for selected components, fuel, lubricants, critical bolt torques, refill capacities, and settings for the truck are found in section 8.

If you have needed for more information on the care and repair of your truck, see your HYUNDAI dealer.

2. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial trucks. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local HYUNDAI dealer.

1) Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities and trained personnel and procedures shall be provided.

2) Maintenance and inspection of all powered industrial trucks shall be performed in conformance with the manufacturer's recommendations.

3) Follow a scheduled planned maintenance, lubrication, and inspection system.

4) Only trained and authorized personnel are permitted to maintain, repair, adjust, and inspect industrial trucks and must do so in accordance with the manufacturer's specifications.

5) Always wear safety glasses. Wear a safety (hard) hat in industrial plants and in special work areas where protection is necessary and required.

6) Properly ventilate work area, vent exhaust fumes, and keep shop clean and floors dry.

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for level or leakage fuel, electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.

8) Before starting work on truck.

(1) Raise drive wheels free of floor and use oak blocks or other positive truck positioning devices.

(2) Remove all jewelry (watches, rings, bracelets, etc.).

(3) Put oak blocks under the load engaging means, inner masts, or chassis before working on them.

(4) Disconnect the battery ground cable (-) before working on the electrical system.

※ **Refer to the jacking and blocking section in the service manual for proper procedures.**

9) Operation of the truck to check performance must be conducted in an authorized, safe, clear area.

10) Before starting to operate the truck.

(1) Be seated in a safe operating position and fasten your seat belt.

(2) Make sure parking brake is applied.

(3) Put the direction control in NEUTRAL.

(4) Start the engine.

(5) Check functioning of lift and tilt systems, direction and speed controls, steering, brakes, warning devices, and load handling attachments.

11) Before leaving the truck.

(1) Stop the truck.

(2) Fully lower the load-engaging means: mast, carriage, forks or attachments.

(3) Put the directional control in NEUTRAL.

(4) Apply the parking brake.

(5) Stop the engine.

(6) Turn the key switch to the OFF position.

(7) Put blocks at the wheels if the truck must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, lift and tilt mechanisms, articulating axle stops, load backrest, overhead guard and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

13) Special trucks or devices designed and approved for hazardous area operation must receive special attention to insure that maintenance preserves the original approved safe operating features.

14) Fuel systems must be checked for leaks and condition of parts. Extra special consideration must be given in the case of a leak in the fuel system. Action must be taken to prevent the use of the truck until the leak has been corrected.

15) All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves, and other parts must be checked to assure that drift or leakage has not developed to the extent that it would create a hazard.

16) When working on the hydraulic system, be sure the engine is turned off, mast is in the fully-lowered position, and hydraulic pressure is relieved in hoses and tubing.

⚠ **Always put oak blocks under the carriage and mast rails when it is necessary to work with the mast in an elevated position.**

17) The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.

18) Batteries, limit switches, protective devices, electrical conductors, and connections must be maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.

19) To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.

20) Industrial trucks must be kept in a clean condition to minimize fire hazards and help in detection of loose or defective parts.

21) Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. This is an OSHA requirement.
Capacity, operation, and maintenance instruction plates, tags, or decals must be changed accordingly.

22) Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires, are to be installed per the manufacturer's procedures. Always use genuine HYUNDAI or HYUNDAI-approved parts.

23) When removing tires follow industry safety practices. Most importantly, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.

24) Use special care when removing heavy components, such as counterweight, mast, etc.. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

3. INSTRUCTIONS BEFORE MAINTENANCE

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the truck by the period as described at based on service meter of LCD.

(2) Shorten the interval of inspect and service depending on site condition. (Such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 250 hours, carry out all the maintenance each 250hours, each 100 hours and daily service at the same time.

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※ Time intervals between maintenance are largely determined by operating conditions. For example, operation in sandy, dusty locations requires shorter maintenance intervals than operation in clean ware-houses. The indicated intervals are intended for normal operation. The operating condition classifications are ;

① **Normal operation**
Eight hour material handling, mostly in buildings or in clean, open air on clean paved surfaces.

② **Harsh operation**

a. All harsh working environment

b. Long term heavy load operation

c. High and low temperature working environment

d. Sudden change in temperature

e. Dusty or sandy working environment

f. Highly corrosive chemical working environment

g. Damp working environment

If the lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

※ **Since the operating environment of lift trucks varies widely, the above descriptions are highly generalized and should be applied as actual conditions dictate.**

2) PRECAUTION

(1) Start maintenance after you have the full knowledge of truck.

(2) The monitor installed on this truck does not entirely guarantee the condition of the truck.
Daily inspection should be performed according to maintenance.

(3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.

(4) Ask to your local dealer or Hyundai for maintenance advise it unknown.

(5) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

3) PROPER MAINTENANCE

(1) Replace and repair of parts
It is required to replace the wearable and consumable parts such as hose, tube and filter etc., regularly. Replaced damaged or worn parts at proper time to keep the performance of truck.

(2) Use genuine parts.

(3) Use the recommended oil.

(4) Remove the dust or water around the inlet of oil tank before supplying oil.

(5) Drain oil when the temperature of oil is warm.

(6) Do not repair anything while operating the engine.

(7) Stop the engine when you fill the oil.

(8) Relieve hydraulic system of the pressure by opening of breather when repairing the hydraulic system.

(9) Confirm if the cluster is in the normal condition after completion of service.

(10) For more detail information of maintenance, please contact local Hyundai dealer.

※ Be sure to start the maintenance after fully understanding the section 1, safety hints.

4) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPE.

(1) Be particularly careful that joint of hose, pipe and functioning item are not damaged.
Avoid contamination.

(2) Assemble after cleaning the hose, pipe and joint of function item.

(3) Use Hyundai genuine parts.

(4) Do not assemble the hose in the condition of twisted or sharp radius.

(5) Keep the specified tighten torque.

5) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) These are the parts which the operator cannot judge the remained lifetime of them by visual inspection.

(2) Repair or replace if an abnormality of these parts is found even before the recommend replacement interval.

※ **Replacement of consumable service parts is not covered under warranty.**

No.	Periodical replacement of safety parts	Interval
1	Fuel hose	Every 2 to 4 years
2	Hydraulic pump hose	Every 2 years
3	Power steering hose	Every 2 years
4	Packing, seal, and O-ring of steering cylinder	Every 2 to 4 years
5	Lift chain	Every 2 to 4 years
6	Lift cylinder hose	Every 1 to 2 years
7	Tilt cylinder hose	Every 1 to 2 years
8	Side shift cylinder hose	Every 1 to 2 years
9	Master cylinder and wheel cylinder caps dust seals	Every 1 years
10	Brake hose or tube	Every 1 to 2 years
11	Brake reservoir tank tube	Every 2 to 4 years
12	Intake air line	Every 2 years
13	Coolant	Every 2 years
14	Radiator hoses and clamps	Every 2 years

※ **Replace the O-ring and gasket at the same time when replacing the hose.**

※ **Replace clamp at the same time if the hose clamp is cracked when checking and replacing hose.**

6) EMISSION-RELATED COMPONENTS WARRANTY (USA AND CANADA ONLY)

Hyundai shall have obligation under the EPA (Environmental Protection Agency) regulation of warranty about Emission-related components. This warranty shall exist for 3,000 hours or five years, whichever occurs first.

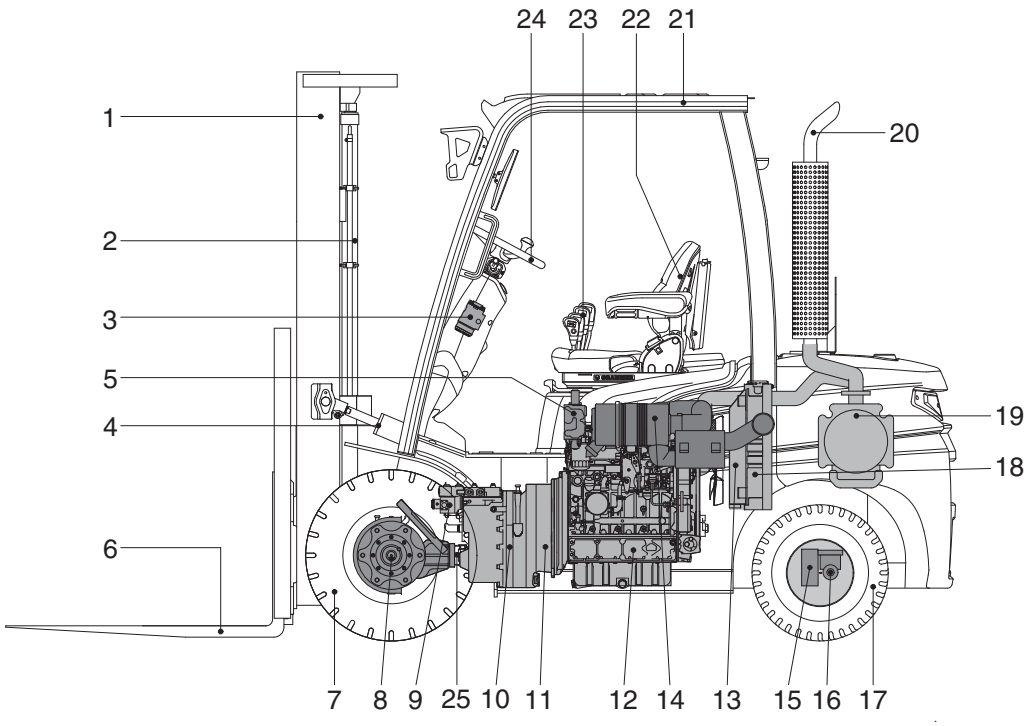
Naturally, this warranty does not cover to damage arising from accident, misuse or negligence, use of non-Hyundai parts, or from alterations not authorized by Hyundai.

※ **Emission-related components according to the EPA regulation.**

1. Air-induction system.
2. Fuel system.
3. Ignition system.
4. Exhaust gas recirculation systems.
5. After treatment devices.
6. Crankcase ventilation valves.
7. Sensors.
8. Electronic control units.

4. PLANNED MAINTENANCE INTERVALS

1) MAJOR COMPONENT LOCATIONS



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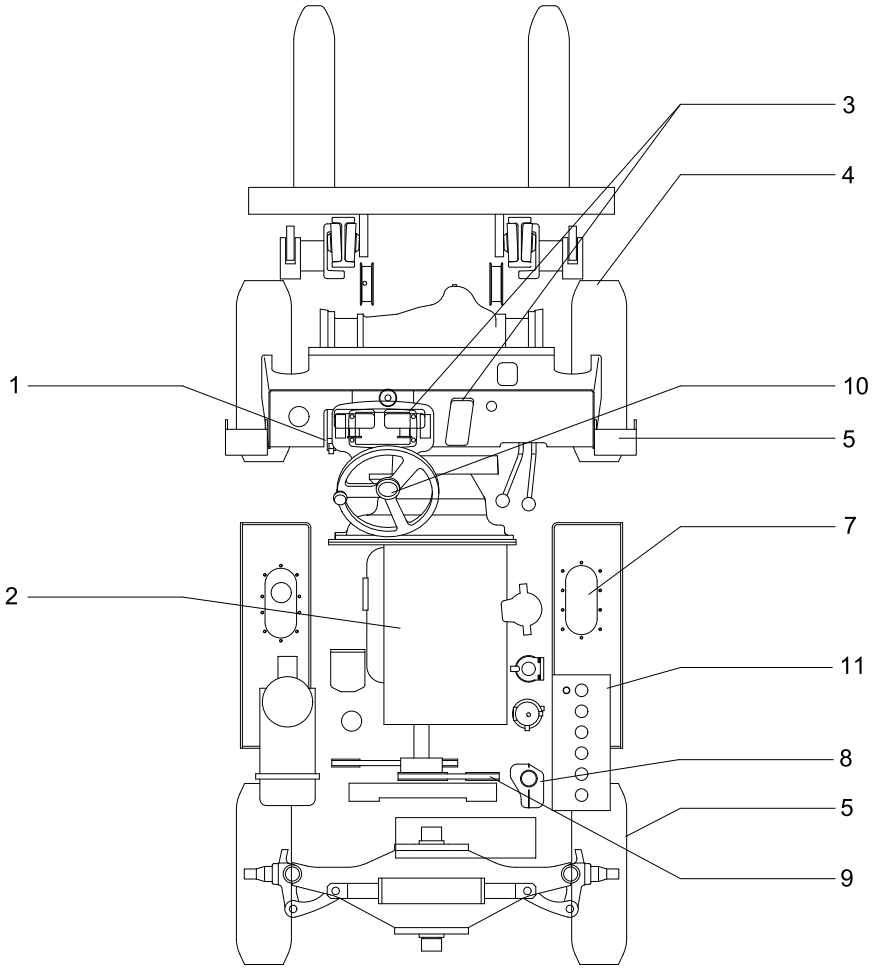
1	Mast	10	Transmission	19	DOC assy
2	Lift cylinder	11	Torque converter	20	Silencer
3	Steering unit	12	Engine	21	Overhead guard
4	Tilt cylinder	13	Exhaust pipe	22	Seat
5	Control valve	14	Air cleaner	23	Control lever
6	Fork	15	Steering axle	24	Steering wheel
7	Front wheel	16	Steering cylinder	25	Drive shaft
8	Drive axle	17	Rear wheel		
9	Hydraulic pump	18	Radiator		

2) SERVICE LOCATIONS



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※ Service intervals are based on the hourmeter reading.
※ Stop the engine when servicing.
※ Do not open the cap or drain plug to avoid injury by unexpected spouting of high temperature fluid or gas.
※ Open the cap slowly to relieve pressure.
※ Always keep the surface of control & instrument panels clean in case of damage or malfunction detected in panel, replace it with a new one.
※ Depending on the ambient and operation contions, the replacement cycle may be shortened.
- All harsh working environment
- Long term heavy load operation
- High and low temperature working environment
- Sudden change in temperature
- Dusty or sandy working environment
- Highly corrosive chemical working environment
- Damp working environment

※ For other details, refer to the service manual.

3) DAILY (OR EVERY 10 HOURS) CHECK LIST

Item No.	Description	Service Action	Oil symbol	Capacity ℓ (U.S. gal)	Service point	Remark
1	Parking brake operation	Check, Adjust	-	-	1	7-30
2	Engine oil level	Check, Add	EO	11.2 (3.0)	1	7-17
3	Pedal linkage operation	Check, Adjust	-	-	1	7-30
4	Drive rim and tire air pressure	Check, Add	-	-	2	5-3, 7-14
5	Steer rim and tire air pressure	Check, Add	-	-	2	5-3, 7-14
6	Lamp operation	Check, Replace	-	-	9	7-29
7	Fuel level	Check, Add	DF	60 (15.9)	1	5-12
8	Radiator coolant	Check, Add	C	9.4 (2.48)	1	5-4
9	Fan belt tension and damage	Check, Adjust, Replace	-	-	1	7-21
10	Horn operation	Check, Replace	-	-	1	7-29
11	Battery	Check, Clean	-	-	1	7-15

※ Oil symbol
Refer to the recommended lubricants for specification.
DF : Diesel fuel HO : Hydraulic oil EO : Engine oil GO : Gear oil
MO : Transmission oil BF : Brake fluid C : Coolant G : Grease

4) PERIODICAL CHECK LIST

Service item		Oil Symbol	Service interval Hours								Initial Hours		
			50	250	500	1000	1500	2000	3000	4000	50i	100i	250i
Tightening (Mounting bolt)	Pump, MCV, steering unit, priority valve				T								T
	Tilt cylinder rod cover				T								T
	Lift, attachment, steering cylinder							T					
	Mast				T								
	Drive and steering axle				T								
	Drive and steering axle wheel		T										
	Counterweight, cabin		T										
	Engine, radiator, transmission		T										
	Hose, fitting, clamp (fuel, coolant, hydraulic)							T					
Lubrication	Tilt pin and mast roller	G			L								L
	Lift chain	EO			L								L
	Steering axle (linkage, kingpin, trunnion	G		L									
	Attachment cylinder rod and tube end			L									
	Pedal pivot				L								
	Drive shaft			L*1	L*2								
	Tilt cylinder rod	G		L*1	L*2								
	Tilt cylinder tube end	G			L								
	Steering unit spline (column shaft)	G						L					
Oli Leakage	Hydraulic tank				I								I
	Valve (MCV, priority, brake)				I								I
	Pump, steering unit				I								I
	Lift, tilt, steering cylinder			I*1	I*2								I
Function test	Steering wheel operation				I								I
	Natural drop and forward tilt							I					
	Fork load indicator (option)							I					
	Mast tilt angle measurement							M					
Periodic replacement parts	Brake oil	BF				R							
	Engine oil	EO			R						R		
	Engine oil filter				R						R		
	Fuel filter				R								
	Water separator element				R								
	Air cleaner element			Clean				R					
	Transmission oil	MO			A	R						R	
	Transmission oil filter					R						R	
	Differential gear oil	GO			A	R						R	
	Radiator coolant	C								R			
	Valve clearance					C							
	Injector tip						C						
	EGR cooler						C						
	EGR system								C				
	Oil separator element						R						
	Turbocharger								C				
	Fork condition and wear				C								
	Fan belt					R							
	Hydraulic oil tank air breather filter			R*1	R*2								
	Hydraulic oil return filter					R							
	Hydraulic oil suction strainer							Clean					
	Hydraulic oil	HO		A				R*3		R*4 (5000)			

*1 Harsh condition *2 Normal condition *3 Conventional hydraulic oil *4 Hyundai genuine long life hydraulic oil

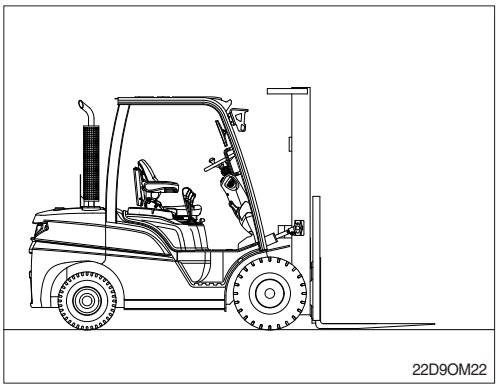
A : Aid C : Checking L : Lubrication R : Replacement T : Retightening

I : Visual inspection (repair or replace if required) M : Measurement (adjust if required)

1) VISUAL INSPECTION

First, perform a visual inspection of the lift truck and its components. Walk around the truck and take note of any obvious damage or maintenance problems.

Check to be sure all capacity, safety, and warning plates are attached and legible.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※ **NAMEPLATES AND DECALS: Do not operate a lift truck with damage or lost decals and nameplates. Replace them immediately. They contain important information.**

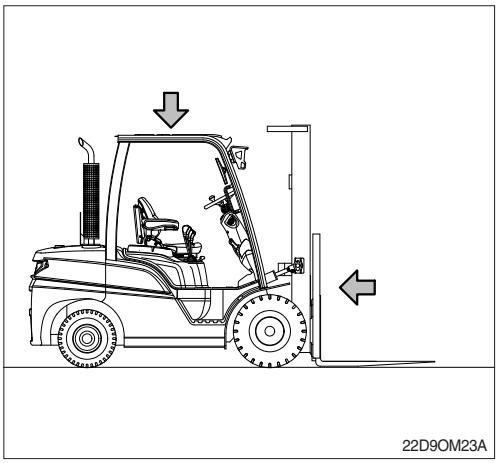
Inspect the truck, before and after starting the engine, for any sign of external leakage of fuel, engine coolant, transmission fluid, etc..

Check for hydraulic oil leaks and loose fittings.

⚠ **HYDRAULIC FLUID PRESSURE: Do not use your hands to check for hydraulic leakage. Fluid under pressure can penetrate your skin and cause serious injury.**

2) OVERHEAD GUARD

Be sure that the driver's overhead guard and any safety devices are in place, undamaged, and attached securely. Check the overhead guard for damage. Be sure that it is properly positioned and all mounting fasteners are in place and tight.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3) LOAD HANDLING COMPONENTS

Inspect the mast assembly, load backrest (LBR), rails, carriage rollers, lift chains, and lift and tilt cylinders. Look for obvious wear and maintenance problems and damaged or missing parts. Check for any loose parts or fittings. Check for leaks, damaged or loose rollers, and rail wear (metal flaking). Carefully check the lift chains for wear, rust, corrosion, cracked or broken links, stretching etc.. Check that the lift and carriage chains are correctly adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight. Inspect all lift line hydraulic connections for leaks.

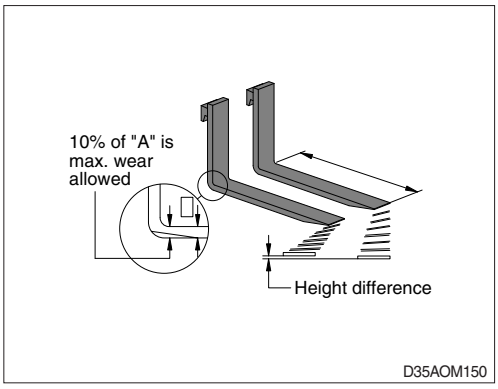
△ **Mast and lift chains require special attention and maintenance to remain in safe operating condition. Refer to lift chain maintenance in this section for additional information.**

4) FORKS

Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

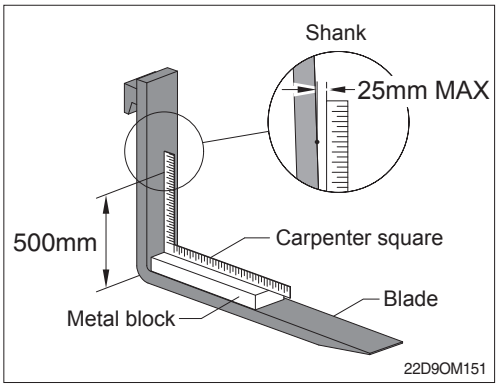
mm

Model	Fork length	Height difference
All models	equal or below 1500	3
	above 1500	4



⚠ If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

Inspect the forks for twists and bends. Put a 50 mm (2 in) thick metal block, at least 100 mm (4 in) wide by 600 mm (24 in) long with parallel sides, on the blade of the fork with the 100 mm (4 in) surface against the blade. Put a 600 mm (24 in) carpenter's square on the top of the block and against the shank. Check the fork 500 mm (20 in) above the blade to make sure it is not bent more than 25 mm (1 in) maximum.

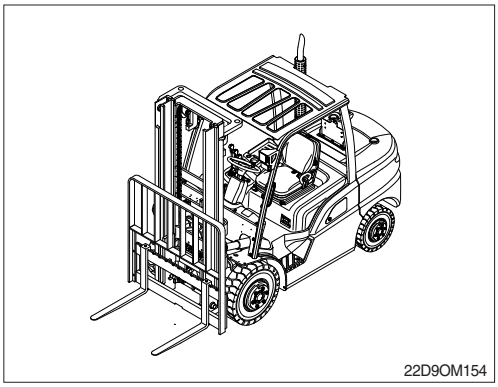


※ **If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.**

Inspect the fork locking pins for cracks or damage. Reinsert them and note whether they fit properly.

5) SIDE SHIFT

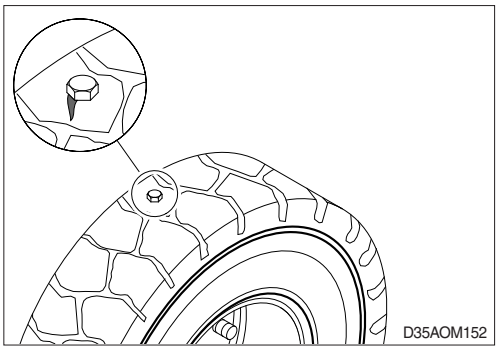
When operating the lever for the side shift and the hanger bar which the forks and the backrest are mounted on it, operator can accurately insert the forks under pallets or stack loads correctly without moving the fork lift.



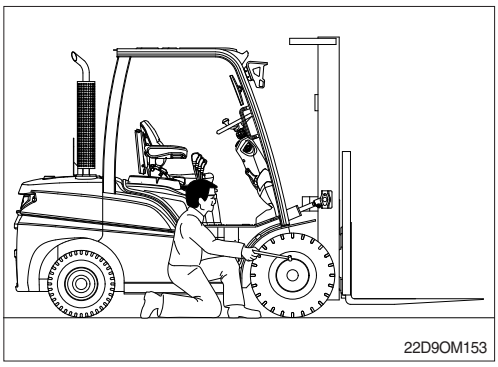
6) WHEEL AND TIRES

Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or **chunking out**.

Check all wheel lug nuts or bolts to be sure none are loose or missing. Replace missing bolts or lug nuts. Torque loose or replaced items to specifications.

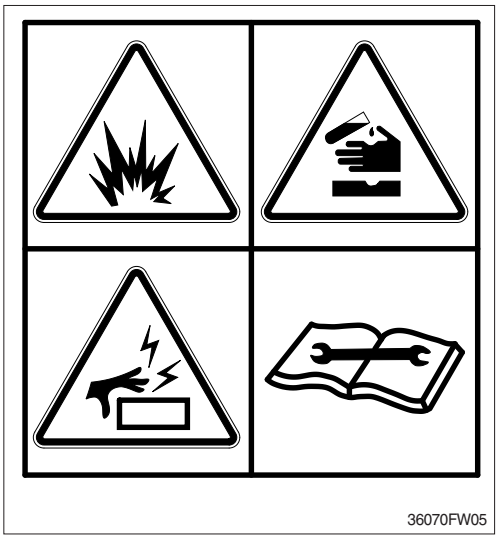


⚠ **Check tire pressure from a position facing the tread of the tire, not form the side. Use a long handled gauge to keep your body away from the side. If tires are low, do not operate and do not add air. Check with a mechanic. The tire may require removal and repair.**
Incorrect (low) tire pressure can reduce the stability of your lift truck. Do not operate truck with low tire pressure. Proper cold inflation is 689 kpa (100 psi).



6. REPLACEMENT AND CHECK

1) BATTERY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(1) Clean

① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ Always wear protective glasses when working with batteries.

⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes. Wash with clean water and go to the doctor if it enters the eyes.

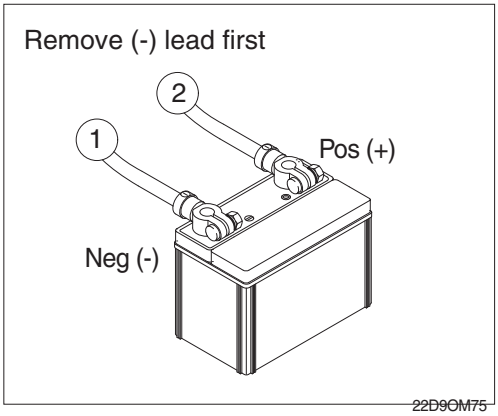
(2) Recycle

Cleaning with compressed air

Never discard a battery.
Always return used batteries to one of the following locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

2) REMOVING AND INSTALLING



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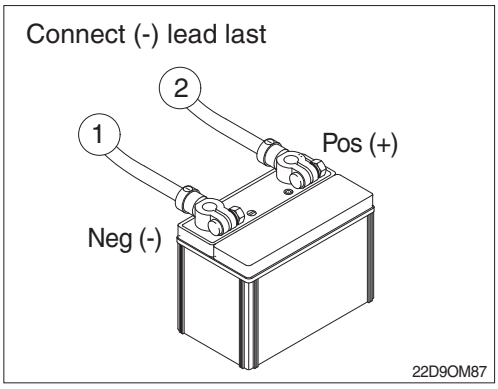
① Remove the lead from the ground side (Normally the (-) terminal side) of the battery. It is dangerous to let a tool, etc., touch the (+) terminal and the body at the same time, since this causes a spark.

② When remounting, connect the ground connection last

⚠ Do not allow tools to touch the (+) terminal and the body of the truck at the same time. This can cause sparking and explosion.
When reinstalling the cables after replaced the battery, pay close attention to maintaining the same alignment state of the cables as it was when supplied. Otherwise, the machine can be exposed to the fire hazards.

⚠ **Prior to reinstall the cable, inspect in detail and confirm the condition of the cables and replace it when the cables possess any kind of abnormal damages such as cracking and wear out of the cable sheath that make you feel somedangerous to use it. Do consult an expert about this matter when you are not able to judge its condition. It is strongly recommended to keep the surroundings of the battery cables clean so that the machine can be freed from the risk of firing by eliminating the flammable contaminations such as oil, dust and etc. acting as a fire developer. Dispose of the old battery in locally approved manner.**



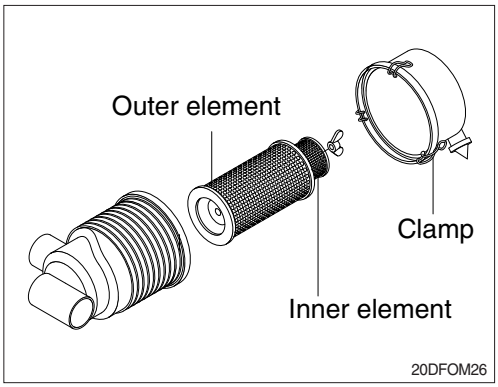
3) AIR CLEANER ELEMENT

(1) Removal

① **Double element type**

Remove the cover by pulling off the clamps, and loosen the wing nut to pull out the outer element.

※ **During periodic service, replace only the outer element. Do not replace the inner element unless damaged.**



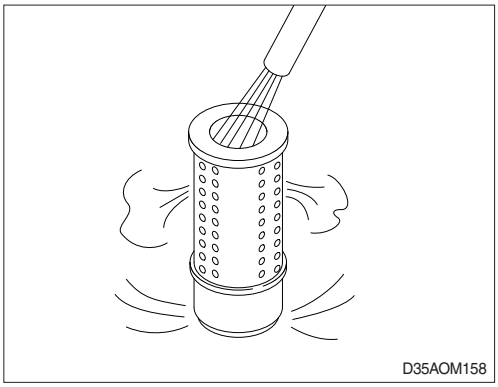
(2) Cleaning

① **Cleaning with compressed air**

Blow dry compressed air (Max 2 kg/cm^2, 30 psi) from inside along pleats. Next blow air form outside along pleats, then blow from inside again and check element.

② **Cleaning with cleaning agent**

If there is grease or carbon on the element, use a special element cleaner, following the instruction given with the cleaner. Have a spare element ready so that the machine can start working again immediately.



※ **Keep clean condition for the air cleaner element all the times.**
A dirty air cleaner could be decreased output power of the engine at worst and it also will be caused to increase fuel consumption and black smoke.

(3) Installation

When installing the element, check that the cleaner housing and element cover are completely in close contact then tighten the nut.

※ Make sure that bottom cap are securely installed. If it is loosely installed, dust will be drawn in and air cleaner will fail to function properly.

⚠ When using compressed air, use safety glasses, face shield and other protective clothes. Never point the air nozzle at anyone. Never clean or replace air cleaner while engine is running.

⚠ OSHA approved eye protection rated for 200 kPa (30 psi) is required for air cleaning operation. Replace element if exhaust is black, or if lack of engine power is noted even after cleaning element. When cleaning the element or element housing, cover the air flow outlet port of the housing with a clean cloth or tape to prevent dirt or dust from entering. Do not clean the elements by bumping or tapping them.

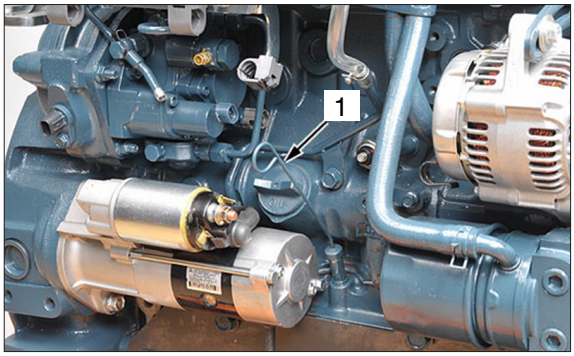
4) ENGINE

(1) Check of engine oil level

① Make the engine level.

② Pull out the dipstick (1) and clean it. Put in and pull it out again.
Make sure that the oil level is between the 2 notches.

③ If the level is too low, add new oil to the specified level.

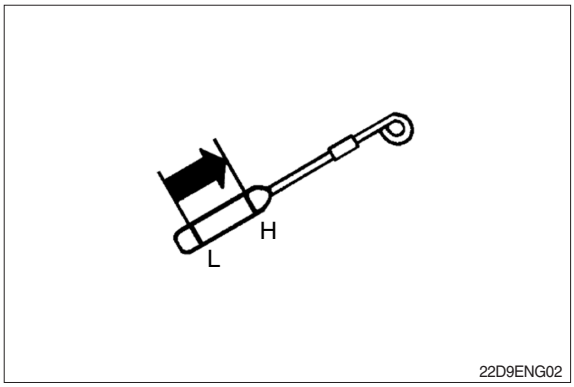


22D9ENG01

1 Dipstick

※ On Diesel Particulate Filter (DPF) equipped engines, part of the fuel may get mixed with engine oil during the regenerating process. This may dilute the oil and increase its quantity. If the oil rises above the dipstick upper limit, it means the oil has been diluted too much, resulting in a trouble. In such case, immediately change the oil for new one.

※ When you use an oil of different brand or viscosity from the previous, drain the remaining oil. Do not mix 2 different types of oil.



22D9ENG02

※ When you examine the engine oil level, make sure that you put it in a level position. If not, you cannot measure oil quantity accurately.

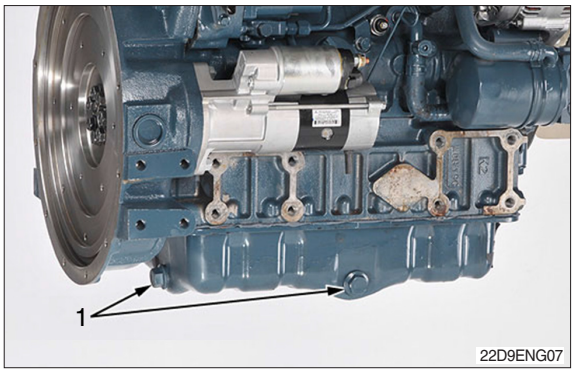
※ Make sure that you keep the oil level between the upper and lower lines of the dipstick.
Too much oil can decrease the output or cause too much blow-by gas.
On the closed breather type engine, the port absorbs the mist and too much oil can cause oil hammer. But if the oil level is not sufficient, the moving parts of engine can get a seizure.

(2) Change of engine oil

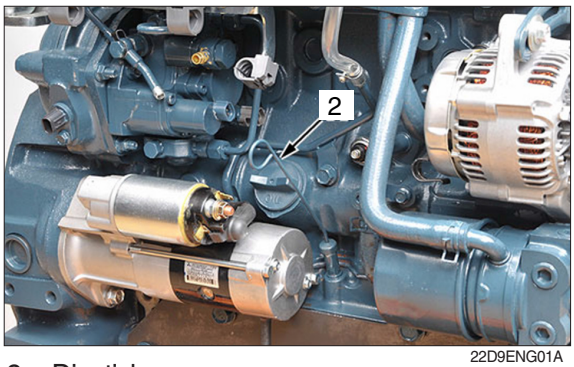
⚠ Make sure that you stop the engine before you change the engine oil.

① Start and warm-up the engine for approximately 5 minutes.
② Put an oil pan below the engine.
③ Remove the drain plug (1) at the bottom of the engine and drain the oil fully.
④ Tighten the drain plug (1).
⑤ Fill new oil until the upper line on the dipstick (2).

※ When you use an oil of different brand or viscosity from the previous, drain the remaining oil.
※ Do not mix 2 different types of oil.
※ Engine oil must have the properties of API classification CJ-4. Use the correct SAE engine oil by reference to the ambient temperature.



1 Drain plug



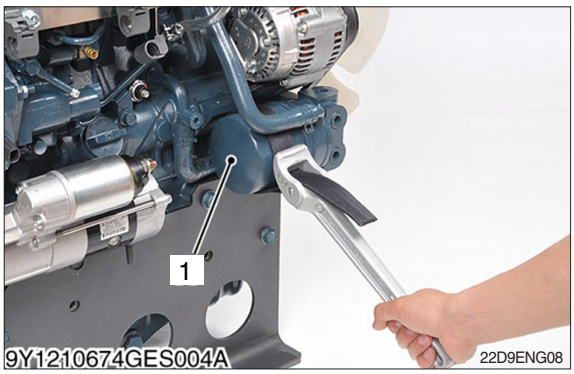
2 Dipstick

(3) Replacement of oil filter cartridge

⚠ Make sure that you stop the engine before you replace the oil filter cartridge.

① Remove the oil filter cartridge (1) with the filter wrench.
② Apply a thin layer of oil on the new cartridge gasket.
③ Install the new cartridge by hand. Do not tighten too much because it can cause deformation of the rubber gasket.
④ After you replace the cartridge, the engine oil usually decrease by a small level. Make sure that the engine oil does not flow through the seal and read the oil level on the dipstick. Fill the engine oil until the specified level.

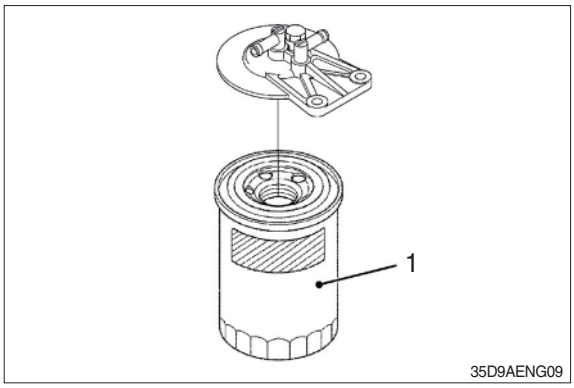
※ To prevent serious damage to the engine, replacement element must be highly efficient. Use only a Hyundai genuine filter or its equivalent.



1 Oil filter cartridge

(4) Replacement of fuel filter cartridge

⚠ Replace the fuel filler when the engine is cool. Carry out this maintenance in a place away from fire. Removing the fuel filler will produce explosive fumes. Wipe off any spilled fuel or oil immediately from the truck or surrounding area.



1 Fuel filter cartridge

① Remove the fuel filter cartridge (1) with filter wrench.

② Apply a thin layer of fuel to the surface of the new filter cartridge gasket before you put it on.

③ Tighten the new cartridge by hand.

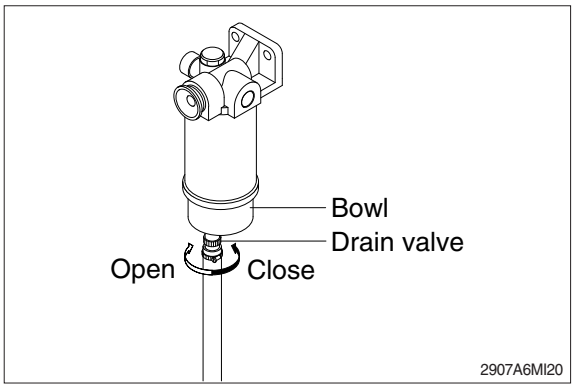
④ Open the fuel valve and bleed the fuel system.

⑤ Operate the engine for a while and check if there is not the fuel leakage from the filter.

※ When the fuel filter is replaced, the fuel system should be bled to remove air if the fuel supply is exhausted during driving.

(5) Check and draining of water separator

※ Inspect or drain the collection bowl of water daily and replace the element every 500 hours.



① Drain water

a. Open bowl drain valve to evacuate water.

b. Close drain valve.

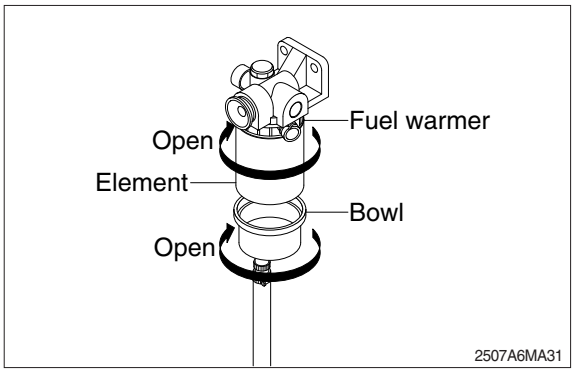
② Replace element

a. Drain the unit of fuel. Follow "Drain water" instructions above.

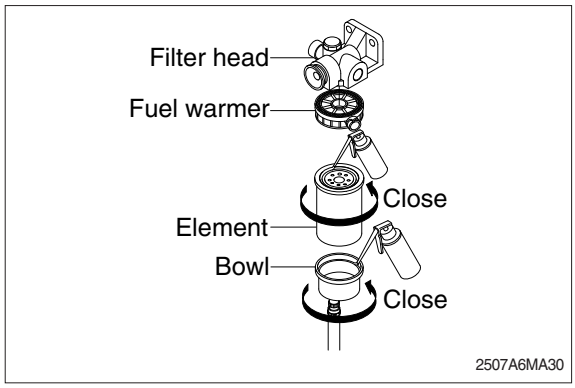
b. Remove element, fuel warmer and bowl from filter head.

※ The bowl is reusable, do not damage or discard.

c. Separate element from bowl. Clean bowl and seal gland.

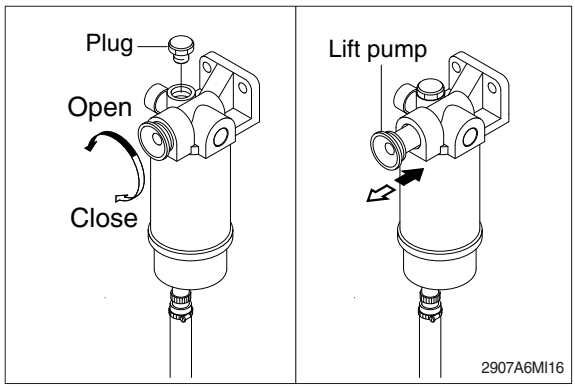


d. Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
e. Attach bowl to new element firmly by hand.
f. Lubricate new element seal and place in element top gland.
g. Attach the element, fuel warmer and bowl to the head.



(6) Bleeding the fuel system

① Loosen fuel supply line plug at the outlet of prefilter.
② Do hand-priming the lift pump repeatedly until air bubbles comes out from fuel supply line completely.
③ Tighten fuel supply line to its origin position.



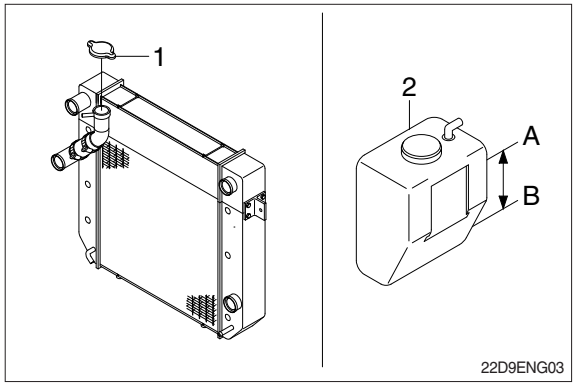
⚠ The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel.

Do not loosen any fittings while the engine is running. Personal injury and property damage can result. Wait at least 10 minutes after shutting down the engine before loosening any fittings in the high-pressure fuel system to allow pressure to do decrease to a lower level.

(7) Check of coolant level

⚠ Do not remove the radiator cap when the engine is hot.
Then loosen the cap slightly to release unwanted pressure before you remove the cap fully.

① Make sure that the coolant level is between Full A and Low B.
② If the coolant level is too low, find out the cause that there is less coolant.



1	Radiator cap	A	Full
2	Reservoir tank	B	Low

Case 1
If the coolant decreases by evaporation, add only clean and soft water.
Case 2
If the coolant decreases by leak, add coolant of the same manufacturer and brand in the specified mixture ratio (clean, soft water and anti-freeze). If you cannot identify the coolant brand, drain all the remaining coolant and add a new brand of coolant mix.

※ When you add the coolant, release the air from the engine coolant channels. The engine releases the air when it shakes the radiator upper and lower hoses.
※ Make sure that you close the radiator cap correctly. If the cap is loose or incorrectly closed, coolant can flow out and the engine can overheat.
※ Do not use an anti-freeze and scale inhibitor at the same time.
※ Do not mix the different type or brand of anti-freeze.

(8) Fan belt and adjustment

① Check and adjustment

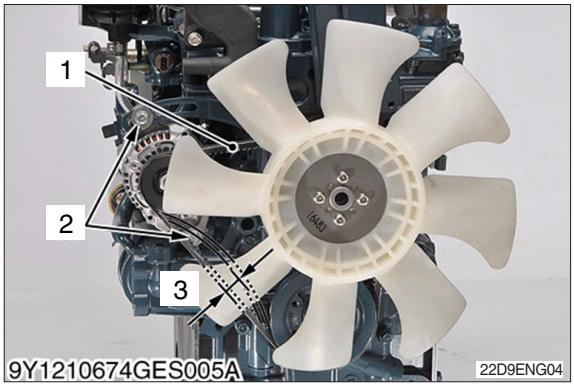
a. Examine if the fan belt is worn out and sunk in the pulley groove, and if it is, replace it.
b. Push the belt halfway between the fan drive pulley and alternator pulley at a specified force 10 kgf (22 lbf) to measure the deflection (3).
c. If the measurement is out of the factory specifications, loosen the alternator mounting screws and adjust its position.

Deflection (3)	Specification	10~12 mm (0.40~0.47 in)

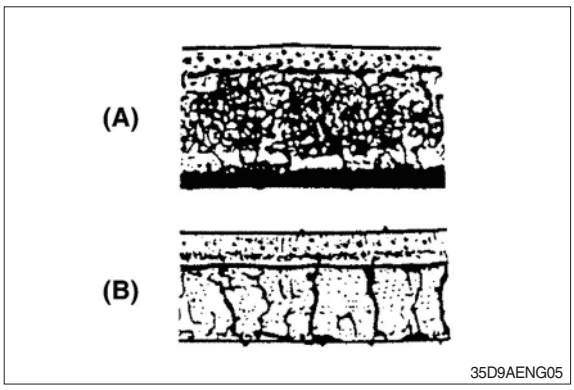
(A) OK (B) Wear

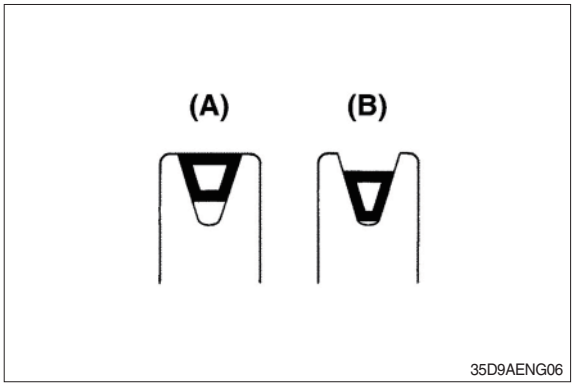
② Replacement of fan belt

a. Remove the alternator.
b. Remove the fan belt (1).
c. Replace the fan belt with a new one.
d. Install the alternator.
e. Check the deflection (3) of fan belt.



1 Fan belt
2 Alternator mounting screw
3 Deflection





(9) Check of EGR cooler

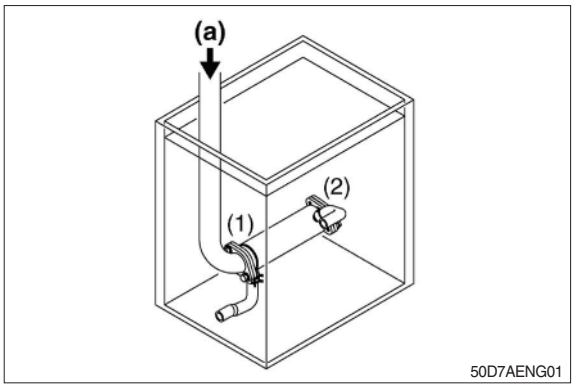
① Exhaust gas passage

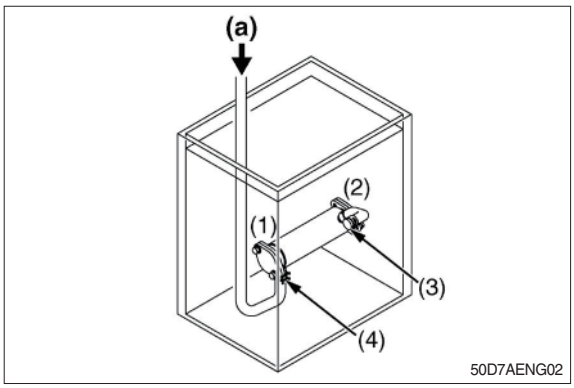
a. Block the EGR cooler exhaust gas outlet (2).
b. Attach an air hose to the EGR cooler exhaust gas inlet (1) and then submerge it in a water tank.
c. Check that the coolant passage is full of water.
d. Apply the specified amount of air pressure (a, 3.0 kgf/cm², 43 psi) to the air hose side, and check that there are no air leaks in any of the EGR cooler parts.
e. If there are air leaks, replace the EGR cooler.

② Coolant passage

a. Block the EGR cooler exhaust gas inlet (1), EGR cooler exhaust gas outlet (2), and the coolant outlet (3).
b. Attach an air hose to the EGR cooler coolant inlet (4), and then submerge it in a water tank.
c. Apply the specified amount of air pressure (a, 2.5 kgf/cm², 36 psi) to the air hose side, and check that there are no air leaks in any of the EGR cooler parts.
d. If there are air leaks, replace the EGR cooler.

EGR cooler leakage test pressure	Factory specification	Exhaust gas passage	3.0 kgf/cm² (43 psi)
		Coolant passage	2.5 kgf/cm² (36 psi)



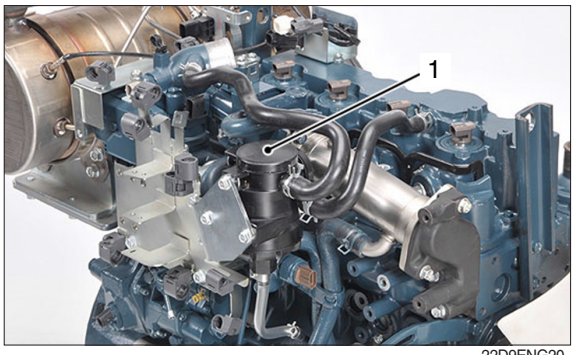


1 Exhaust gas Inlet
2 Exhaust gas outlet
3 Coolant outlet
4 Coolant inlet
a Air pressure

(10) Replacement of oil separator element

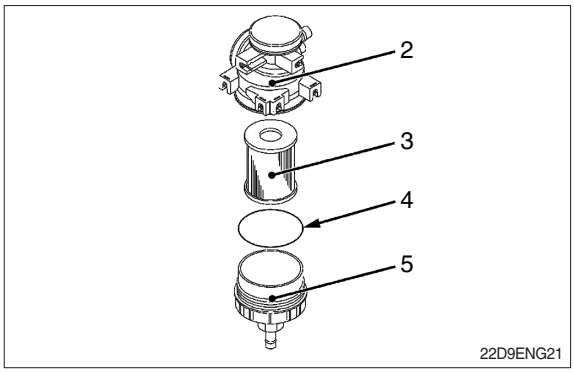
⚠ Be sure to stop the engine before replacement the oil separator element.

① Remove the case (5).
② Remove the oil separator element (3) and O-ring (4).
③ Replace the oil separator element and O-ring with a new one.



22D9ENG20

1 Oil separator

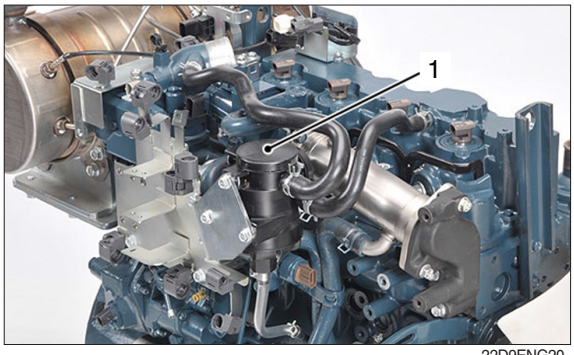


22D9ENG21

2 Body
3 Element
4 O-ring
5 Case

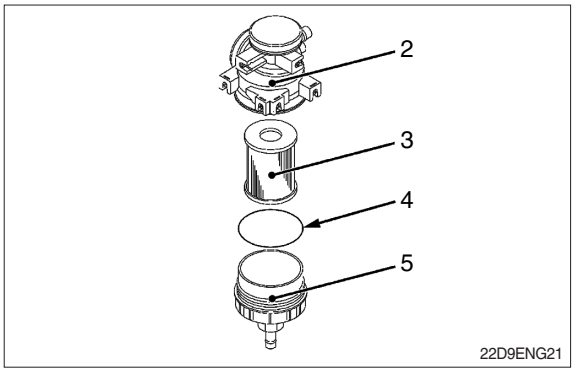
(11) Check of PCV valve (Positive Crankcase Ventilation)

① After you remove the oil separator case (5) and element (3), look into the hole leading to the PCV valve of the oil separator body (2) inside, and then check if there is no crack, break or abnormal sediment in the PCV valve.
② Check the oil separator assembly (1) for crack, oil leakage and loose connections.
③ If you find a crack or oil leakage, replace the oil separator assembly (1) with a new one.
④ If you find loose connections, tighten the clamp or replace the hoses.



22D9ENG20

1 Oil separator

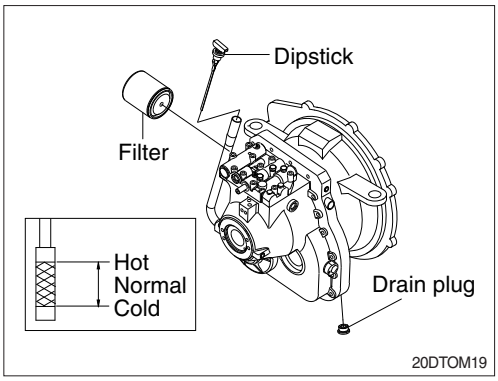


22D9ENG21

2 Body
3 Element
4 O-ring
5 Case

5) TRANSMISSION OIL

⚠ Do not touch hot components or allow hot oil to contact your skin.



(1) Transmission oil

Park the truck in a level place and lower the forks. Apply the parking brake.

(2) Oil level check

① At engine idling speed.
② Open inspection plate, and oil level can be checked using dipstick.
③ Add oil through oil filler plug if necessary.
④ Always check oil level using dipstick after add oil.

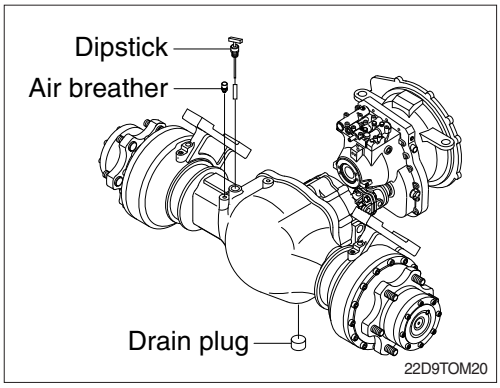
(3) Change

① Remove drain plug.
② When changing oil, remove strainer and clean it with flushing oil.

⚠ **OSHA approved eye protection rated for 200 kPa (30 psi) is required for air cleaning operation.**

- Blow dry compressed air from the inside of strainer to outside and install when completely dry.
- Dispose of used oil in locally approved manner.

6) DIFFERENTIAL CASE



(1) Differential oil

Park the truck in a level place. Set the mast vertical, and raise the forks approx. 1 m. Put blocks under the fork carriage.

Then stop the engine and apply the parking brake.

(2) Oil level check

Remove level plug, and check that oil is filled up to hole.

(3) Change

Change oil after removing drain plug.

Add oil until it just begins to flow out of the oil level.

Dispose of used oil in locally approved manner.

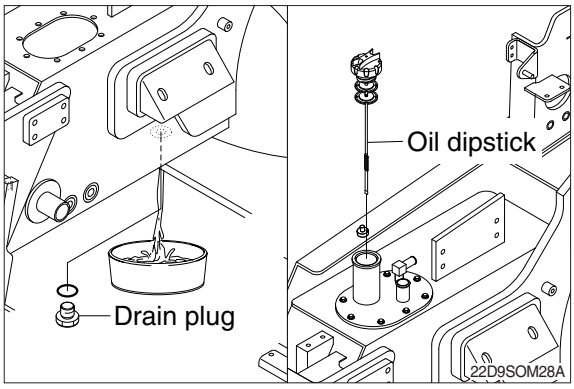
7) HYDRAULIC TANK

(1) Hydraulic oil change

Park the truck in a level place and lower the forks.

Then stop the engine and apply the parking brake.

Change oil after removing drain plug on tank bottom.



(2) Strainer Cleaning

⚠ OSHA-approved eye protection rated for 2 kg/cm² (30 psi) is required for air cleaning operation.

① When changing oil, remove strainer and clean it with flushing oil. Blow dry compressed air from inside of strainer to outside and install when completely dry.
Dispose of oil in locally approved manner.

② Bleed the air after checking the oil level as below;

- Start engine.
- Check for mast overhead clearance.
- Fully raise and lower mast and also fully tilt it forward and backward several times.
- Recheck oil level.

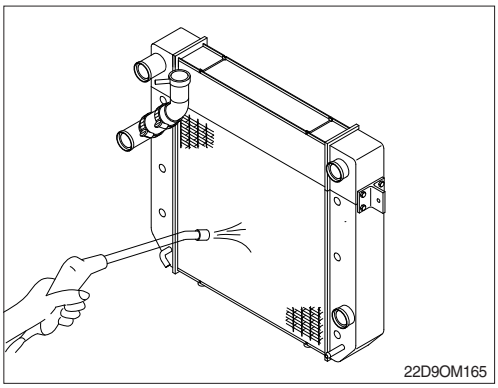
8) COOLING SYSTEM

(1) Radiator fins cleaning

Remove dust between radiator fins with compressed air. Steam or water may be used instead of compressed air. Air pressure should be less than 2 kg/cm² (30 psi). Nozzle of cleaning device should be held about 50 mm (2 in) from radiator fins. Also, check rubber hose connected to radiator. Replace if cracked or deteriorated. Check that hose clamps are tight.

⚠ Be sure to keep air or steam nozzle at right angles to radiator. Wear safety glasses and a face shield when using compressed air.

(2) Radiator Cleaning



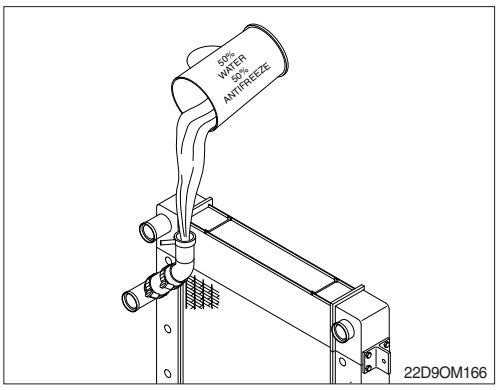
① Close drain valves and add clean, soft water (city water, etc.) through water filler. Add radiator cleaner and run the engine at idling speed for 15 minutes.

② Stop engine and drain water from drain valves.

③ Add clean water and run at idling speed (5 to 10 minutes). Then stop the engine and drain water.

④ Close drain valves and fill radiator with clean water.

※ Do not pour cold water in an overheated engine. It can be caused the crack of the engine block due to sudden cooling.



⚠ For low temperatures, add antifreeze.(See cold weather operation for details). When not using antifreeze, add anticorrosive compound. Park truck on level ground and clean radiator.

※ Replace the coolant from time to time to clean up the cooling system so that it can prevent the engine from overheating problem and always keep the specified level for the coolant.

※ Dispose of used antifreeze mixture in locally approved manner.

9) TIRE REPLACEMENT

① Park the truck in a safe and level place suitable for changing the tire. Then lower the forks, stop the engine, and apply the parking brake.

⚠ The tires are under high inflation pressure, so failure to follow the correct procedures, when changing or servicing tires and rims could cause the tire to explode, causing serious injury or damage. The tires and rims should always be serviced or changed by trained personal using the correct tools and procedures. For details of procedures, contact your HYUNDAI dealer. Wear safety glasses and a face shield when using compressed air.

② Block the tire at the opposite corner from the tire to be replaced.

③ Loosen the lug nuts slightly with a lug nut wrench.

④ Jack up the truck to raise the tire from the ground, then remove the lug nuts and take off the tire.

※ Points to fit jack when jacking up

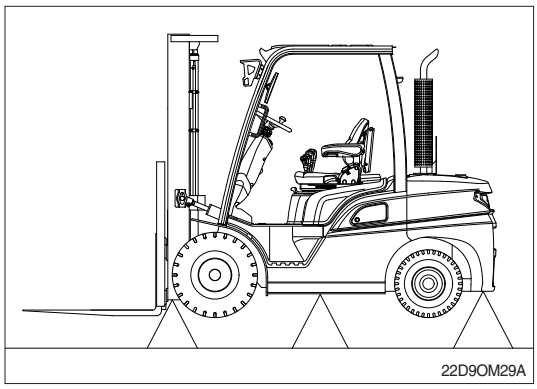
Front tires : Bottom of outer mast or bottom of frame.

Rear tires : Bottom of counterweight or bottom of rear axle.

⚠ When jacking up the truck, always check carefully that the jack does not come out of position. When jacking up the truck, never go under the truck. For wheels using a separate type rim, check first that the rim nut is not loose before loosening the lug nuts.

Be careful not to mistake the rim nuts and lug nuts.

When assembling separated type rims with bolts and nuts, check any damage and tighten them to the specified tightening torque. Change the bolts and nuts with new ones after using twice for your safety.



⑤ Replace the tire and tighten the lug nuts partially. The mounting faces of the wheel, lug nuts and wheels must be free from any dirt or lubricant of any kind.

⑥ Tighten the lug nuts on opposite sides in turn,
and check that there is no play in the wheel.

⑦ Lower the jack to lower the truck to the ground, then tighten the lug nuts to the specified tightening torque (For details, see service data).

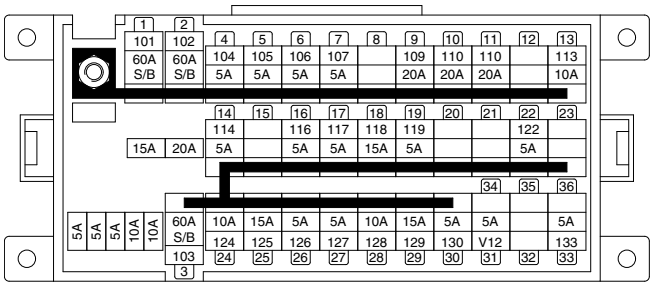
⑧ Check and adjust the inflation pressure.
Tire inflation pressure : For details, see 5-3 page, CHECK BEFORE STARTING ENGINE.

⚠ Precautions for adjusting the inflation pressure when repairing a puncture.

※ The tires used on forklift trucks have a high inflation pressure, so any cracks or deformation of the rim are extremely dangerous. When adjusting the inflation pressure, do not raise the pressure above the correct level under any circumstances. If the pressure of the compressor is not adjusted beforehand, the pressure inside the tire will rise to the maximum air pressure of the compressor, and this may cause a serious accident. Therefore, always be extremely careful when carrying out this work.

10) FUSES REPLACEMENT

No.	Capacity	Related electrical component
①	60A	Alternator
②	60A	Glow plug
③	60A	Main power
④	5A	Horn
⑤	5A	Flasher unit
⑥	5A	Warning buzzer
⑦	5A	MCU
⑧	-	-
⑨	20A	ECU
⑩	20A	Air conditioner 1
⑪	20A	Air conditioner 2
⑫	-	-
⑬	10A	OHG/Cabin
⑭	5A	Gear selector
⑮	-	-
⑯	5A	OPSS solenoid
⑰	5A	Parking
⑱	15A	Combi switch
⑲	5A	Alternator IG
⑳	-	-
㉑	-	-
㉒	5A	Air conditioner
㉓	-	-
㉔	10A	MCU/Cluster
㉕	15A	OHG/Cabin (IG)
㉖	5A	Brake lamp
㉗	5A	Seat heater
㉘	10A	Work/beacon lamp
㉙	15A	Fuel warmer
㉚	5A	Signal power
㉛	5A	Start relay
㉜	-	-
㉝	5A	ECU
㉞	5A	Start relay
㉟	-	-
㊱	5A	ECU



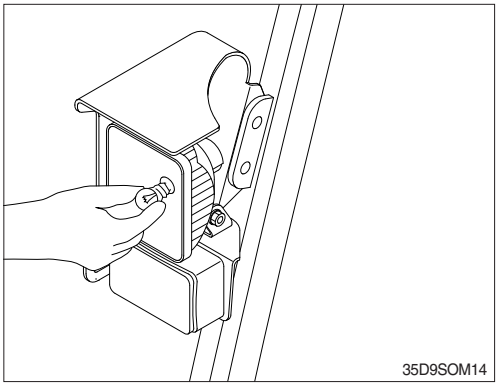
① Turn the starting switch OFF.

② Open the cover of the fuse box, and replace fuses inside (To open the cover of the fuse box, push the side of the cover lightly with a finger, and pull the cover forward to remove it.)

⚠ When replacing the fuse, check the relationship between the fuse and the electrical components it protects. Always replace fuses with a fuse of the same capacity. Always turn the starting switch OFF before replacing any fuse.

11) LAMP BULBS REPLACEMENT

Lamp	Spec (for 12 V)
Head lamp	55W
Turn signal lamp	LED
Clearance lamp	LED
Stop lamp	LED
Backup lamp	LED
License lamp (option)	3.4W
Beacon lamp (option)	Xenon LED
Rear work lamp	55W



⚠ **After checking that the fuse is not blown and that there is no disconnection in the wiring harness, replace the lamp bulb.**

12) FUNCTIONAL TESTS

You will start the engine to complete the functional tests, so be sure that:

- The parking brake is applied.
- Directional control is in NEUTRAL.
- Forks are fully lowered to the floor or ground.
- All controls are in neutral or other correct position.
- You are familiar with the safety procedures given in section 5, **Starting and operating procedures**, in this manual.

As you test the following components, be sure they are properly mounted and working correctly.

(1) Horn

Press the horn button to check horn function. If the horn or any other part does not operate, report the failure and have it repaired before the truck is put into operation.

(2) Hour meter

Start the engine and let it warm up until it runs evenly and accelerates smoothly when you push on the accelerator pedal. Check the hour meter for operation with the engine running. Write the hour meter reading on the PM report form. Report any malfunction or damage.

(3) Indicator lights

Check that all lights are functioning and indicate normal truck operation as described in section 3, Know your truck, in this manual.

(4) Service brakes and inching pedal

With the direction control in NEUTRAL and the engine running, push the service brake pedal fully down and hold. The brakes should apply before the pedal reaches the floor plate. If the pedal continues to creep downward, report the failure immediately. Do not operate the truck until the brakes are repaired. Perform the same check with the inching pedal. (Additional braking/inching checks will follow).

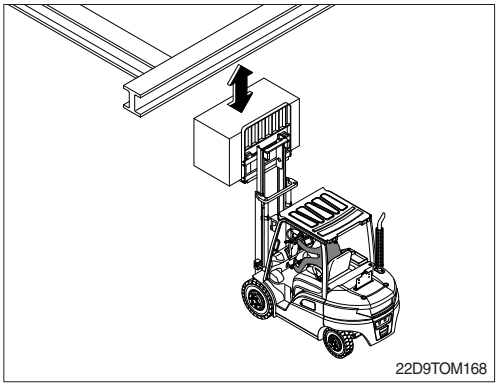
(5) Parking brake

Check the function of the parking brake. Release, then reapply. To check parking brake holding capability, park the lift truck on a grade and apply the parking brake. The parking brake should hold a lift truck with rated load on a 15% grade.

⚠ Do not operate a lift truck if the service or parking brakes are not operating properly.

(6) Lift mechanisms and controls

Pull back on the tilt control lever and hold until the mast reaches the full back tilt position. Push forward on the lever to return the mast to the vertical position. Release the lever.



⚠ Be sure that there is adequate overhead clearance before raising the mast.

Pull back on the lift control lever and raise the fork carriage to full height. Watch the mast assembly as it rises. Release the lever.

If the maximum fork height is not reached, this indicates there is an inadequate (low) oil level in the hydraulic sump tank or severe binding within the mast.

Push forward on the lift control lever. Watch the mast as it lowers. When the forks reach the floor, release the lever.

All movements of the mast, fork carriage, and lift chains must be even and smooth, without binding or jerking. Watch for chain wobble or looseness; the chains should have equal tension and move smoothly without noticeable wobble.

(7) Auxiliary controls (Option)

If your lift truck is equipped with an attachment, test the control lever for correct function and briefly operate the attachment.

(8) Steering system

※ **The steering system, steering axle, and steering linkage on your truck should be inspected periodically for abnormal looseness and damage, leaking seals, etc.. Also, be alert for any changes in steering action. Hard steering, excessive freeplay (looseness), or unusual sound when turning or maneuvering indicates a need for inspection or servicing.**

Check the steering system by moving the steering handwheel in a full right turn and then in a full left turn. Return the handwheel to the straight ahead position. The steering system components should operate smoothly when the handwheel is turned. Never operate a truck that has a steering system fault.

⚠ **Fasten your seat belt before driving the truck.**

(9) Direction control, braking and inching

※ **Be sure that the travel area is clear in front of the truck.**

① Push firmly on the brake pedal. Release the parking brake. Move the directional control lever from NEUTRAL to FORWARD.

② Remove your right foot from the service brake pedal and put it on the accelerator pedal. Push down until the truck moves slowly forward. Remove your foot from the accelerator pedal and push down on the service brake pedal to stop the truck. The brakes should apply smoothly and equally.

※ **Be sure that the travel area is clear behind the truck.**

③ Put the directional control lever in the REVERSE travel position. Release the service brake and push down on the accelerator pedal until the truck moves slowly in the reverse direction. Remove your foot from the accelerator pedal and push down on the service brake pedal to stop the truck. The brakes should apply smoothly and equally.

④ Put the directional control in FORWARD. Press the inching pedal fully down and hold. Depress the accelerator. The truck should not move. Now, with the accelerator still depressed, slowly release the inching pedal until the truck Inches forward smoothly and slowly.

※ **Report any problems.**

※ **When you have completed the operational tests, park and leave the truck according to standard shut down procedure as described in section 5 of this manual. Be sure to make a record of all maintenance and operating problems you find.**

13) FLUIDS, FILTERS AND ENGINE ACCESSORIES

To check fluid levels and other components within the engine compartment, unlatch and open the hood to access the engine compartment.

⚠ **To avoid the possibility of personal injury, never work in the engine compartment with the engine running, except when it is absolutely necessary to check or make adjustments. Take extreme care to keep hands, tools, loose clothing, etc., away from fan and drive belts. Also remove watches, bracelets, and rings.**

(1) Engine accessories

Inspect the engine coolant hoses and fan belt (s). Look for leaking and obvious damage, worn (frayed) condition, breaks, etc. that could cause failure during operation.

(2) Engine air cleaner

Check the engine air cleaner for damage and contamination (excessive dirt build-up and clogging). Be sure that the air cleaner hose is securely connected (not loose or leaking). Fan or cone shaped dust deposit on tube or hose surfaces indicate a leak.

Change or service the air cleaner element every one year, depending upon your application. Service intervals may also be determined by the air restriction indicator.

(3) Battery

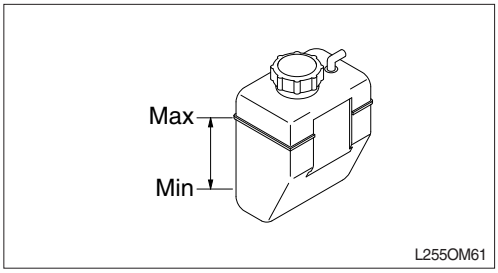
Inspect the battery for damage, cracks, leaking condition, etc.. If the terminals are corroded, clean and protect them with HYUNDAI battery saver (Available from your HYUNDAI dealer). If your battery has removable cell caps, check to be sure the cells are all filled. Refill them with distilled water.

⚠ When refill the distilled water in the battery, be careful not to allow the fluid to come in contact with eyes, skin, clothing and metal surface. If the fluid has come in contact with them, wash it out immediately with water.

⚠ EXPLOSIVE GASES : Do not smoke or have open flames or sparks near batteries. An explosion can cause injury or death.

(4) Engine cooling system

To check engine coolant level open the hood to the engine compartment. Visually inspect the recovery bottle, locate the MAX and MIN marks. The MAX mark indicates maximum level at operating temperature. The MIN mark indicates additional coolant needs to be added to the system.



△ A level anywhere between the MAX and MIN marks is normal.

※ Inspect the coolant level in the overflow bottle only.

⚠ Do not remove the radiator cap when the radiator is hot. STEAM from the radiator will cause severe burns. Do not remove the radiator cap to check the coolant level.

⚠ Never remove the radiator cap while the engine is running. Stop the engine and wait until it has cooled. Failure to do so could result in serious personal injury from hot coolant or steam blowout and/or damage to the cooling system or engine.

If the level is low, add a 50/50 mixture of specified coolant and water to the correct fill level. If you have to add coolant more than once a month or if you have to add more than one quart at a time, check the coolant system for leaks.

- Check engine oil for presence of coolant leaking into engine.
- Inspect the coolant for condition. Look for excessive contamination or rust or oil in the coolant solution.
- Check the PM time interval for need to change coolant.
- Check the condition of radiator cap rubber seal and radiator filler neck for damage. Be sure they are clean.
- Check overflow hose for logging or damage.

※ **Your lift truck cooling system is filled with a factory installed solution of 50% water and 50% permanent-type antifreeze containing rust and corrosion inhibitors. You should leave the solution in year around. Plain water may be used in an emergency, but replace it with the specified coolant as soon as possible to avoid damage to the system. Do not use alcohol or methanol antifreeze.**

(5) Engine oil and filter

Locate the engine oil dipstick. Pull the dipstick out, wipe it with a clean wiper, and reinsert it fully into the dipstick tube. Remove the dipstick and check oil level.

It is normal to add some oil between oil changes. Keep the oil level between the Full and Low mark on the dipstick by adding oil as required. **Do not overfill**. Use the correct oil as specified under lubricant specification.

It is recommended to :

- Check and add the engine crankcase oil every day (Depending on application).
- Replace the diesel engine oil filter every 500 hours.
- Remove the oil pan drain plug to drain old oil after the truck has been in operation and the engine (oil) is operating temperature.

⚠ **Engine oil at operating temperature is hot and can cause burns. Beware of splashing oil.**

- Carefully check for leaks after changing oil and installing new filter.

※ **The time interval for changing engine oil depends upon your application and operating conditions. To determine the correct schedule for your truck, it is suggested that you periodically submit engine oil samples to a commercial laboratory for analysis of the condition of the oil.**

OIL PERFORMANCE DESIGNATION : To help achieve proper engine performance and durability, use only engine lubricating oils of the proper quality. For diesel engines, HYUNDAI recommends that you use motor oil that meets API CJ-4, SAE 10W-30.

(6) Hydraulic sump tank

Check the hydraulic sump tank fluid level. Correct fluid level is important for proper system operation. Low fluid level can cause pump damage. Over filling can cause loss of fluid or lift system malfunction. Hydraulic fluid expands as its temperature rises. Therefore, it is preferable to check the fluid level at operating temperature (after approximately 30 minutes of truck operation). To check the fluid level, first park the truck on a level surface and apply the parking brake.

Put the mast in a vertical position and lower the fork carriage fully down. Pull the dipstick out, (attached to the sump breather) wipe it with a clean wiper, and reinsert it. Remove dipstick and check oil level. Keep the oil level above the LOW mark on the dipstick by adding recommended hydraulic fluid only, as required. **Do not overfill.**

Check the condition of the hydraulic fluid (age, color or clarity, contamination). Change the oil as necessary.

(7) Hydraulic fluid and filter change

Drain and replace the hydraulic sump fluid every 2000 or 5000 operating hours. (Severe service or adverse conditions may require more frequent fluid change). Please to the page 7-11 for service interval. Replace the hydraulic oil filter element at every oil change. Remove, clean, and reinstall the hydraulic and steer system suction line screens at first PM and every 2000 hours thereafter.

Check for leaks after installation of the filter. Also, check that the hydraulic line connections at the filter adapter are tightened correctly.

(8) Sump tank breather maintenance and inspection

Remove the sump tank fill cap/breather and inspect for excessive (obvious) contamination and damage. Replace the fill cap/breather, per recommended PM schedule or as required by operating conditions.

(9) Transmission fluid check

To check the transmission fluid locate the dipstick. The dipstick is located on the driver's left hand side under the floor plate near the transmission valve. Before checking, run the engine until the unit is at operating temperature. This is important since transmission oil temperature should be minimum of 65˚C (150˚F) to 120˚C (250˚F) maximum, the engine should also be at operating temperature. Apply the parking brake.

With the engine operating at idle and the transmission in NEUTRAL, and the parking brake set, check the fluid on the dipstick. Fill, if necessary, to the FULL mark on the dipstick, using the transmission fluid recommended by HYUNDAI.

※ Check the planned maintenance interval (operating hours) or the condition of the oil to determine if the transmission fluid needs to be changed.

14) LUBRICATION

(1) Truck chassis inspection and lubrication

Lubrication and inspection of truck chassis components, including steering wheels, steering axle linkage, steering cylinder, and wheel bearings are easier if the truck is raised and blocked up under the frame. Refer to your service manual for additional information on machine blocking and jacking. Also refer to your service manual for the location of grease fittings.

Inspect the steering cylinder piston rods, seals, and fasteners for damage, leaks, and looseness. Lubricate the steering axle linkage rod ends and linkage pivot points. Be sure to clean the grease fittings before lubricating, and remove the excess grease from all points after lubricating. Lubricate miscellaneous linkage as needed.

(2) Mast and tilt cylinder lubrication

Clean the fittings and lubricate the tilt cylinder rod end bushings (forward end) and both the base rod-end bushings (rear end). Clean and lubricate the mast trunnion bushings.

(3) Lift chains

Lubricate the entire length of the mast rail lift and carriage chains with HYUNDAI chain and cable lube.

15) AIR CLEANING

Always maintain a lift truck in a clean condition. Do not allow dirt, dust, lint, or other contaminants to accumulate on the truck. Keep the truck free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry, and safe. A clean truck makes it easier to see leakage and loose, missing, or damaged parts, and helps prevent fires. A clean truck runs cooler. The environment in which a lift truck operates determines how often and to what extent cleaning is necessary.

For example, trucks operating in manufacturing plants that have a high level of dirt, dust, or lint (for example, cotton fibers or paper dust) in the air or on the floor or ground, require more frequent cleaning. The radiator especially may require daily air cleaning to ensure correct cooling.

If air pressure does not remove heavy deposits of grease, oil, etc., it may be necessary to use steam or liquid spray cleaner.

※ Lift trucks should be air cleaned at every PM interval, or more often if necessary.

Use an air hose with special adapter or extension, a control valve, and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 2.0 kgf/cm^2 (30 psi), maximum (OSHA requirement).

⚠ Wear suitable eye protection and protective clothing when air cleaning. Never point the air nozzle at anyone.

Air clean the mast assembly, drive axle, radiator - from both counterweight and engine side, engine and accessories, drive line and related components, and steering axle and cylinder.

16) CRITICAL FASTENER TORQUE CHECKS

Fasteners in highly loaded (critical) components can quickly fail if they become loosened. Also, loose fasteners can cause damage or failure of the component. For safety, it is important that the correct torque be maintained on all critical fasteners of components that directly support, handle, or control the load and protect the operator. (SEE 8. SPECIFICATIONS)

Critical items include:

- Drive axle mounting
- Overhead guard
- Drive and steering wheel mounting
- Tilt cylinder mounting and yokes
- Counterweight mounting
- Mast mounting and components

Torque specifications are in your service manual.

17) LIFT CHAIN MAINTENANCE

The chain system on the mast was designed for safe, efficient, and reliable transmission of lifting force from hydraulic cylinder to the forks. Safe use of your truck with minimum down time depends on the correct care and maintenance of the lift chains. Most complaints of unacceptable chain performance are a result of poor maintenance. Chains need periodic maintenance to give maximum service life.

⚠ Do not attempt to repair a worn chain. Replace worn or damaged chains. Do not piece chains together.

(1) Lift chain inspection and measurement

Inspect and lubricate the lift chains every PM (250 hours). When operating in corrosive environments, inspect the chains every 50 hours. During the inspection, check for the following conditions:

· Rust and corrosion, cracked plates, raised or turned pins, tight joints, wear, and worn pins or holes.

· When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

· Chain wear can be measured by using a chain scale or a steel tape measure. When checking chain wear, be sure to measure a segment of chain that moves over a sheave. Do not repair chains by cutting out the worn section and joining in a new piece. If part of a chain is worn, replace all the chains on a truck.

(2) Lift chain lubrication

Lift chain lubrication is an important part of your maintenance program. The lift chains operate under heavy loadings and function more safely and have longer life if they are regularly and correctly lubricated. HYUNDAI chain lubricant is recommended; it is easily sprayed on and provides superior lubrication. Heavy motor oil may also be used as a lubricant and corrosion inhibitor.

(3) Lift chain wear and replacement criteria

① **New chain length**

The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

② **Worn chain length**

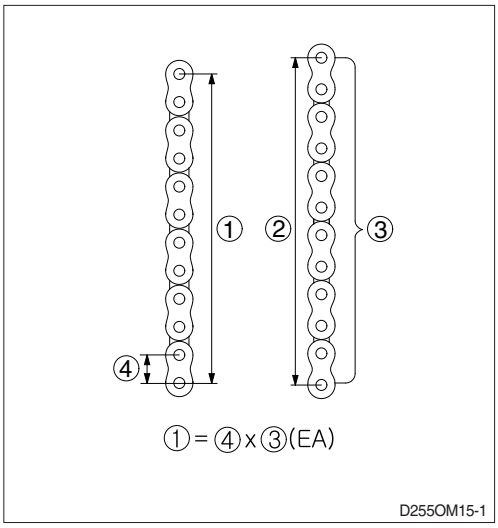
The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

③ **Span**

The number of pins in the length (Segment) of chain to be measured.

④ **Pitch**

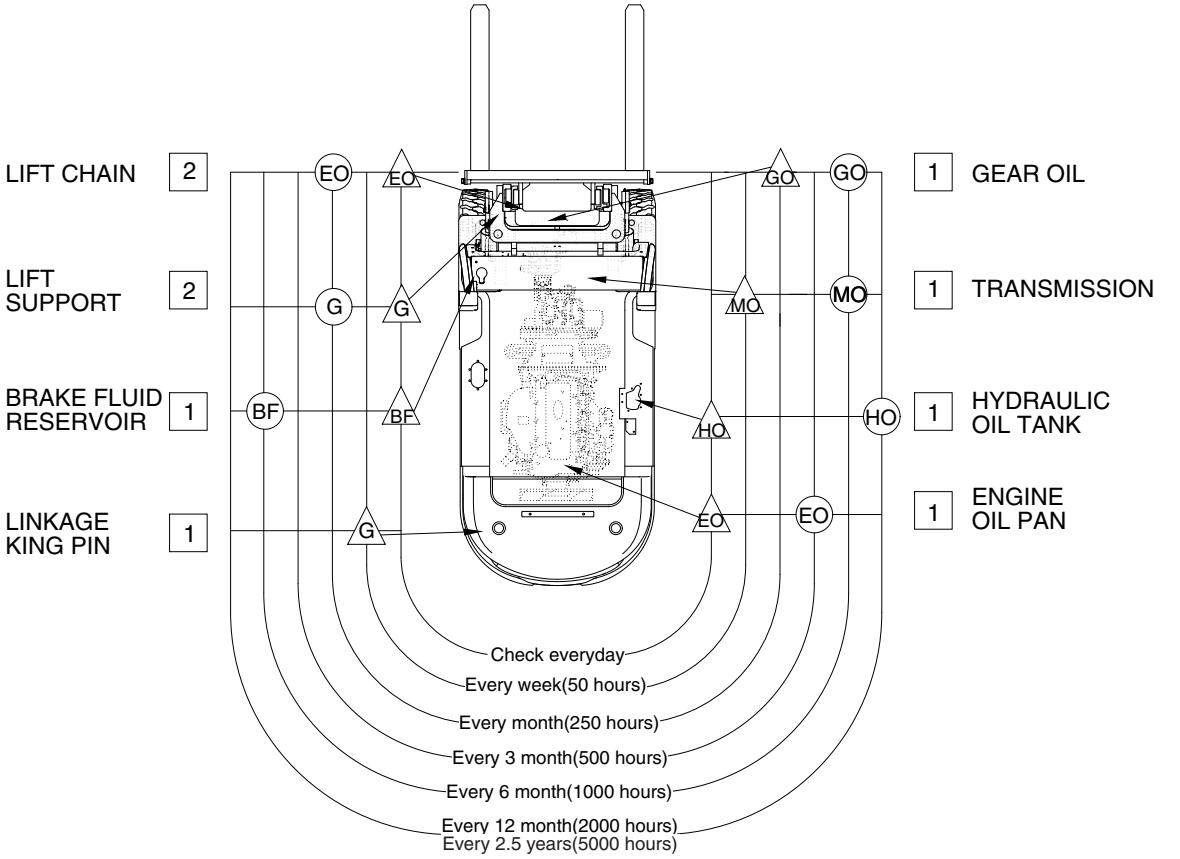
The distance from the center of one pin to the center of the next pin.



All chains must be replaced if any link has wear of 3% or more, or if any of the damaged conditions notes above are found during inspection. Order replacement chains from your HYUNDAI dealer. Replace all chains as a set. Do not remove factory lubrication or paint new chains. Replace anchor pins and worn or broken anchors when installing new chains. Adjust tension on new chains. Lubricate chains when they are installed on the mast.

※ Please refer to your service manual for additional information on lift chain measurement and maintenance.

7. LUBRICATION CHART



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NOTES

① △: Check, add oil when needed.

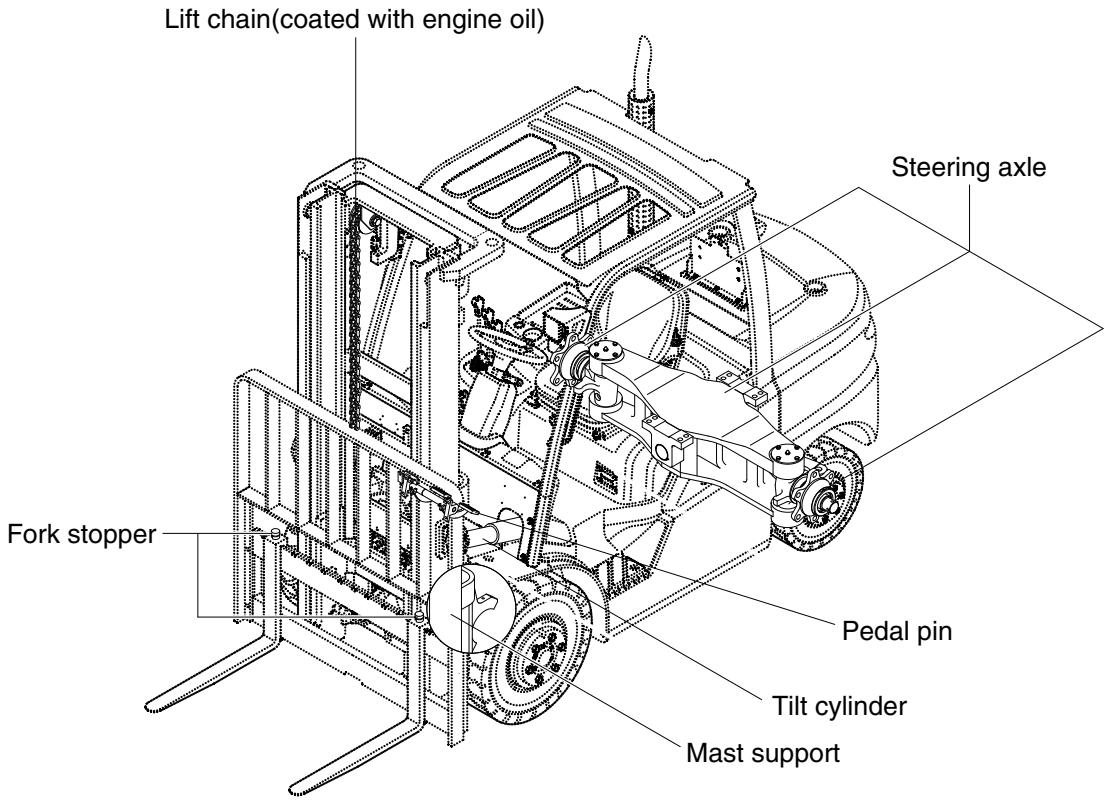
② ○: Change oil or add oil.

③ Figures in squares indicate number of lubricating points.

④ All service intervals in the chart are based on daily, 2 weeks, 1 month, 3 months, 6 months, and service meter readings.

Mark	Kind of lubricants	In moderate weather	Cold region
EO	Engine oil	API CJ-4 class	
MO	T/M oil	ATF DEXRON III	
GO	Gear oil	Shell DONAX TD	
HO	Hydraulic oil	ISO VG 46, VG68	ISO VG 15
BF	Brake fluid	AZOLLA ZS32 (Hydraulic oil ISO VG32)	
G	Grease	NLGI No. 2	NLGI No.1

8. GREASING POINT



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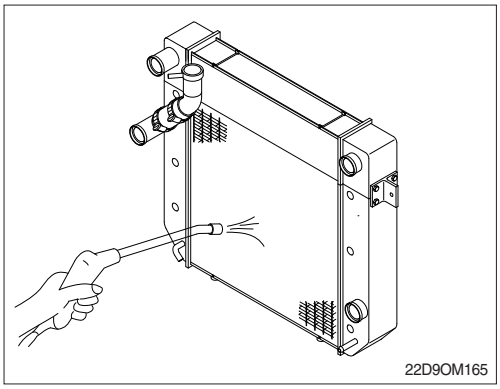
9. HANDLING MACHINE IN EXTREMELY HOT PLACES

Pay careful attention particularly to the following points when handling the machine in extremely hot places.



■ **Cooling system**

1) Scale and rust form more easily in the cooling system, so wash with anticorrosion liquid. Always try to have clean and soft water circulating in the system.
2) Clogging of the radiator fins is one cause of overheating, so use air or water jets to clean the fins. When doing this, the air nozzle must be at right angles to the radiator.
   · Air pressure max : 2 kgf/cm^2 (30 psi)
3) Check the fan belt tension. If it is too slack, adjust the tension. (SEE 8. SPECIFICATIONS)
4) In case of overheating, do not stop the engine immediately.
   (1) Run the engine at low idling.
   (2) Open the hood to ventilate the engine compartment.
   (3) When the water temperature drops, stop the engine.
   (4) Check the cooling water level. If it is low, add more water.

⚠ **Wear safety glasses and a face shield when using compressed air. Never touch the radiator cap while the engine is hot. Steam may spurt out. Wait until the water temperature drops. It is extremely dangerous to try to check the fan belt tension while the engine is running. When inspecting the fan belt or other moving parts, or near such parts, always stop the engine first.**

※ **Always keep fill the coolant to specified level and check for coolant leaks if necessary.**

■ **Battery**

In case of operating the machine in hot weather, it will be fallen fast the electrolyte level of the battery. Always check the electrolyte level of the battery and make sure that the level is kept near the upper level.

10. COLD WEATHER OPERATION

1) PREPARATION FOR LOW TEMPERATURE

(1) Replace lubrication oil with oil of the prescribed viscosity.

(2) Fuel of low pour point must be used. ASTM D975 No.1 diesel fuel should be used at ambient temperature lower than -5˚C .

(3) When ambient temperatures are below use an anti-freeze mixture per the above table to prevent freezing of the cooling system.

Min ambient temperature (˚C)	-5	-10	-15	-20	-25	-30	-50
Amount of antifreeze (%)	25	30	35	40	45	50	60
Amount of water (%)	75	70	65	60	55	50	40

⚠ **Use permanent type antifreeze.**
⚠ **Use soft water (city water, etc.) as mixing water.**
⚠ **Cooling system must be thoroughly flushed before filling with antifreeze mixture.**
⚠ **When the climate becomes warmer and antifreeze is not needed, replace with soft water (city water, etc.) after thoroughly cleaning the cooling system.**
⚠ **Do not expose antifreeze to flame. It is inflammable.**

※ **Dispose of old antifreeze mixture in locally approved manner.**

2) BATTERY

As ambient temperature drops, battery capacity will drop and electrolyte may sometimes freeze if battery charge is low. Maintain battery at a charge level of over 75% and insulate it against cold temperature so that machine can be readily started the next morning.

※ **When the electrolyte level is low, add distilled water in the morning before work instead of after the day's work. This is to prevent fluid from freezing at night.**

3) CARE AFTER DAILY OPERATION

(1) Drain water from fuel system to prevent freezing.
(2) Fill the tank at the end of each day of operation to drive out moisture laden air to prevent condensation.
Do not fill the tank to top.

⚠ **Explosive fumes may be present during refueling.**

11. STORAGE

1) BEFORE STORAGE

When you keep your forklift truck in storage for an extended period of time, observe the following safeguard instruction:

(1) Wash and tidy the truck and house it in a dry building.

(2) When the truck has to be placed outdoors, park it on a even ground and cover it securely with canvas.

(3) Give enough fuel, grease, lubricant and oil.

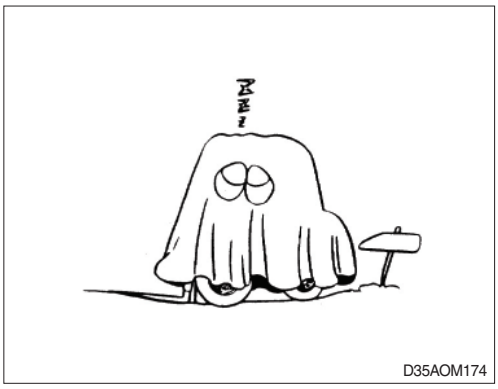
(4) Coat exposed piston rods of all hydraulic cylinders fully with grease.

(5) Cover batteries after removing terminals, or remove battery from the machine and store separately.

(6) When the atmospheric temperature is anticipated to drop below 0˚C , add antifreeze. (Refer to COLD WEATHER OPERATION about ratio of water and antifreeze.)

2) DURING STORAGE

(1) Operate the engine and move the machine for a short distance **once a month** so that a new oil film will be coated over movable parts and component surfaces. Remove and storage the battery at the same time.



⚠ The above operations should be performed in the open. If they have to be performed inside a building, open the windows and doors to improve ventilation.
This is to avoid the danger of gas poisoning.

※ BATTERY

① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.
② Every 2 months, check the battery voltage and keep battery voltage over 12.54V.
③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

3) AFTER STORAGE

After storage (When it is kept without cover or the rust-preventive operation once a month is not carried out), you should apply the following treatment before operation.

(1) Remove the drain plugs from the oil pan and other cases and drain any water.

(2) Remove the rocker housing cover and lubricate the valves and rocker arms well. Inspect the valve operation.

(3) After the engine is started, run it at idling speed until it is warmed up completely.

12. TRANSPORT

1) PRECAUTIONS FOR LOADING AND UNLOADING

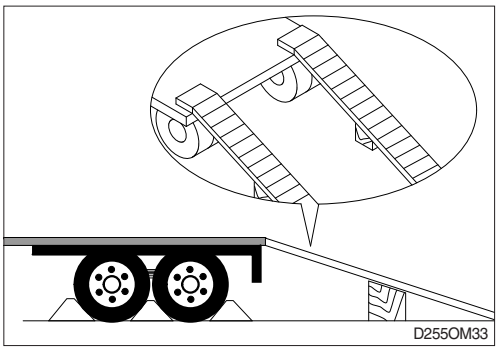
Contact your HYUNDAI forklift distributor for advice regarding transportation of the machine.
When loading or unloading the machine on or from a transporter, using loading ramp, the following precautions must always be observed.

⚠ **Check travel route for overpass clearance.**
Make sure there is adequate clearance if the lift truck being transported is equipped with a high mast or cab.

Remove ice, snow or other slippy material from the shipping lift truck and the loading dock.

(1) Ensure that the transporter cannot move by applying the brake and putting blocks under the wheels. Place the transmission control in NEUTRAL.

(2) Fix the loading ramps securely so that the centers of the transporter and machine are aligned. (The loading ramps should be of sufficient width, length and thickness to permit safe loading or unloading.)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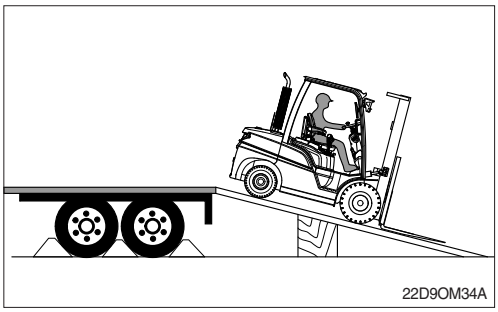
(3) After checking that the machine is aligned with the loading ramps, back the machine slowly up the ramps to load it on the transporter.

⚠ **When on the loading ramps, never change direction. If it is necessary to change direction, drive off the ramp and realign the machine.**
Block the wheels and secure the lift truck with tiedowns.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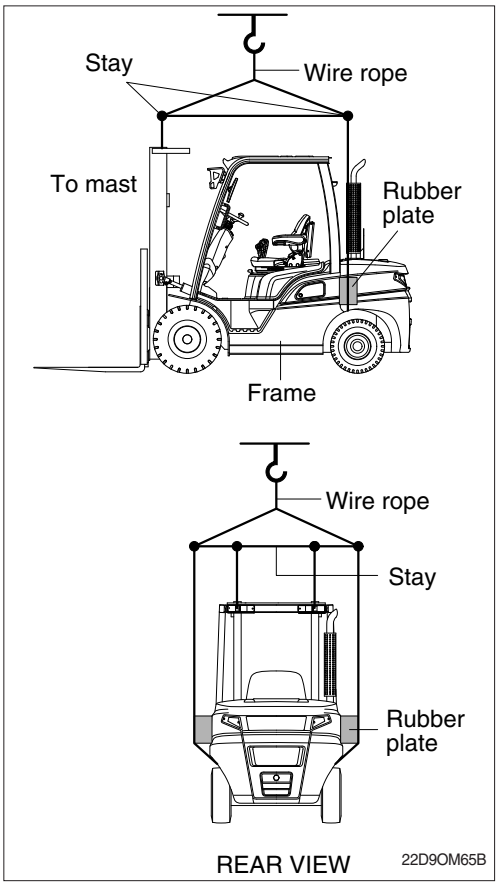
13. LOADING AND UNLOADING BY CRANE

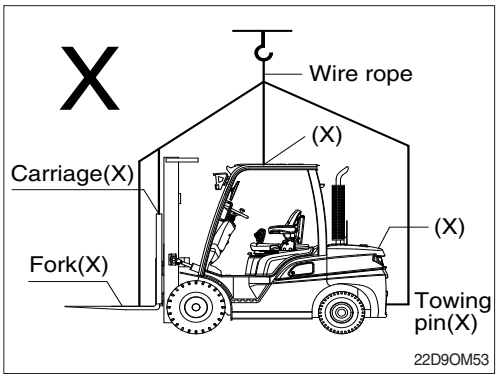
1) Check the specification of the truck when you are going to hoist the truck.
2) Use long wire rope and stay to keep the distance with the machine as it should avoid touching with the truck body.
3) Put a rubber plate where the wire rope contact with the truck's body to prevent damage.
4) Place crane on the proper place.
5) Install the wire rope and stay like the illustration.



⚠ Make sure wire rope is proper size.
⚠ Make sure that the truck is shut down before hoisting. Lifting the truck with engine running can cause serious accident.
⚠ The wrong hoisting method or installation of wire rope can cause damage to driver and truck.
⚠ Do not load abruptly.
⚠ Keep area clear of personnel.
⚠ Recommend to manufacture the stays separately as per lifting conditions.

6) If there is lifting brackets on the truck's body, use them to lift a truck.

⚠ Use appropriate method for your forklift truck.
⚠ Do not install the wire to unsafe position such as forks, carriage, head guard, counterweight lifting hole or towing pin, etc.. It can cause serious injury or damage to driver and truck.
⚠ If there is any problem to lift a truck, please contact your dealer.
⚠ Perform the lifting service with skilled service men.



14. RECOMMENDATION TABLE FOR LUBRICANTS

1) NEW MACHINE

New machine uses following fuel, coolant and lubricant.

Description	Specification
Engine oil	SAE 15W-40 (API CJ-4 class)
T/M oil	ATF DEXRON III
Gear oil	Shell DONAX TD
Hydraulic oil	ISO VG46/VG68, Hyundai genuine long life hydraulic oil ISO VG15, Conventional hydraulic oil★1
Brake oil	AZOLLA ZS32 (Hydraulic oil ISO VG32)
Grease	Lithium base grease NLGI No.2
Fuel	ASTM D975-No.2
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water

- SAE : Society of Automotive Engineers
- API : American petroleum Institute
- ISO : International Organization for Standardization
- NLGI : National Lubricating Grease Institute
- ASTM : American Sociery of Testing and Material

★1 : Cold region
Russia, CIS, Mongolia

15. FUEL AND LUBRICANTS

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature °C(°F)
			-50 (-58) / -30 (-22) / -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	11.2 (3.0)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Torque converter transmission	Transmission oil	10 (2.6)	ATF DEXRON III
Axle	Gear oil	5 (1.3)	Shell DONAX TD
Hydraulic tank	Hydraulic oil	40 (10.6)	★ISO VG 15 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel★1	60 (15.9)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease	-	★NLGI NO.1 NLGI NO.2
Brake reservoir tank	Brake oil	0.5 (0.13)	★AZOLLA ZS10 (Hydraulic oil, ISO VG10) AZOLLA ZS32 (Hydraulic oil, ISO VG32)
Radiator	Antifreeze : Water	9.4 (2.48)	Ethylene glycol base permanent type (50:50) ★Ethylene glycol base permanent type (60 : 40)

NOTES :

- Engine oil should be API classification CJ-4.
- Change the type of engine oil according to the ambient temperature.
- When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.

★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★ : Cold region
Russia, CIS, Mongolia

16. AIR CONDITIONER AND HEATER

1) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (About 5°C lower than the outside temperature).

(4) When cooling, change air occasionally.

2) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

3) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (Each for a few minutes) to avoid loss of oil film in the compressor.

4) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
22/25/30/33D-9/35DA-9	HFC-134a	0.55 kg (1.21 lb)	787 CO_2 eq.

※ GWP

Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO2). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO2.

(2) Envior

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.
HFC-134a refrigerant is a flourinated greenhouse gas and contributes to global warming.
Do not release refrigerant into the environment.

(3) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.
Do not attempt to preform work on the air conditioning system.
Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(4) Action in case of exposure

① Eye contact / Limited skin contact
Rinse with warm water and apply a light bandage. Seek medical attention immediately.

② Extensive skin contact
Rinse with warm water and carefully heat the area with warm water or warm clothing.
Seek medical attention immediately.

③ Inhalation
Leave the area and find fresh air. Seek medical attention immediately.