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A MESSAGE TO HYUNDAI LIFT TRUCK OPERATORS

Lift trucks are specialized machines with unique operating characteristics, designed to perform a specific job. Their function and operation is not like a car or ordinary truck. They require specific instructions and rules for safe operation and maintenance.

Safe operation of lift trucks is of primary importance to HYUNDAI.
Our experience with lift truck accidents has shown that when accidents happen and people are killed or injured, the causes are:

- **Operator not properly trained**
- **Operator not experienced with lift truck operation**
- **Basic safety rules not followed**
- **Lift truck not maintained in safe operating condition**

For these reasons, HYUNDAI wants you to know about the safe operation and correct maintenance of your lift truck.

This manual is designed to help you operate your lift truck safely.
This manual shows and tells you about safety inspections and the important general safety rules and hazards of lift truck operation. It describes the special components and features of the truck and explains their function. The correct operating procedures are shown and explained. Illustrations and important safety messages are included for clear understanding. A section on maintenance and lubrication is included for the lift truck mechanic.

The operator's manual is not a training manual. It is a guide to help trained and authorized operators safety operate their lift truck by emphasizing and illustrating the correct procedures. However, it cannot cover every possible situation that may result in an accident. You must watch for hazards in your work areas and avoid or correct them. It is important that you know and understand the information in this manual and that you know and follow your company safety rules!
Be sure that your equipment is maintained in a safe condition. Do not operate a damaged or malfunctioning truck. Practice safe operation every time you use your lift truck. Let's join together to set high standards in safety.

Remember, before you start operating this lift truck, be sure you understand all driving procedures. It is your responsibility, and it is important to you and your family, to operate your lift truck safely and efficiently.

△ **Be aware that the Federal Occupational Safety and Health Act(OSHA) and state laws require that operators be completely trained in the safe operation of lift trucks; It is also an (OSHA) requirement that a machine inspection be performed before every shift. If you need training in operating or inspecting your lift truck, ask your supervisor.**

HYUNDAI lift trucks are built to take hard work, but not abuse. They are built to be dependable, but they are only as safe and efficient as the operator and the persons responsible for maintaining them. Do not make any repairs to this truck unless you have been trained in safe lift truck repair procedures and are authorized by your employer.

This manual describes procedures for operation, handling, lubrication, maintenance, checking and adjustment. It will help the operator realize peak performance through effective, economical and safe machine operation.

INTRODUCTION

HYUNDAI welcomes you to the growing group of professionals who own, operate and maintain HYUNDAI lift trucks. We take pride in the long tradition of quality products and superior value the HYUNDAI name represents. This manual familiarizes you with safety, operating, and maintenance information about your new lift truck. It has been specially prepared to help you use and maintain your HYUNDAI lift truck in a safe and correct manner.

Your HYUNDAI lift truck has been designed and built to be as safe and efficient as today's technology can make it. As manufactured, for some models, it meets all the applicable mandatory requirements of ANSI B56.1-1988 Safety Standard for Powered Industrial Trucks. Some trucks are also furnished with equipment to help you operate safety; for example, load back rest, parking brake and horn are standard equipment.

Safe, productive operation of a lift truck requires both skill and knowledge on the part of the operator. The operator must know, understand, and practice the safety rules and safe driving and load handling techniques described in this manual. To develop the skill required, the operator must become familiar with the construction and features of the lift truck and how they function, the operator must understand its capabilities and limitations, and see that it is kept in a safe condition.

Routine Servicing and Maintenance

Regular maintenance and care of your lift truck is not only important for economy and utilization reasons; it is essential for your safety. A faulty lift truck is a potential source of danger to the operator, and to other personnel working near it. As with all quality equipment, keep your lift truck in good operating condition by following the recommended schedule of maintenance.

Operator Daily Inspection - Safety and Operating Checks

A lift truck should always be examined by the operator, before driving, to be sure it is safe to operate. The importance of this procedure is emphasized in this manual with a brief illustrated review and later with more detailed instructions. HYUNDAI dealers can supply copies of a helpful **Drivers Daily Checklist.** It is an OSHA requirement.

Planned Maintenance

In addition to the daily operator inspection, HYUNDAI recommends that a planned maintenance and safety inspection program(PM) be performed by a trained and authorized mechanic on a regular basis. The PM will provide an opportunity to make a thorough inspection of the safety and operating condition of your lift truck. Necessary adjustments and repairs can be done during the PM, which will increase the lift or components and reduce unscheduled downtime and increase safety. The PM can be scheduled to meet your particular application and lift truck usage.

The procedures for a periodic planned maintenance program that covers inspections, operational checks, cleaning, lubrication, and minor adjustments are outlined in this manual. Your HYUNDAI dealer is prepared to help you with a Planned Maintenance Program by trained service personnel who know your lift truck and can keep it operating safely and efficiently.

Service Manual

In-depth service information for trained service personnel is found in Service Manual.

HOW TO USE THIS MANUAL

This manual is a digest of essential information about the safe operation, the features and functions and explains how to maintain your lift truck. This manual is organized into nine major parts:

Section 1. Safety hints, reviews and illustrates accepted practices for safe operation of a lift truck.

Section 2. Operating Hazards, warns of conditions that could cause damage to the truck or injury to the operator or other personnel.

Section 3. Know Your Truck, describes the major operating components, systems, controls, and other features of your truck and tells how they function.

Section 4. Operator Maintenance and Care, presents details on how to perform the operator's daily safety inspection and refuel the lift truck.

Section 5. Starting and Operating Procedures, discusses specific instructions on the safe, efficient operation of your lift truck.

Section 6. Emergency Starting and Towing, gives instructions for towing your truck in an emergency and for using battery jumper cables to start your truck in an emergency.

Section 7. Planned Maintenance and Lubrication, describes the PM (Planed Maintenance) program.

Section 8. Specifications, provides reference information and data on features, components, and maintenance items.

Section 9. Troubleshooting, provides trouble symptoms, causes and methods of remedy.

Section10. Testing and Adjusting, gives instructions for testing and adjusting.

※**The descriptions and specifications included in this manual were in effect at the time of printing.** HYUNDAI reserves the right to make improvements and changes in specifications or design, without notice and without incurring obligation. Please check with your authorized HYUNDAI dealer for information on possible updates or revisions.

The examples, illustrations, and explanations in this manual should help you improve your skill and knowledge as a professional lift truck operator and take full advantage of the capabilities and safety features of your new lift truck.

The first section of the manual is devoted to a review, with illustrations and brief messages, of general safety rules and the major operating hazards you can encounter while operating a lift truck. Next, you will find description's of the components of your specific lift truck model and how the instruments, gauges, and controls operate. Then, you will find a discussion of safe and efficient operating procedures, followed by instruction's on how to tow a disabled lift truck. The later sections of the manual are devoted to maintenance and truck specifications.

Take time to carefully read the **Know Your Truck** section. By acquiring a good basic understanding of your truck's features, and how they function, you are better prepared to operate it both efficiently and safely.

In **Planned Maintenance**, you will find essential information for correct servicing and periodic maintenance of your truck, including charts with recommended maintenance intervals and component capacities. Carefully follow these instructions and procedures.

Each major section has its own table of contents, so that you can find the various topics more easily.

We urge you to first carefully read the manual from cover to cover. Take time to read and understand the information on general safety rules and operating hazards. Acquaint yourself with the various procedures in this manual. Understand how all gauges, indicator lights, and controls function. Please contact your authorized HYUNDAI dealer for the answers to any questions you may have about your lift truck's features, operation, or manuals.

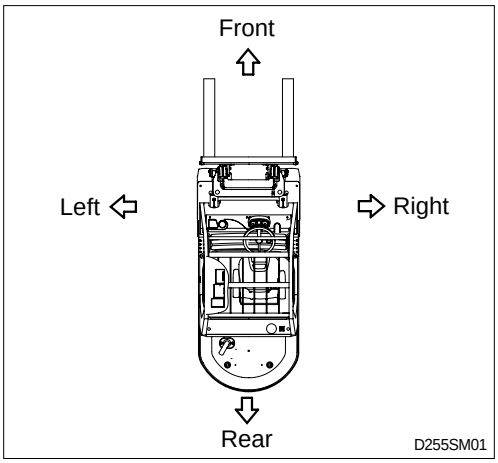
Operate your lift truck safely; careful driving is your responsibility.
Drive defensively and think about the safety of people who are working nearby. Know your truck's capabilities and limitations. Follow all instructions in this manual, including all symbols (⚠ △ ※)and messages to avoid damage to your lift truck or the possibility of any harm to yourself or others.

This manual is intended to be a permanently attached part of your lift truck. Keep it on the truck as a ready reference for anyone who may drive or service it. If the truck you operate is not equipped with a manual, ask your supervisor to obtain one and have it attached to the truck. And, remember, your HYUNDAI dealer is pleased to answer any questions about the operation and maintenance of your lift truck and will provide you with additional information should you require it.

※ **Illustrations may differ from your machine, but they are applicable to your machine.**

1. DIRECTION

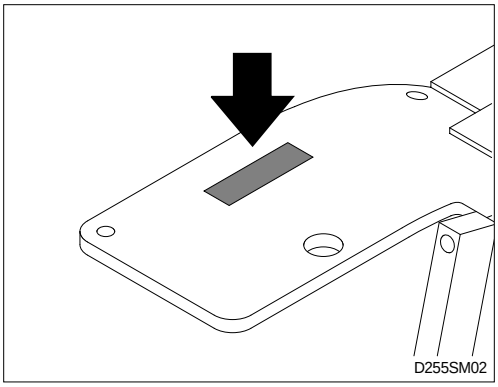
The directions of this machine indicate forward, backward, right and left when machine is in the travelling direction.



2. SERIAL NUMBER

Inform following when you order parts or the machine is out of order.

1) MACHINE SERIAL NUMBER
It's shown on front of the right side frame.



3. SYMBOLS

⚠ Important safety hint

△ It indicates matters which can cause the great loss on the machine or the surroundings.

※ It indicates the useful information for operator

1. DAILY INSPECTION

At the beginning of each shift, inspect your truck and fill out a check, maintenance and lubrication table.

Check for damage and maintenance problems.

Have repairs made before you operate the truck.

Do not make repairs yourself. Lift truck mechanics are trained professionals. They know how to make repairs safely.

D35AOM01

2. DO'S AND DON'TS

Do watch for pedestrians.

Do wear safety equipment when required.

Don't mix drugs or alcohol with your job.

Don't block safety or emergency equipment.

Don't smoke in NO SMOKING areas or when refueling.

Don't operate the truck outdoors in rainy day.

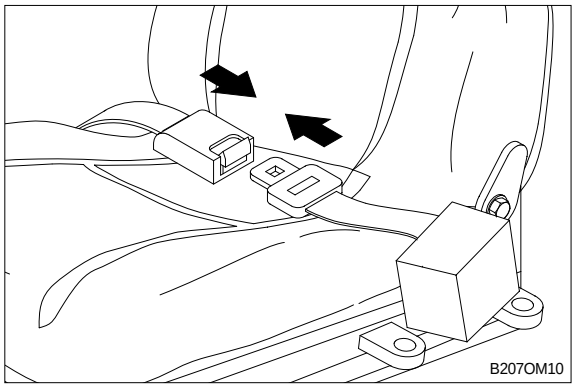
※ **Exclude the truck equipped cabin.**

Exhaust gas is dangerous.
Do not operate the truck at the inhouse, if possible.
Provide adequate ventilation when working in a closed space.

3. SEAT BELTS

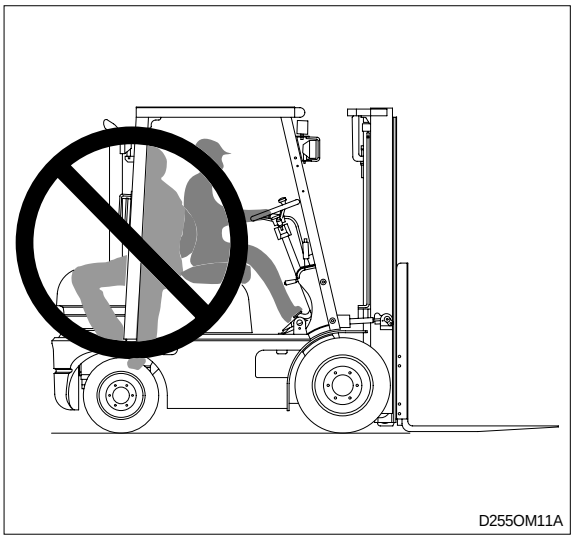
⚠ Always buckle up for the machine equipped with safety belt.

⚠ Seat belts can reduce injuries.



4. NO RIDERS

1) The operator is the only one who should be on a truck.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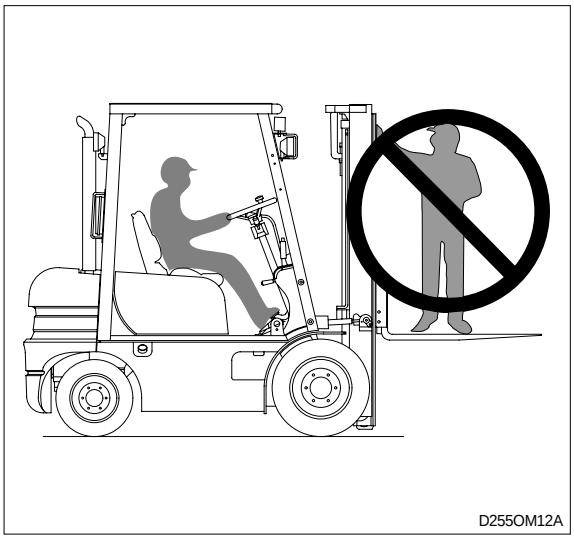
2) Never transport personnel on the forks of a lift truck.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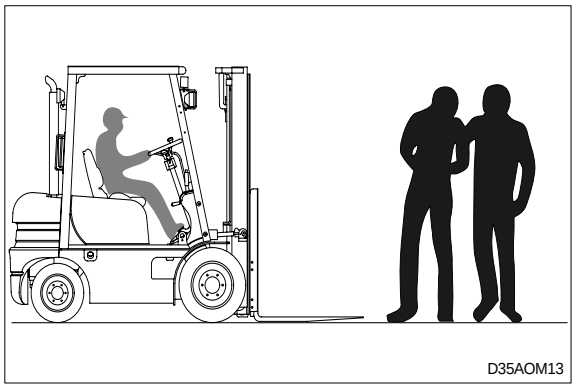
5. PEDESTRIANS

1) Watch where you are going. Look in the direction of travel. Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.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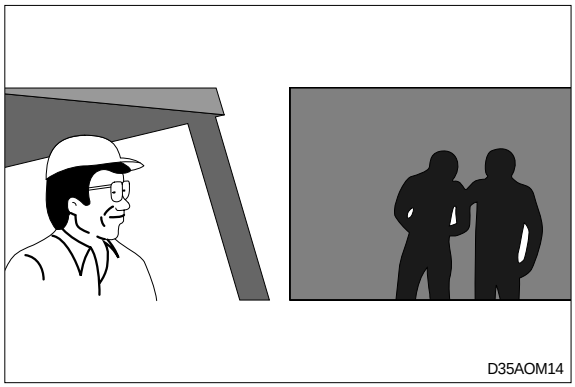
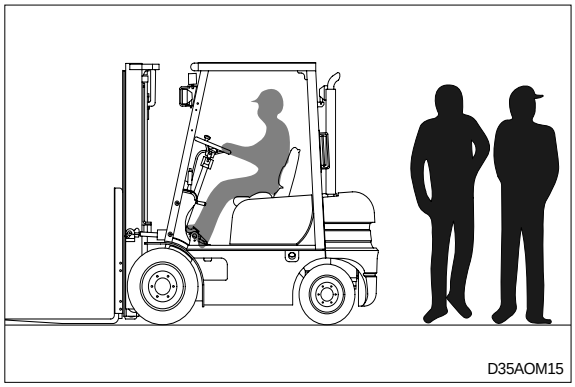
2) Watch for people in your work area even if your truck has warning lights or alarms. People may not watch for you.


D35AOM14

3) Watch for people standing back, even when you are parked.

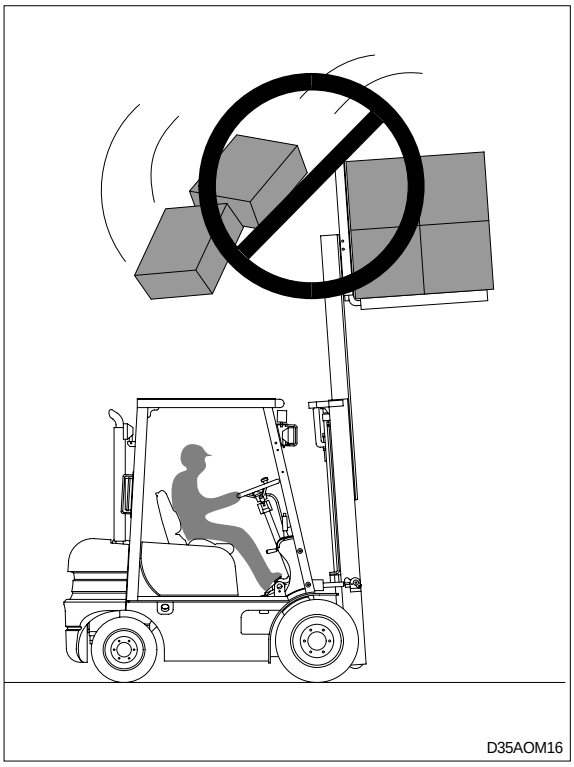

D35AOM15

6. OPERATOR PROTECTION

1) Keep under the overhead guard.

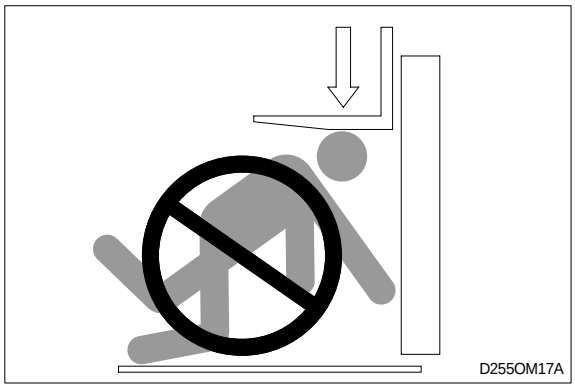
2) Always keep your body within the confines of the truck.

⚠ **Do not operate truck without overhead guard, unless condition prevent use of a guard.**

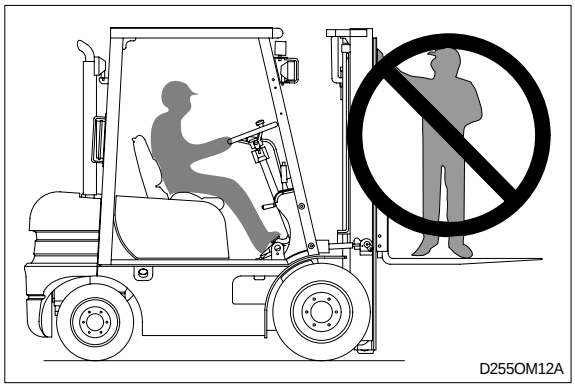


7. FORK SAFETY

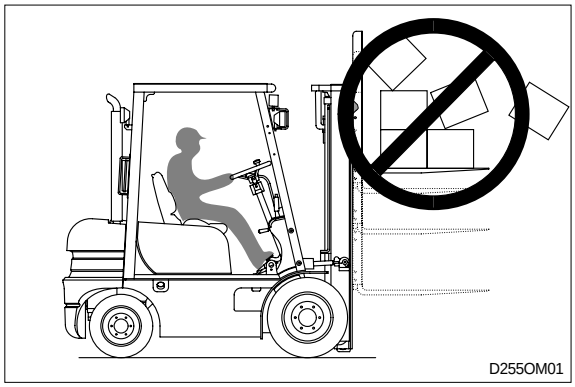
Never allow anyone to walk under raised forks.



There is special equipment to raise people for overhead work.
DO NOT USE LIFT TRUCKS.

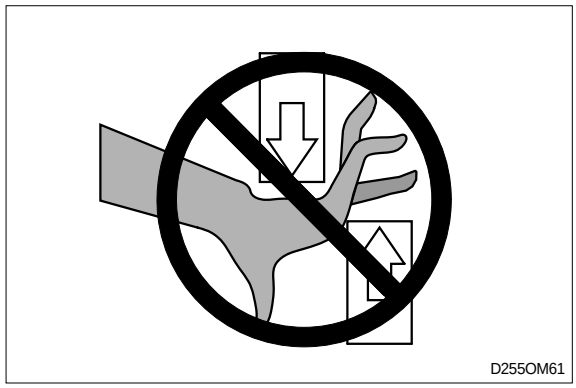


Always lower the load slowly.
Raise and lower with mast vertical or tilted slightly back(Never forward).



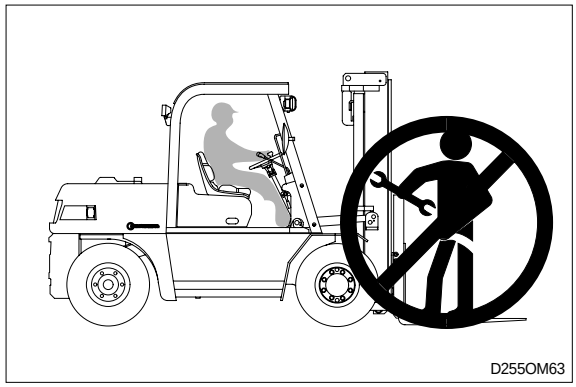
8. PINCH POINTS

⚠ Keep hands, feet and legs out of the mast.



⚠ Don't use the mast as a ladder.

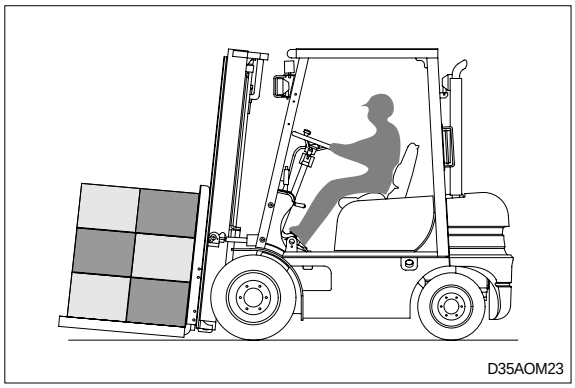
⚠ Never try to repair the mast, carriage, chain, or attachment by yourself. Always get a trained mechanic.



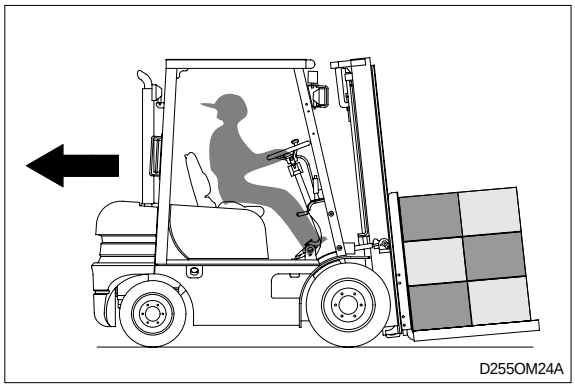
9. TRAVEL

1) Travel with the load near the floor/ground, with mast tilted back to cradle the load whenever possible.

⚠ **Never lift or lower the load when the truck is in motion.**



2) When handling bulky loads that restrict your vision operate your truck in reverse to improve visibility. Be sure to pivot in the seat to give maximum visibility.

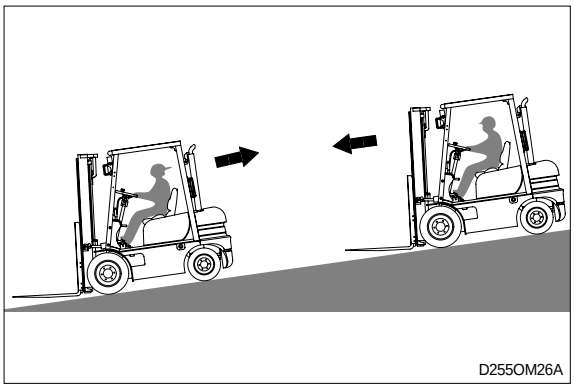


3) Unstable loads are a hazard to you and to your fellow workers. Always make certain that the load is well stacked and evenly positioned across both forks. Never attempt to lift a load with only one fork.

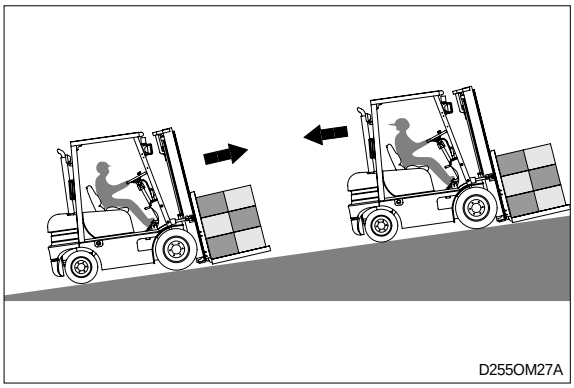
10. GRADES, RAMPS, SLOPES AND INCLINES

⚠ Never turn on a grade, either loaded or unloaded.

1) Unloaded-Forks downgrade



2) Loaded - Forks upgrade



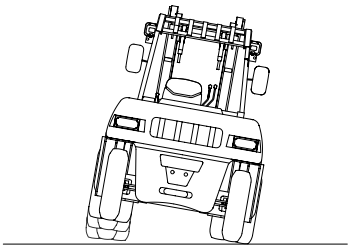
11. TIP OVER

1) LATERAL TIP OVER

(1) Lateral tip over can occur with a combination of speed and sharpness of turn. This combination will exceed the stability of the truck. This condition is even more likely with an unloaded truck.

(2) With the load or mast raised, lateral tip over can occur while turning and/or braking when traveling in reverse or accelerating and turning while traveling forward.

(3) Lateral tip over can occur loaded or unloaded by turning on an incline or ramp.



D35AOM28

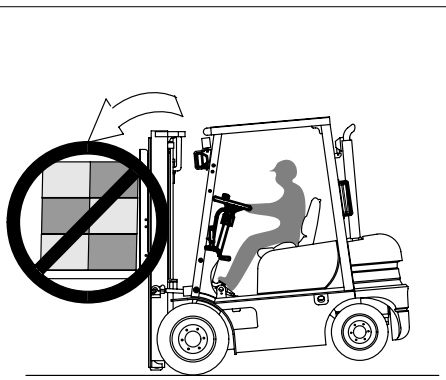
2) LONGITUDINAL TIP OVER

(1) Longitudinal tip over can occur with combination of overloading and load elevated also with capacity load and elevated. This combination will exceed the stability of the truck. This condition is even more likely with excessive forward tilt, braking in forward travel or accelerating rearward.

(2) Longitudinal tip over can occur by driving with the load down slope on a steep grade.

Lateral and longitudinal tip over can occur if the truck is driven over objects on the floor or ground, off the edge of improved surfaces, or into potholes in the road surface, or by running into overhead objects or collisions.

An off dock type of tip over can occur if the truck is steered too close to the dock edge, driven off the edge of the dock or ramp, or if the highway truck or trailer rolls away from the dock or is driven away during loading.



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⚠ The conditions listed above can be further aggravated by overloading, excessive tilt, or off center loads.

⚠ Lift truck tip over can cause serious injury or death if the operator is trapped between the truck and the ground.

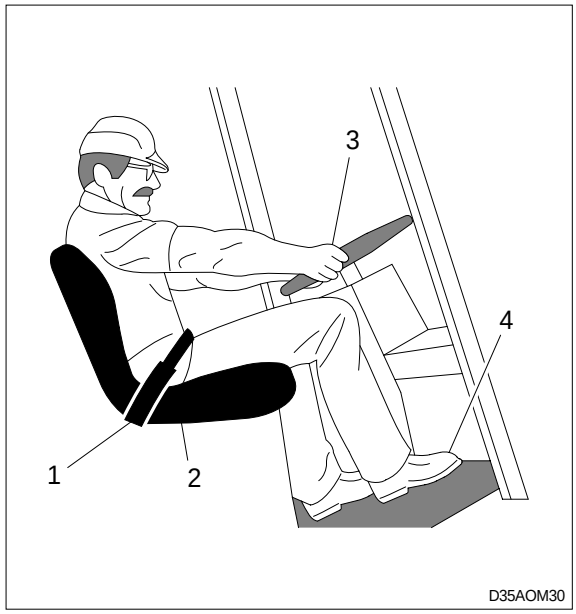
3) WHAT TO DO IN CASE OF A TIP OVER

⚠ **If your truck starts to tip over, Do not jump.**

⚠ **Brace yourself as illustrated right.**

1. Make sure your seat belt is fastened securely, if the truck is equipped with seat belt.
2. Stay in your seat.
3. Grip the wheel.
4. Brace your feet.

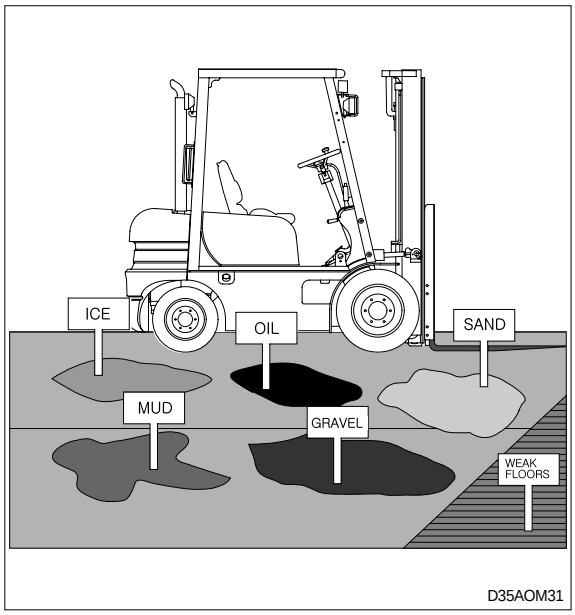
⚠ **Your chances for survival in a tip-over are better if you stay with the truck, in your seat.**



12. SURFACE AND CAPACITY

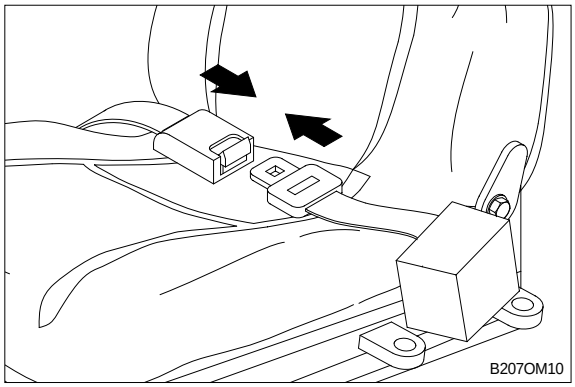
Avoid these conditions. They can cause a truck to tip over or lose traction for braking or driving.

⚠ **Know the weight of your truck and load. Especially when using elevators, Know the capacity of the elevator you intend to use. Do not overload.**



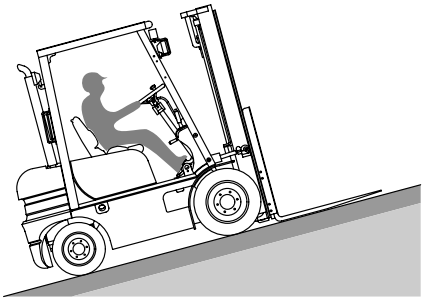
TIPOVER

⚠ **Seat belts can reduce injuries. ALWAYS BUCKLE UP**



13. PARKING

1) Never park on a grade.



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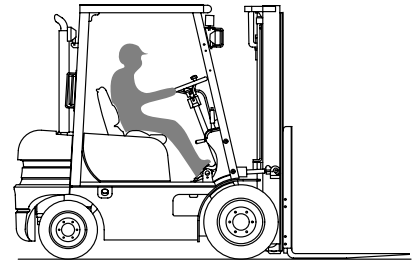
2) Always come to a complete stop before leaving truck. Be sure travel control is in NEUTRAL.



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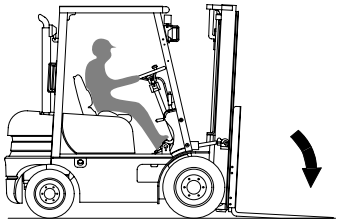
3) Lower forks fully to floor and tilt forward.



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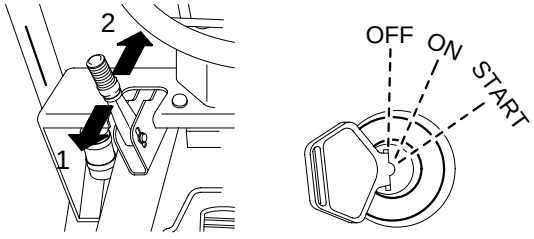
4) Set parking brake.
   Position 1 : Lock
   Position 2 : Release

5) Turn key to OFF position.



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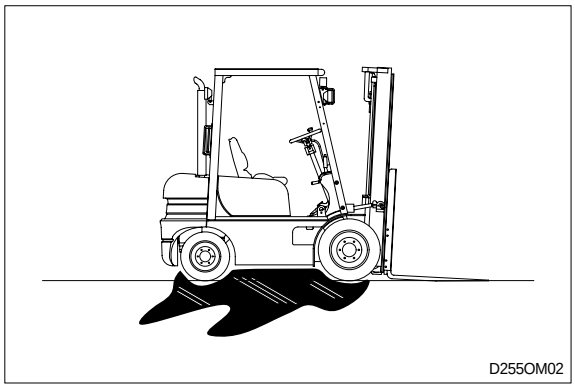
14. REFUELING

1) Before adding oil, check around machine for oil leakage.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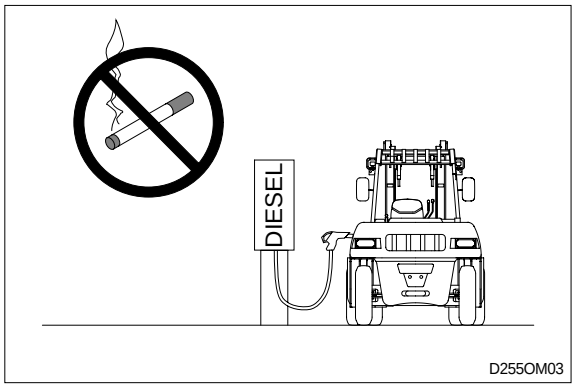
2) Keep away from fire when adding oil or during operation.



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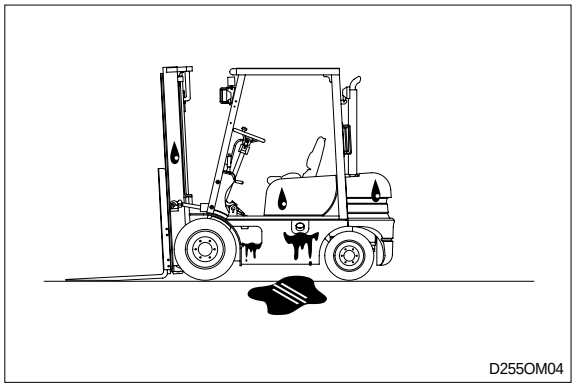
3) After adding oil, wipe off any oil spilled on machine.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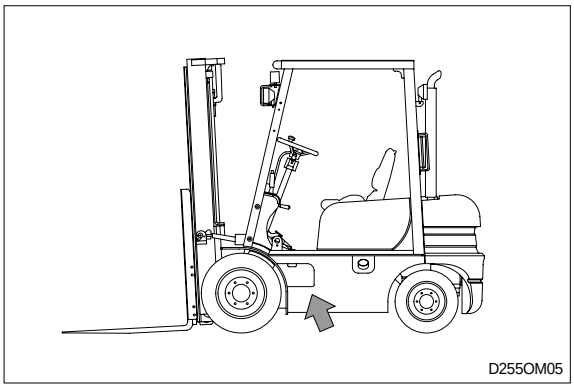
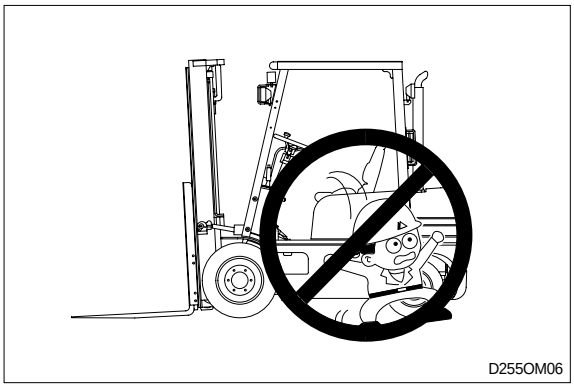
15. STEP

1) When getting on or off the machine, use the step provided.



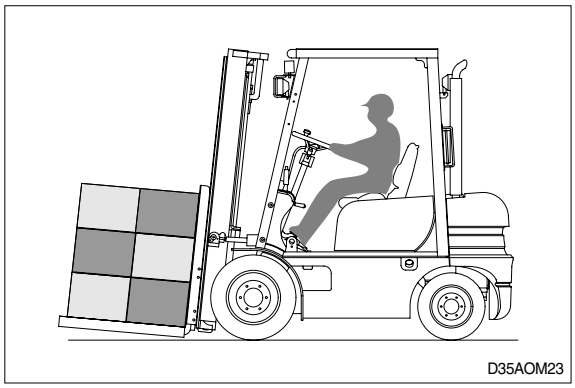
2) Do not jump up or down from the machine.



16. OPERATOR'S SAFETY RULES

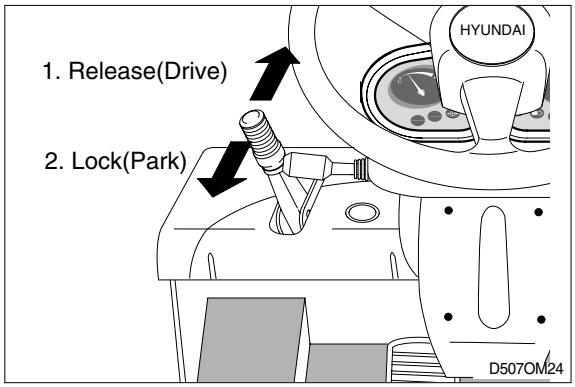
1) All operational functions require that the operator be seated in the operator's seat.

⚠ **Always buckle up if a seat belt is provided.**



2) Parking brake must be locked in the PARK POSITION before exiting from the vehicle.

⚠ **Parking brake must remain locked in the park position(2) except when an operator is in the normal operating position.**



3) ANSI/ASME REGULATIONS (USA ONLY)

⚠ **This forklift truck is equipped with an Operator Existence Sensing System per ANSI/ASME B56.1 ~ 7.21.10 and 7.21.11.**

(1) Traction safety warning

① This function works when the key switch is ON or START position.
② The transmission shifts automatically to neutral in 2 seconds from the driver's off the seat.
③ At the same time, the alarm will sound intermittently.
④ To release the function, the forward-reverse lever must be cycled through neutral with the operator in the normal operating position to regain powered directional control.

(2) Parking brake warning (35DS/40DS/45DS-7, 35D/40D/45D-7, HDF50/70-7(S) ONLY)

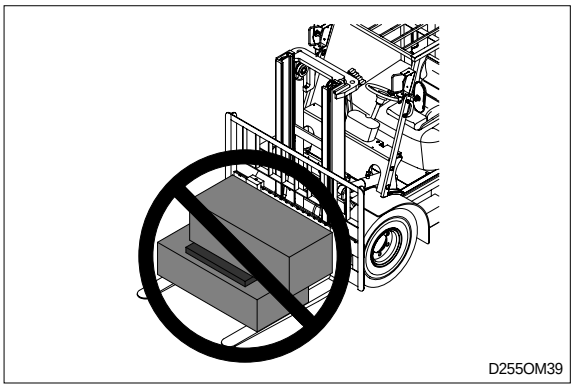
① This function works when the key switch is not only ON or START position but also OFF position.
② Alarm sounds in 2 seconds from the driver's off the seat with the parking lever released.
③ To release the function, the parking lever must be applied to LOCK position.
④ When the key switch is OFF position, alarm will sound only for 30 seconds to prevent battery discharge and noise.

2. OPERATING HAZARDS

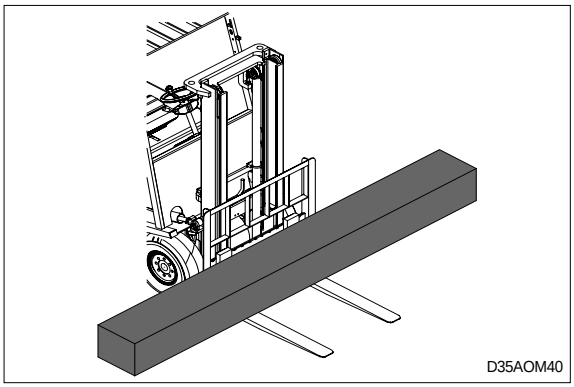
1. LOOSE LOADS

⚠ Loose or unbalanced loads are dangerous. Observe these precautions.

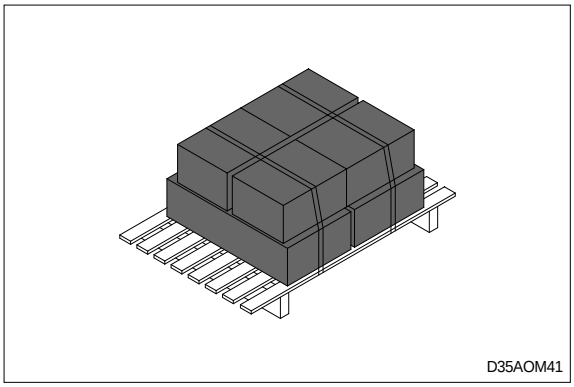
Never carry loose or uneven material.



Center wide loads.

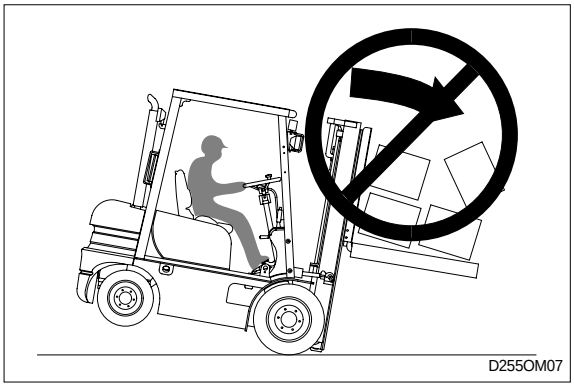


Stack and band loose material.



Avoid sudden braking or starting

⚠ When the machine is loaded, do not drive at maximum speed.

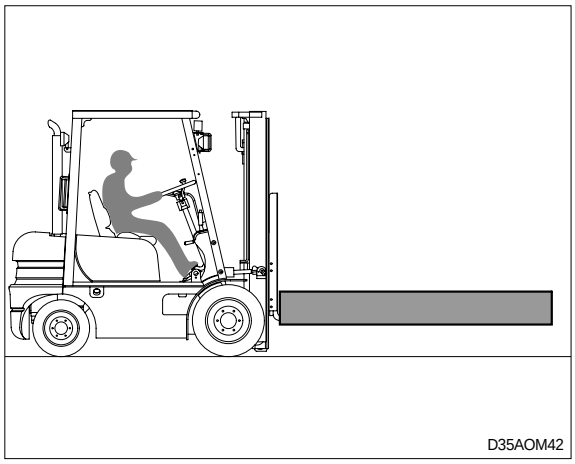


2. LONG AND WIDE LOADS

⚠ With long or wide loads, you need more room. So slow down and watch your clearance.

When extra-long material makes it necessary to travel with the load elevated, do so with extreme care and be alert to load end-swing when turning.

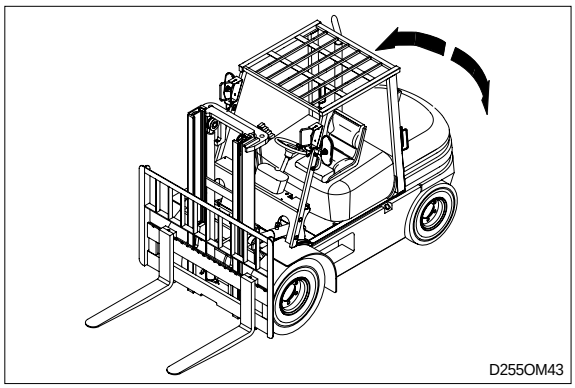
⚠ A long load reduces the capacity of the truck. Know and understand your truck load rating.



D35AOM42

3. REAR SWING

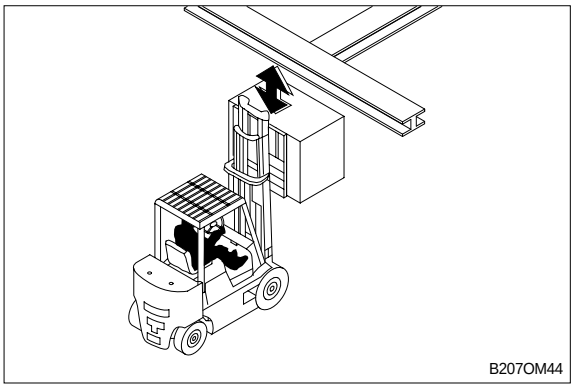
⚠ When turning, be sure the rear end of the truck does not swing into racks, posts, etc. Watch for pedestrians beside the truck.



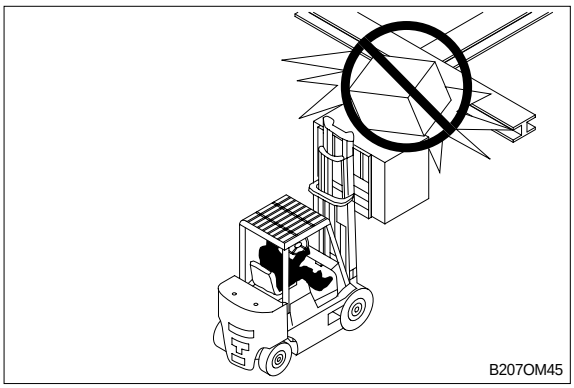
D255OM43

4. LOW OVERHEAD CLEARANCE

⚠ Know the height of your truck, with and without a load. Check your clearances. Keep the load low and tilted back.

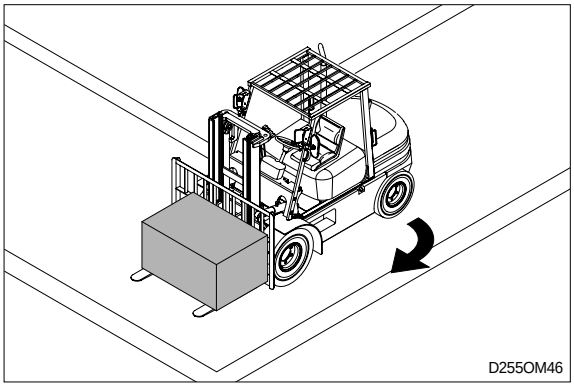


⚠ Watch overhead clearance:
Moving into overhead structures can tip a truck over, or spill a load.

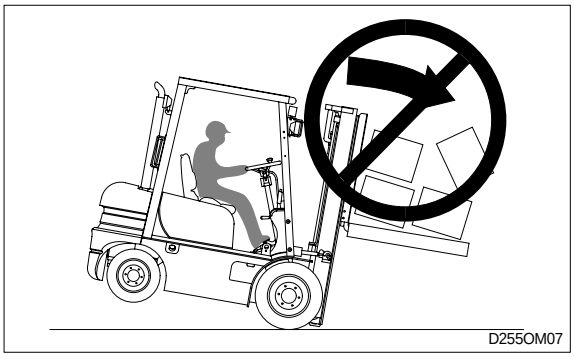


5. FAST TURNS AND HIGH LOADS

⚠ Slow down before turning.
The truck can tip over.



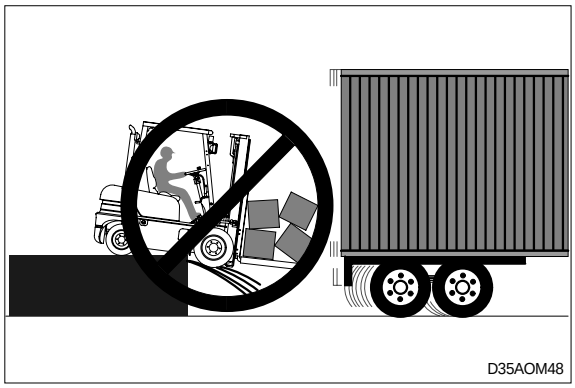
⚠ Turn too sharp with a raised load and your truck can tip even at slow speeds. Travel with a load raised only when removing or depositing a load.



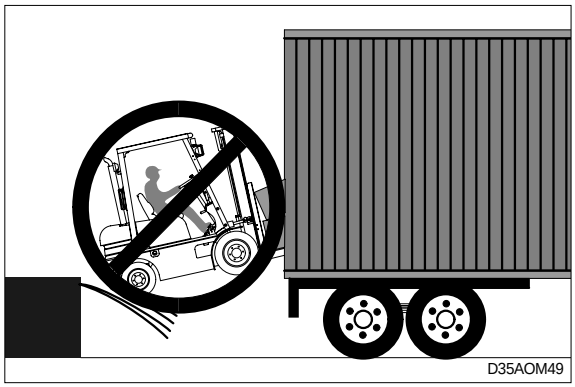
6. DROP-OFFS

⚠ **To avoid these hazards, you must:**

1) Talk to the truck driver yourself: make sure the driver does not move the trailer until you are done.
2) Apply trailer brakes.
3) Use wheel chocks.
4) Use trailer-to-dock locking system if available.

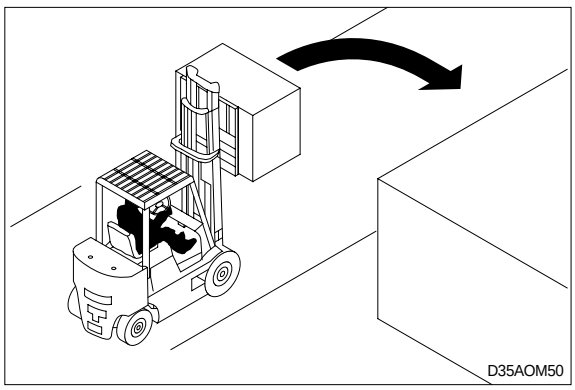


⚠ **The impact of moving in and out of a trailer may cause the trailer to creep or move.**



7. RIGHT ANGLE STACKING

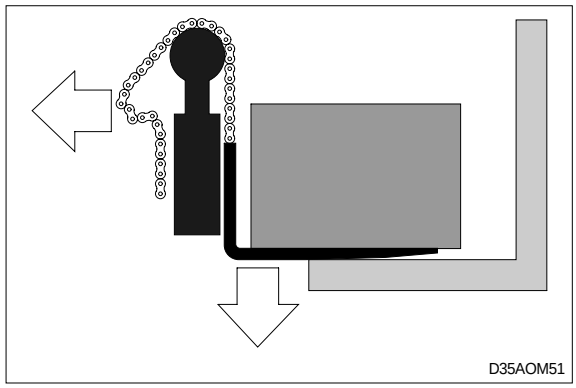
⚠ **When right angle stacking or moving with a raised load to clear low objects, avoid sharp turns and move slowly.**

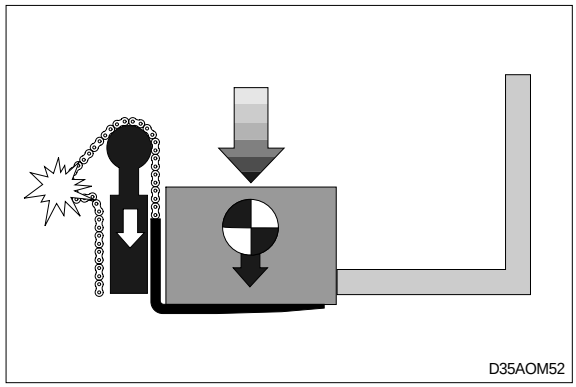


8. CHAIN SLACK

⚠ Slack chains mean rail or carriage hang-up.
Raise the forks before you move, or broken chains can result.

⚠ In case forks with loads are stuck while lowering the mast, lift the mast again and prevent chains from being slack.

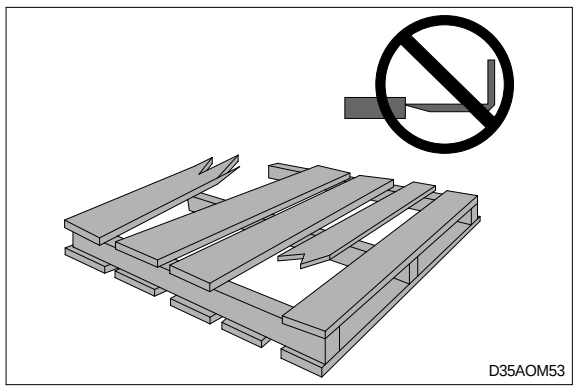




9. PALLETS AND SKIDS

⚠ Do not move or store materials on damaged pallets or skids. Items can fall through them causing severe injury or death.

⚠ Be sure the pallet or skid you are using is in good condition and does not have defective or missing components and fasteners.



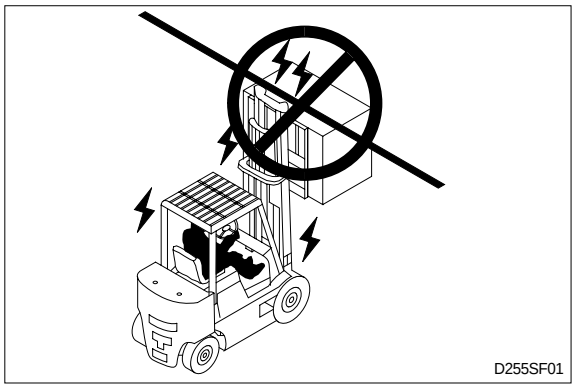
10. CAUTION FOR ELECTRICAL LINES

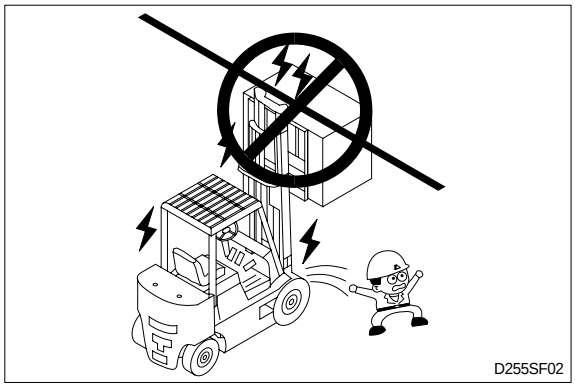
⚠ When moving the machine with the mast raised, watch out electrical lines over the machine.

⚠ The operating near the electrical lines is very dangerous.
Operate within safe working permitted as below.

Supply voltage	Min safe separation
6.6 kV	3m (10ft)
33.0 kV	4m (13ft)
66.0 kV	5m (16ft)
154.0 kV	8m (26ft)
275.0 kV	10m (33ft)

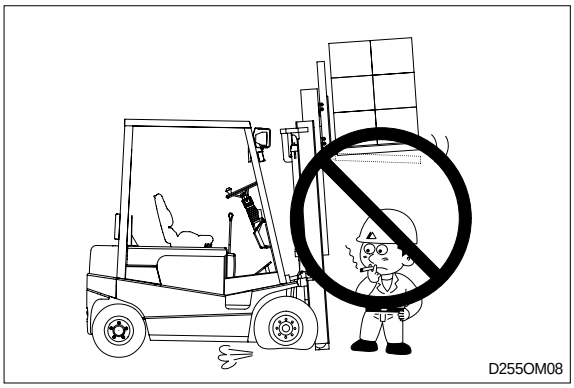
⚠ If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current.
Jump off the machine without contacting the machine when you need to get off.


D255SF01

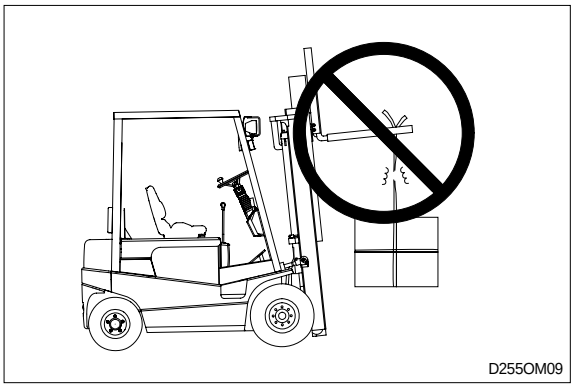

D255SF02

11. LIFTING LOADS

Never permit any persons to stand or pass under lifted load.

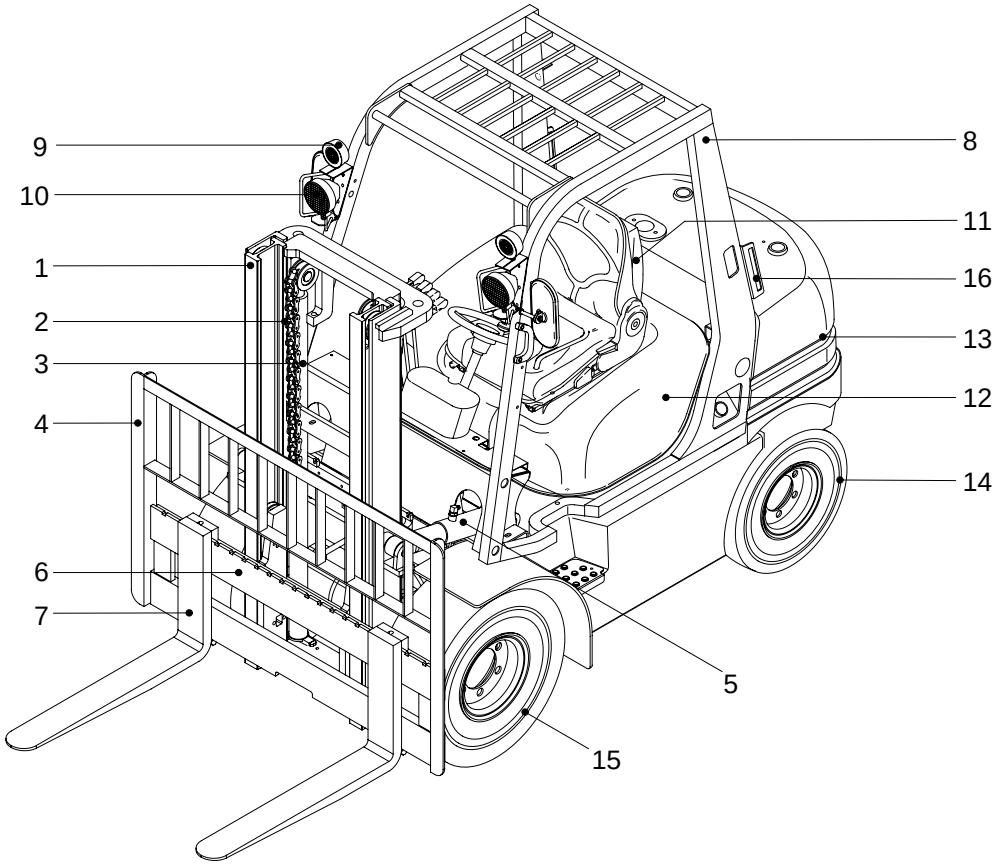


Never use wire rope to lift a load.



1. GENERAL LOCATIONS

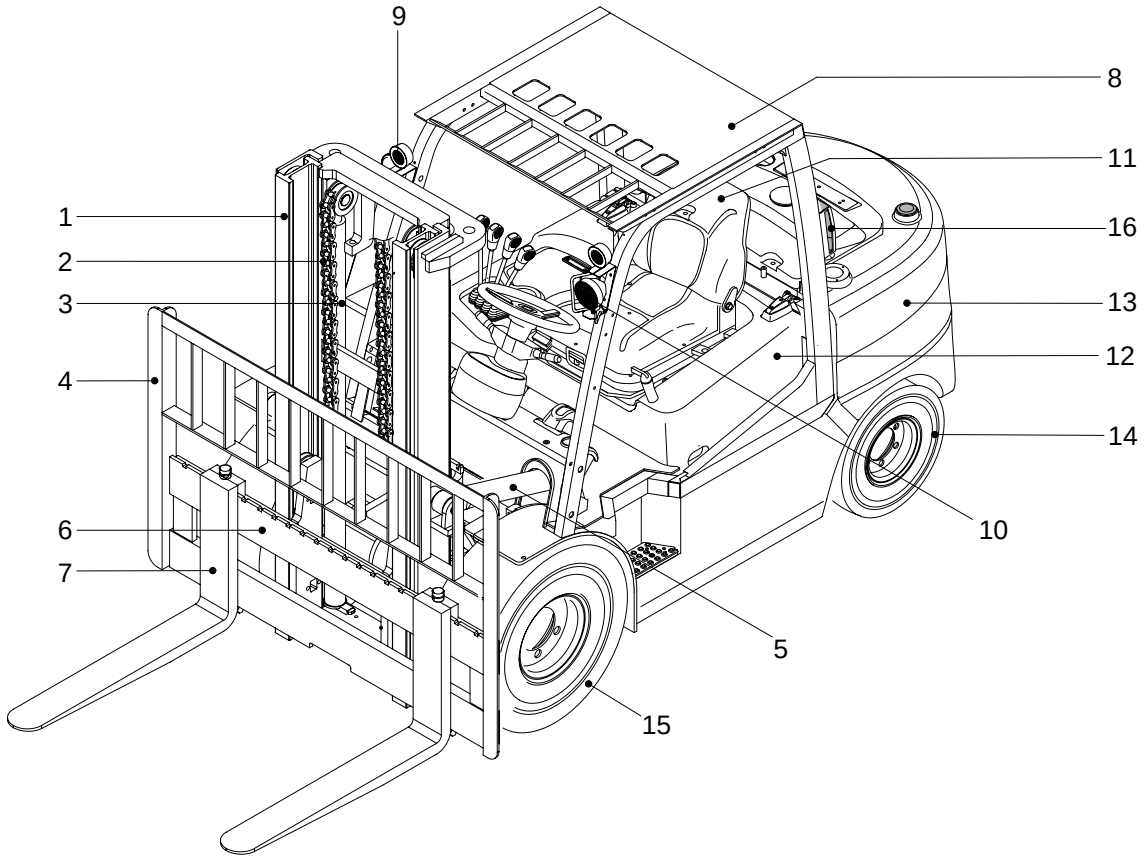
1) HDF15/18-5, HDF20/25/30-5



D155OM54

1	Mast	7	Forks	13	Counterweight
2	Lift chain	8	Overhead guard	14	Rear wheel
3	Lift cylinder	9	Turn signal lamp	15	Front wheel
4	Backrest	10	Head lamp	16	Rear combination lamp
5	Tilt cylinder	11	Operator's seat		
6	Lift bracket	12	Bonnet		

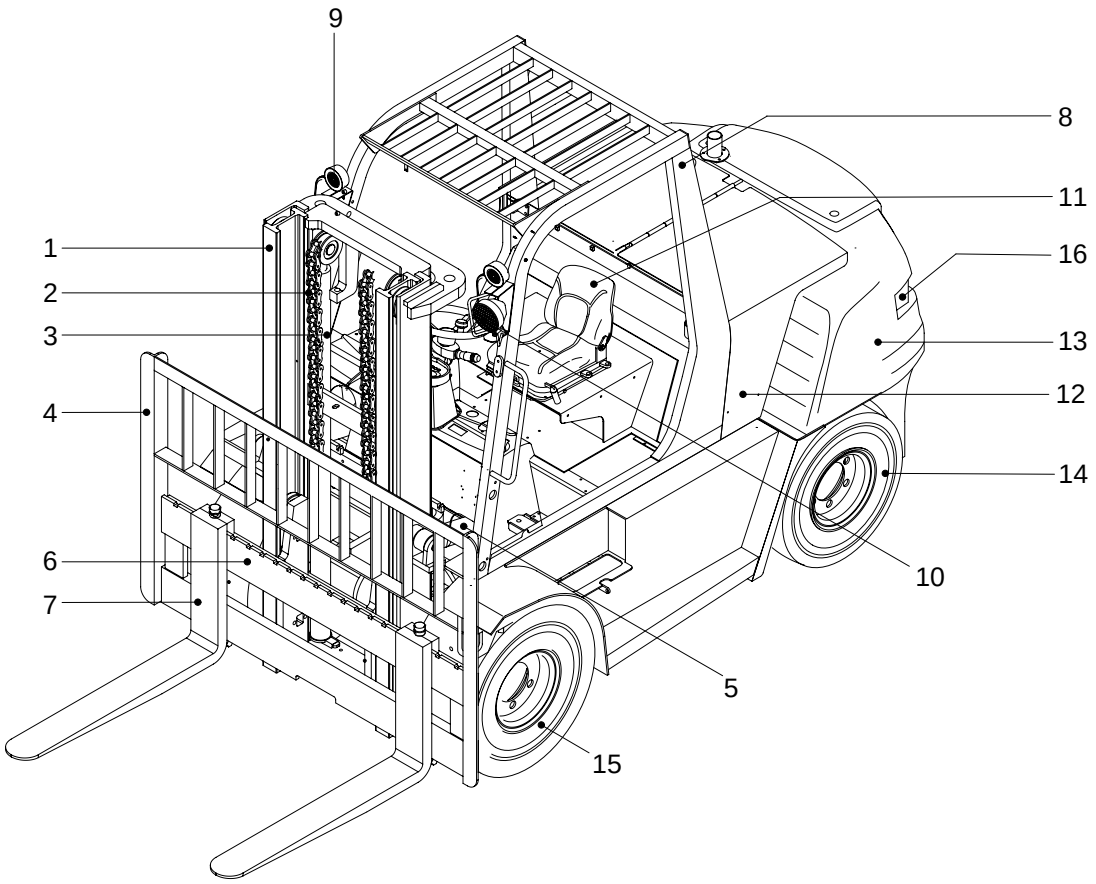
2) 35D/40D/45D-7, 35DS/40DS/45DS-7



D357OM54

1	Mast	7	Forks	13	Counterweight
2	Lift chain	8	Overhead guard	14	Rear wheel
3	Lift cylinder	9	Turn signal lamp	15	Front wheel
4	Backrest	10	Head lamp	16	Rear combination lamp
5	Tilt cylinder	11	Operator's seat		
6	Lift bracket	12	Bonnet		

3) HDF50/70-7S, HDF50/70-7

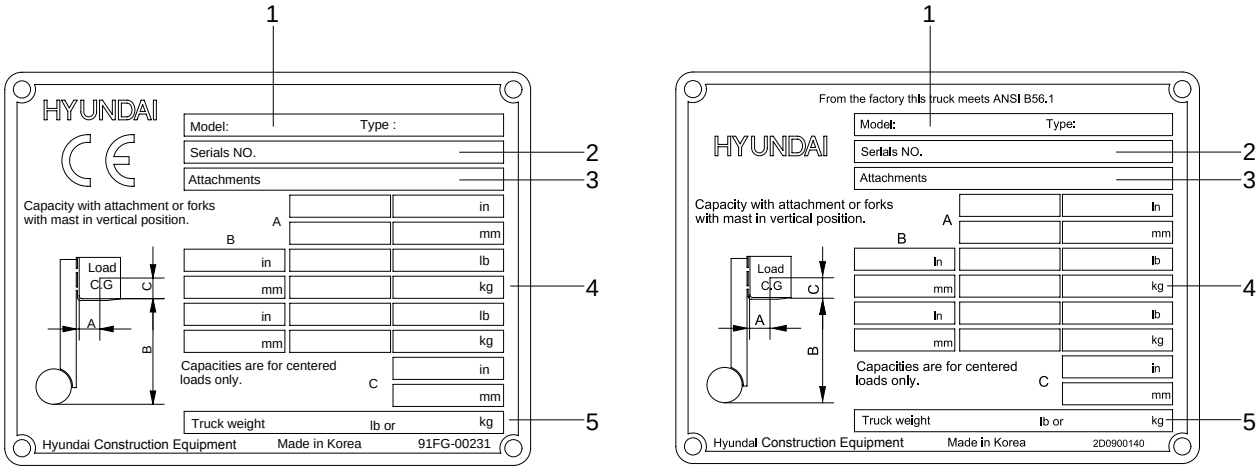


D507OM54

1	Mast	7	Forks	13	Counterweight
2	Lift chain	8	Overhead guard	14	Rear wheel
3	Lift cylinder	9	Turn signal lamp	15	Front wheel
4	Backrest	10	Head lamp	16	Rear combination lamp
5	Tilt cylinder	11	Operator's seat		
6	Lift bracket	12	Bonnet		

2. DATA/SAFETY PLATES AND DECALS

1) TRUCK DATA AND CAPACITY PLATE



FOR CE

FOR USA ONLY

D507OM56

(1) Truck model number or registered name

(2) Truck serial number

An identification number assigned to this particular truck and should be used when requesting information or ordering service parts for this truck from your authorized HYUNDAI dealer. The serial number is also stamped on the frame.

(3) Attachment description(If any installed)

The user must see that the truck is marked to identify the attachment(s), including the weight of the truck/attachment combination and truck capacity with the attachment.

(4) Capacity rating, load center, and lifting height data

Shows the maximum load capacity of this truck with relation to load centers and fork heights(See diagram on plate). Personal injury and damage to the truck can occur if these capacities are exceeded.

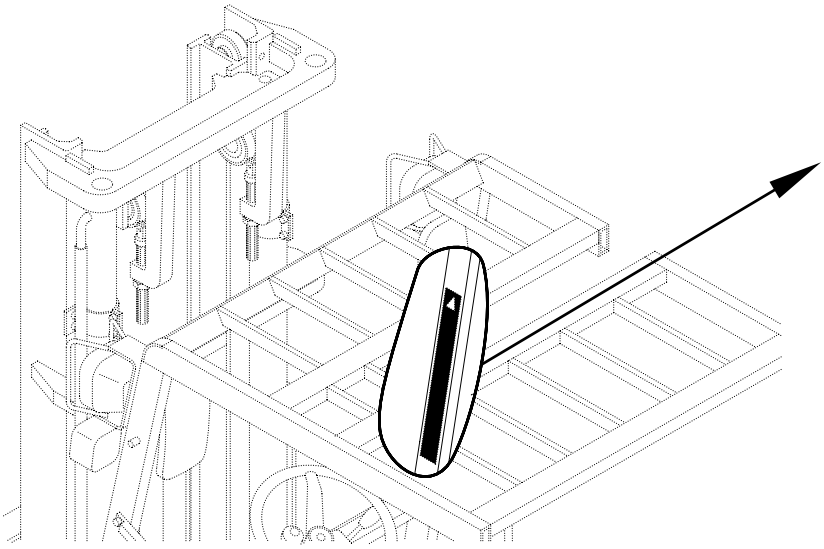
Do not exceed the maximum capacity specified.

(5) Truck weight

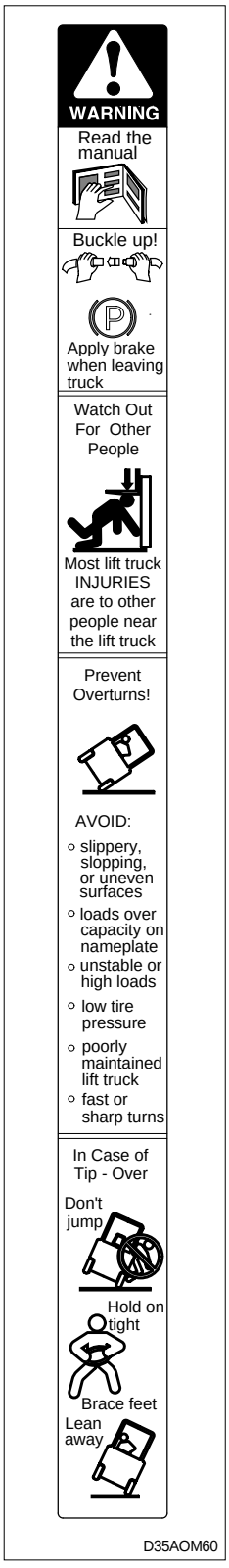
The approximate weight of the truck without a load on the forks. This weight plus the weight of the load must be considered when operating on elevators, elevated floors, etc. to be sure they are safe.

⚠ Before modifications that affect the stability of safety systems are made written approval from HYUNDAI. This is an OSHA requirement. Contact your authorized HYUNDAI dealer for a new nameplate showing the revised capacity.

2) OPERATOR SAFETY WARNING DECAL



D35AOM59



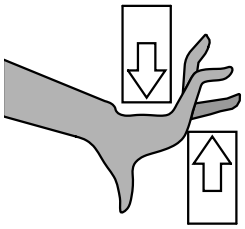
D35AOM60

⚠ **Safety and warning decals are placed in conspicuous locations on the truck to remind you of essential procedures or to prevent you from making an error that could damage the truck or possibly cause personal injury. You should know, understand, and follow these instructions. Safety and warning decals. Should be replaced immediately if missing or defaced(Damaged or illegible). Refer to your Service manual for the location of all decals.**

⚠ **Operator/Tip-over warning decal**

This decal is located on the front right hand leg of the drivers overhead. Its purpose is to remind the operator that staying in the seat provides the best chance of avoiding injury in the event of a truck-tipping or driving off a dock mishap.

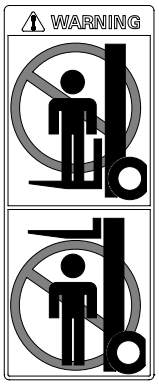
Lift trucks can be tipped over if operated improperly. Experience with lift truck accidents has shown that the driver cannot react quickly enough to jump clear of the truck and overhead guard as the truck tips. To protect operators from severe injury or death in the event of a tip over, it is best to be held securely in the seat. So, please, always buckle up when driving your lift truck.



D35AOM61

⚠ Mast warning decal

This safety decal is placed on the mast to warn of the danger of injury from movement between rails, chains, sheaves, fork carriage, and other parts of the mast assembly. Do not climb on or reach into the mast. Personal injury will result if any part of your body is put between moving parts of the mast.



D35AOM62

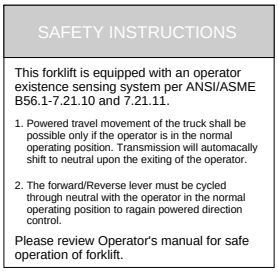
⚠ Keep away from forks decal

This safety decal is placed on the mast to warn of the danger of injury from forks when they are in the raised position. Do not ride on or stand under forks or attachments. The forks can fall and cause injury or death. Always make sure that the forks are in the fully lowered position when they are not handling a load.

D35AOM63

⚠ Fan warning decal

This safety decal is displayed on the cooling fan shroud of the radiator to warn of the danger or injury from spinning fan blades when the engine is running. Be sure that you keep your hands, fingers, arms, and clothing away from a spinning fan. Don't stand in line with a spinning fan. Fan blades can break at excessively high RPM and be thrown out of the engine compartment.



D507OM62

⚠ Safety instructions (For USA only)

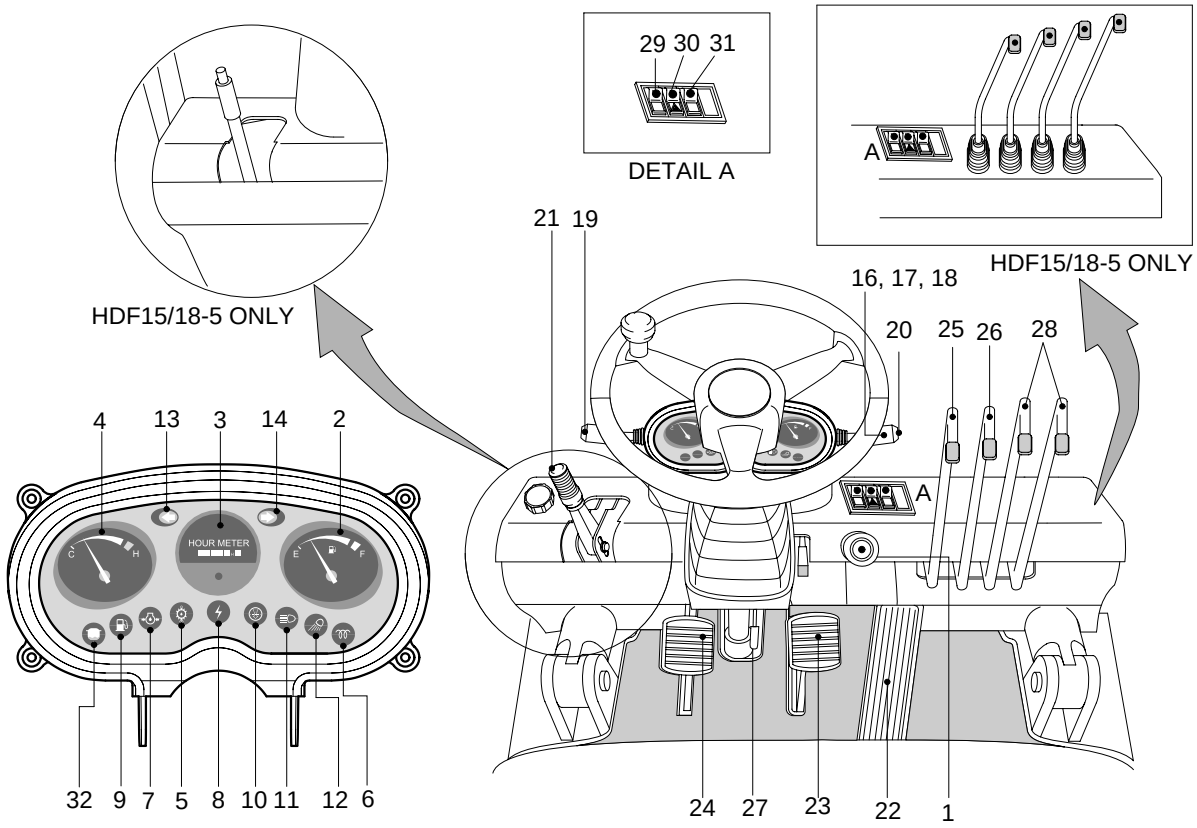
This forklift is equipped with an operator existence sensing system per ANSI/ASME B56.1-7.21.10 and 7.21.11.

1. Powered travel movement of the truck shall be possible only if the operator is in the normal operating position. Transmission will automacally shift to neutral upon the exiting of the operator.

2. The forward/Reverse lever must be cycled through neutral with the operator in the normal operating position to ragain powered direction control.

3. INSTRUMENTS AND CONTROLS

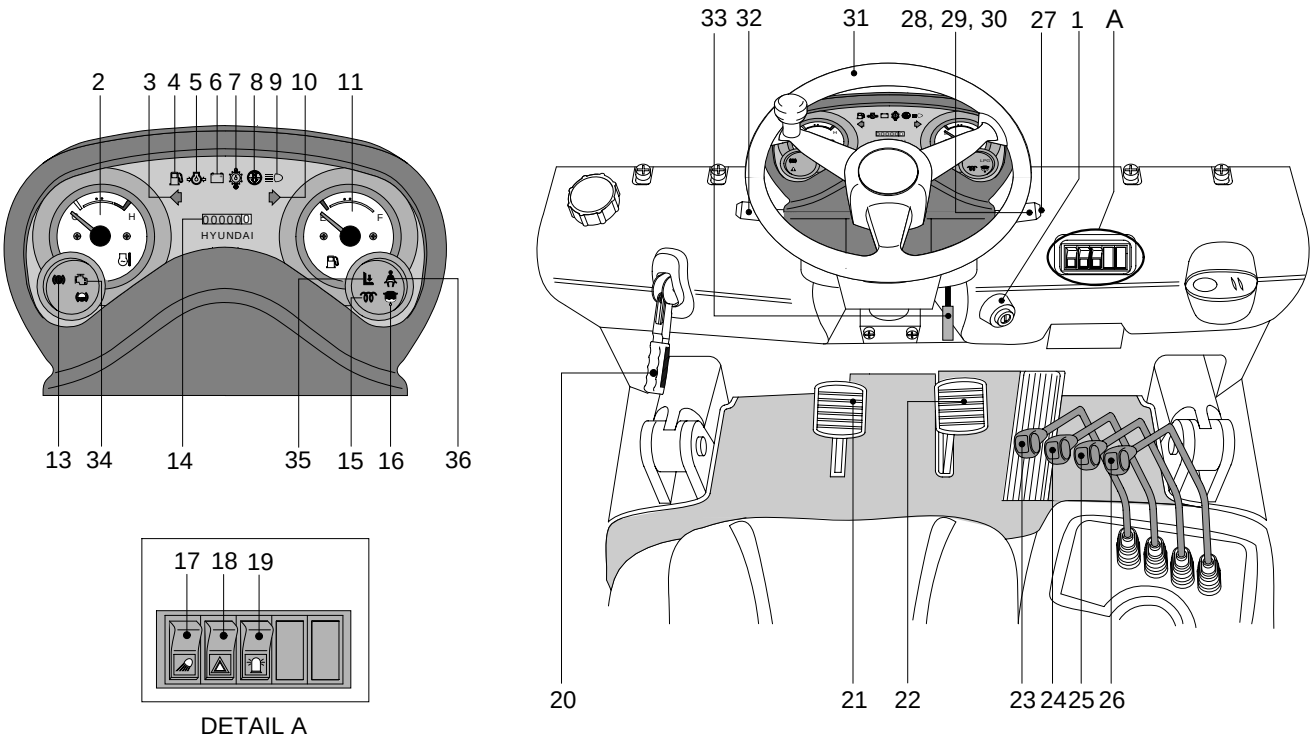
1) HDF15/18-5, HDF20/25/30-5



1	Start switch	12	Work lamp signal lamp	23	Brake pedal
2	Fuel gauge	13	Left turn signal lamp	24	Inching pedal
3	Hour meter	14	Right turn signal lamp	25	Lift lever
4	Water temperature gauge	15	Fuel water separator	26	Tilt lever
5	T/M oil temp warning lamp	16	Head lamp switch	27	Steering wheel lock knob
6	Pre-heater signal lamp	17	Illumination lamp	28	Attach lever(opt)
7	Engine oil pressure warning lamp	18	Turn signal switch	29	Hazard lamp switch(opt)
8	Battery charge warning lamp	19	Forward-reverse lever	30	Work lamp switch(opt)
9	Fuel empty lamp	20	Horn button	31	Beacon lamp switch(opt)
10	Air cleaner element warning lamp	21	Parking brake lever	32	Water separator lamp
11	Head lamp signal lamp	22	Accel pedal		(HDF20/25/30-5 only)

△ **Familiarize yourself with the controls and follow safe operating procedures.**

2) 35D/40D/45D-7, 35DS/40DS/45DS-7



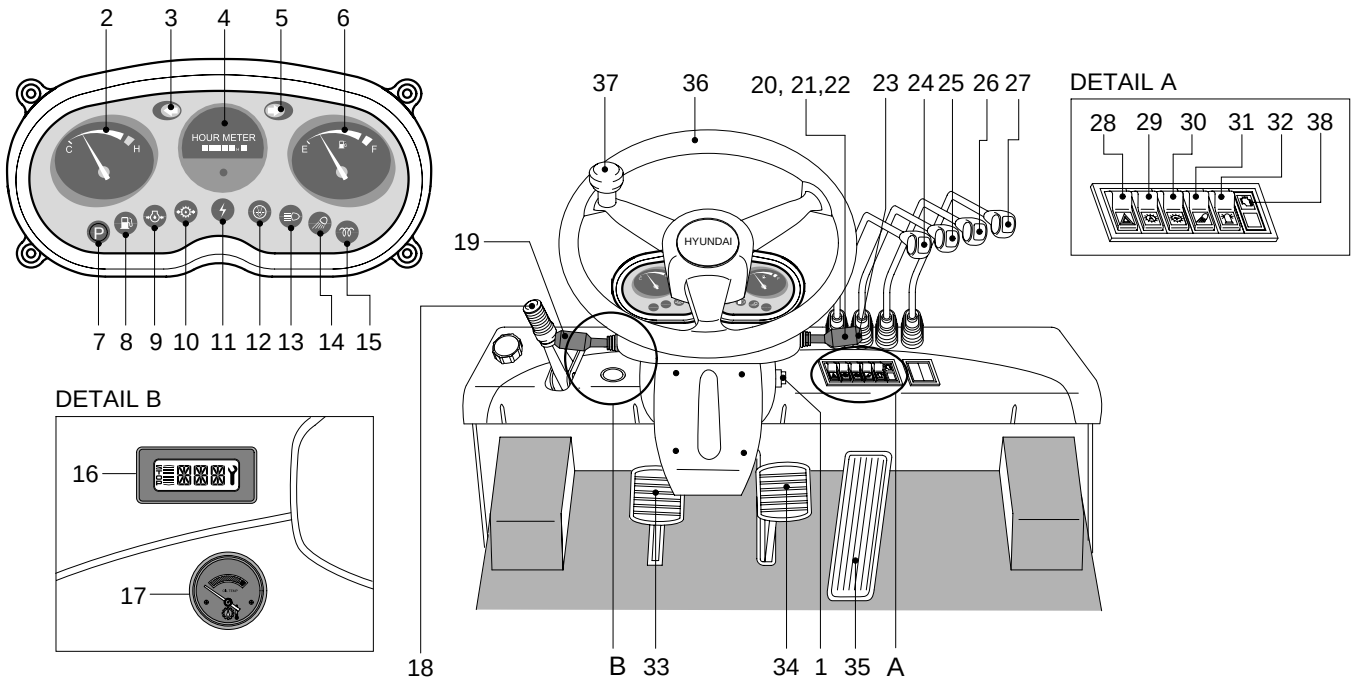
1	Start switch	16	Water separator lamp*	30	Turn signal switch
2	Water temperature gauge	17	Work lamp switch(opt)	31	Steering wheel
3	Left turn signal lamp	18	Hazard lamp switch(opt)	32	Forward-reverse lever
4	Fuel level warning lamp	19	Beacon lamp switch(opt)	33	Steering column adjust lever
5	Engine oil pressure warning lamp	20	Parking brake lever	34	Engine check lamp**
6	Battery charge warning lamp	21	Inching pedal	35	Operator safety lamp(OPSS)*
7	T/M oil temp warning lamp	22	Brake pedal	36	Seat belt warning lamp
8	Air cleaner element warning lamp	23	Lift lever		
9	Head lamp signal lamp	24	Tilt lever		
10	Right turn signal lamp	25	Attach 1 lever(opt)		
11	Fuel gauge	26	Attach 2 lever(opt)		
13	Parking brake signal lamp	27	Horn button		
14	Hour meter	28	Head lamp switch		
15	Preheater signal lamp	29	Illumination lamp		

* 35DS/40DS/45DS-7 only

* * 35D/40D/45D-7(TIER II, #1001-) only

△ **Familiarize yourself with the controls and follow safe operating procedures.**

3) HDF50/70-7S, HDF50/70-7



D507OM64T

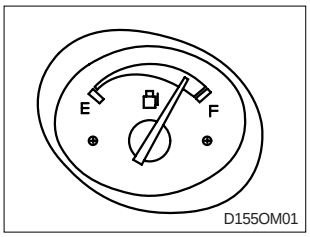
1	Start switch	14	Work lamp signal lamp	27	Attach 2 lever(opt)
2	Water temperature gauge	15	Preheater signal lamp	28	Hazard lamp switch
3	Left turn signal lamp	16	T/M display	29	Full automatic switch
4	Hour meter	17	T/M temperature gauge	30	Inching switch
5	Right turn signal lamp	18	Parking brake lever	31	Work lamp switch
6	Fuel gauge	19	Forward-reverse lever	32	Beacon lamp switch(opt)
7	Parking brake signal lamp	20	Head lamp switch	33	Inching pedal
8	Fuel level warning lamp	21	Clearance lamp switch	34	Brake pedal
9	Engine oil pressure warning lamp	22	Turn signal switch	35	Accelerator pedal
10	T/M oil temp warning lamp	23	Washer & horn button	36	Steering wheel
11	Battery charge warning lamp	24	Lift lever	37	Steering wheel knob
12	Air cleaner element warning lamp	25	Tilt lever	38	Engine check lamp**
13	Head lamp signal lamp	26	Attach 1 lever(opt)		

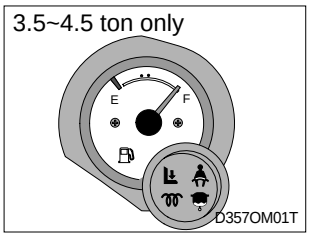
** HDF50/70-7(TIER II, #1001-) only

△ **Familiarize yourself with the controls and follow safe operating procedures.**

4. INDICATOR SYMBOLS

1) FUEL GAUGE





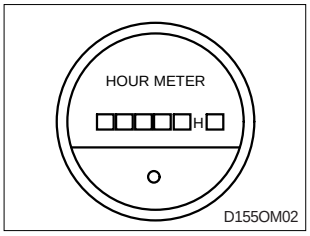
E : Empty

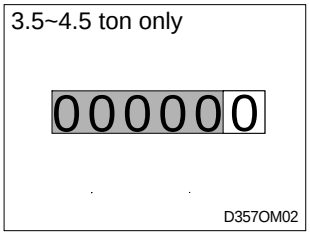
F : Full

Fill fuel tank regularly. Never allow machine to run out fuel.

※ **Do not overfill the fuel tank.**
Always check the fuel level on level ground.

2) HOUR METER



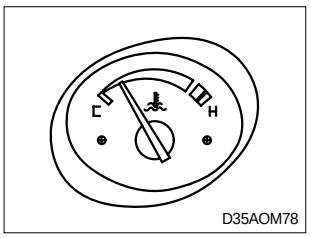


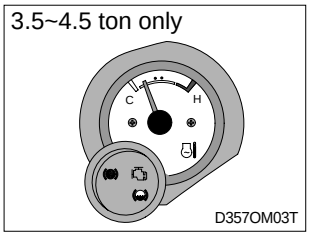
This indicates the time of total machine operation.

All service intervals for periodic maintenance are based on service meter readings.

※ **The last digit advances by "1" every six minutes when the starting switch is at the ON position.**

3) WATER TEMPERATURE GAUGE





The indicator shows the engine cooling water temperature.

White range : Normal

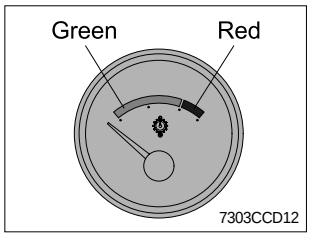
Red range : Danger of overheating.

Action to take if indicator enters red range.

1. Stop operations immediately and move the truck to a safe place.
2. Open the engine hood to improve the ventilation and run the engine at low idling until the temperature drops to the white range.

For details, see HANDLING MACHINE IN EXTREMELY HOT PLACES, page 7-35.

4) TRANSMISSION OIL TEMPERATURE GAUGE(5.0TON~7.0TON)



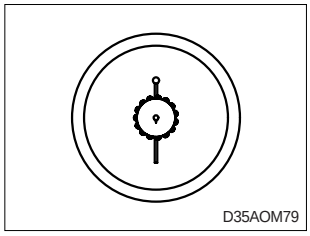
(1) This range indicates the temperature of transmission oil.
- Green range : 50-120℃(122-248℉)
- Red range : 120℃(248℉) Above

(2) The green range indicates when operating.

(3) Keep idling engine at low speed until the green range indicates, before operation of machine.

(4) If the indicator is in the red range, it means the transmission is overheated. Be careful that the indicator does not move into the red range.

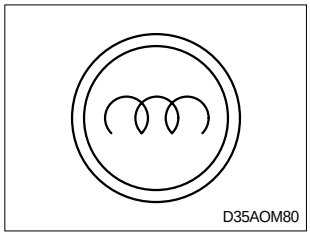
5) TRANSMISSION OIL TEMPERATURE WARNING LAMP(1.5TON~4.5TON)



This lamp informs the operator that transmission oil is above the specified temperature.
- Transmission oil temperature warning lamp ON : Abnormal.
- Transmission oil temperature warning lamp OFF : Normal.

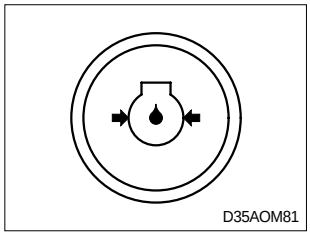
※ **When this lamp lights up during operation, stop the engine and check the machine.**

6) PRE HEATER SIGNAL LAMP



(1) This lamp lights up when key is turned to ON position. After a while the heater signal lamp goes out, then turn the key to START position.

7) ENGINE OIL PRESSURE WARNING LAMP

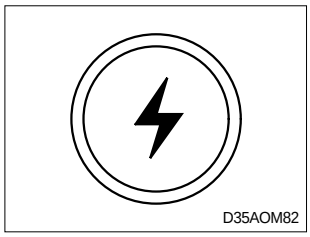


(1) This lamp informs the operator that the engine oil pressure is below the specified level.

(2) This lamp lights when starting switch is turned ON and goes out when oil pressure becomes normal.

※ **Immediately stop operation if this lamp lights up during operation. Stop the engine and check the machine if necessary.**

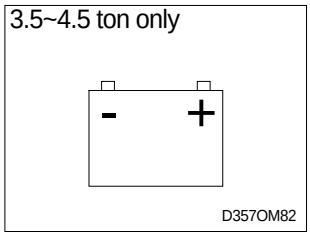
8) BATTERY CHARGE WARNING LAMP



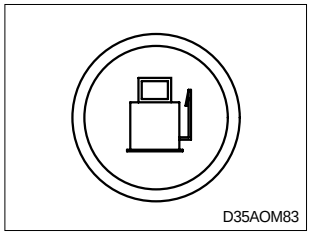
(1) This lamp shows that the alternator is not generating electricity.

※ **When the starting switch is turned ON, the lamp will lights up, but it should go out after the engine starts.**

※ **If the lamp lights up during operation, stop the engine and check the fan belt tension and the electrical system.**



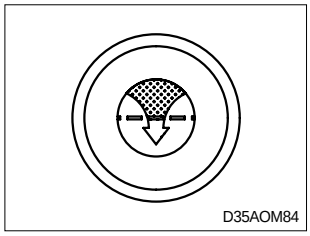
9) FUEL LEVEL WARNING LAMP



(1) This lamp informs the operator that fuel in the tank is below the specified level. And this lamp prevents the engine from stopping suddenly. This lamp is installed separate from the fuel gauge.

※ **If this lamp lights up, stop the engine and refill the fuel immediately.**

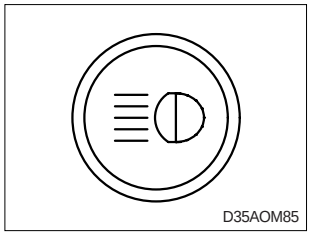
10) AIR CLEANER ELEMENT WARNING LAMP



(1) This lamp lights up when the replacement time of element is late and the element is dirty, so air influx is not smooth.

※ **If this lamp lights up, clear the element or replace it.**

11) HEAD LAMP SIGNAL LAMP

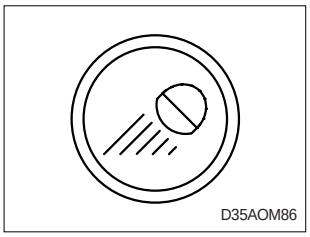


(1) This lamp shows that the head lamp lights up or not.

① Head lamp lights up : Signal lamp lights up.

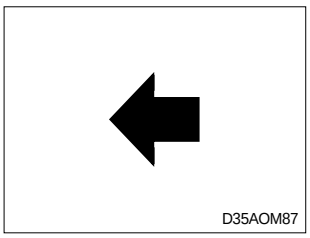
② Head lamp goes out : Signal lamp goes out.

12) WORKING LAMP SIGNAL LAMP



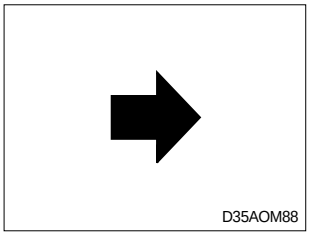
(1) This lamp shows that the working lamp lights up or not.
① Working lamp lights up : Signal lamp lights up.
② Working lamp goes out : Signal lamp goes out.

13) LEFT TURN SIGNAL LAMP



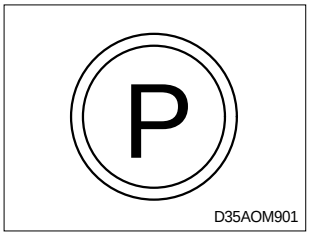
(1) Left turn signal lamp flickers when pushing on the turn signal lever.

14) RIGHT TURN SIGNAL LAMP



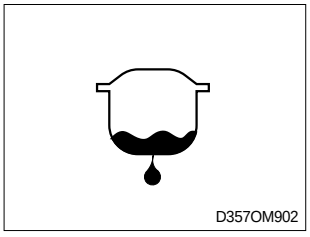
(1) Right turn signal lamp flickers when pulling on the turn signal lever.

15) PARKING BRAKE SIGNAL LAMP (35D/40D/45D-7, 35DS/40DS/45DS-7, HDF50/70-7, HDF50/70-7S)



(1) This lamp shows that the parking brake is applied or not.
① Parking brake locked : Signal lamp lights up.
② Parking brake unlocked : Signal lamp goes out.

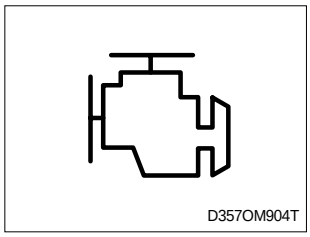
16) WATER SEPARATOR LAMP (HDF20/25/30-5, 35DS/40DS/45DS-7, HDF50/70-7S)



(1) This lamp lights up when the water separator is full of water or malfunctioning.

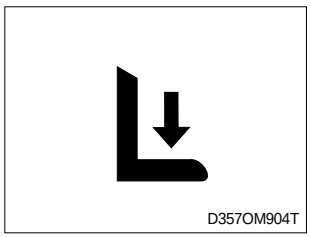
※ **When this lamp lights up, stop the machine and spill water out of the separator.**

17) ENGINE CHECK LAMP (35D/40D/45D-7(#1001-), HDF50/70-7(#1001-))



(1) This lamp lights ON during a nonfatal engine system error. The engine can steel be run, but the fault should be corrected as soon as possible.

18) OPERATOR SAFETY LAMP (35DS/40DS/45DS-7, OPSS equipped)

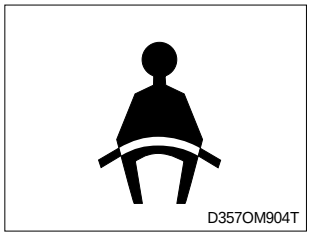


(1) This signal lamp lights ON when the operator leaves the seat.

(2) Powered travel movement of the truck shall be possible only if the operator is in the normal operating position. Transmission will automacally shift to neutral upon the exiting of the operator.

(3) The forward/Reverse lever must be cycled through neutral with the operator in the normal operating position to ragain powered direction control.

19) SEAT BELT WARNING LAMP (35D/40D/45D-7, 35DS/40DS/45DS-7)



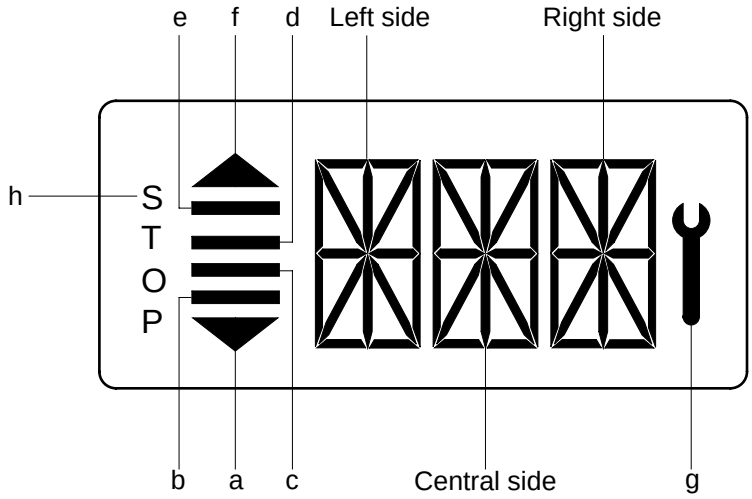
(1) This lamp lights ON and alarm sounds for the first 3 seconds after starting the truck.

18) TRANSMISSION ERROR DISPLAY(HDF50/70-7S, HDF50/70-7 : ZF Transmission)

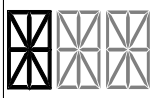
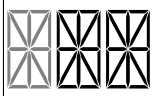
(1) Function

The display can be used with the gear selector(DW-3). It indicates speed and driving direction as well as the activated kickdown.

When driving in the automatic mode, a bar indicator gives additionally also information about the selected driving range; The automatic range is symbolized by arrows above and below the bar indicator. In case of possible errors in the system, a wrench appears on the display, combined with indication of the error number. Also sporadically occurring errors can be indicated.



7803A3CD33

1	Bars	a, f	Automatic range(up and down shifting)
		b, c, d, e	Preselected gear
2	Left side		For the moment still without function
3	Central and Right side		On the two alphanumeric 16-segment display, the electric control unit issues the actual state of gear and driving direction. Besides, a two digit error code will be indicated via these two segment
4	Spanner	g	Electronic control unit recognized an error, is flashing
5	Letters **STOP**	h	Immediate stop is required(At the moment not activated)

(2) Display during operation

Symbol	Meaning	Remarks
F, N, R 1, 2, 3	Actual gear and direction Central side shows actual gear Right side shows actual direction	
NN (Central and right side)	Not neutral, waiting for neutral after power up or a severse fault	To engage a gear, first move shift selector to neutral position and again to F to R position
1 bar	Manual mode lst gear	
2 bar	Manual mode 2nd gear	
3 bar	Manual mode 3nd gear	
4 bars and 2 arrows	Automatic mode	a, f
Arrows(a, f) flashing	Kick down mode active	
	Transmission neutral	Cold start phase
Bars flashing	Downshift mode active	
Spanner flashing	At least on fault active	Select neutral to get fault code displayed
WT	Warning torgue converter temperature	Changes between actual gear/direction while driving, in neutral only displayed if no fault is detected(spanner)
WS	Warning sump temperature	Changes between actual gear/direction while driving, in neutral only displayed if no fault is detected(spanner)
WE	Warning high engine speed	Changes between actual gear/direction while driving, in neutral only displayed if no fault is detected(spanner)
PN	Direction F or R selected while parking brake engaged	Transmission in neutral until parking brake is released. ※ Machine starts to move after release of parking brake.
F or R flashing	Direction F or R selected while turbine speed is to high	※ Gear will engage when turbine speed drops
EE flashing (central and right side)	No communication with display	

(3) Definition of the error codes

① Introduction

The error codes consists of two hexadecimal numbers.

The first number shows the type of signal, the second number shows signal and the type of the error.

② Description of error codes

First No.	Meaning of number
1 hex	Digital input signals
2 hex	Analog input signals
3 hex	Speed signals
4 hex	Speed signals
7 hex	Analog current output signals
8 hex	Analog current output signals
9 hex	Digital output signals
A hex	Digital output signals
B hex	Clutch errors
D hex	Power supply
E hex	High speed signals
F hex	General errors

③ List of error codes

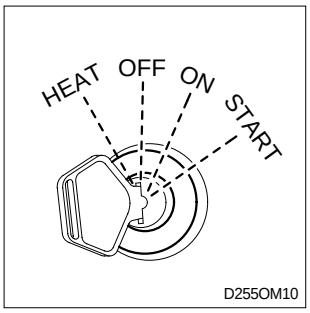
Number	Meaning of error code	
11 hex	Logical error at gear range signal	
12 hex	Logical error at direction select signal	
21 hex	Short circuit to battery voltage at clutch cutoff input	
22 hex	Short circuit to ground or open circuit at clutch cutoff input	
23 hex	Short circuit to battery voltage at load sensor input	not used
24 hex	Short circuit to ground or open circuit at load sensor input	not used
25 hex	Short circuit to battery voltage or open circuit at temperature sensor input	
26 hex	Short circuit to ground at temperature sensor input	
31 hex	Short circuit to battery voltage at engine speed input	
32 hex	Short circuit to ground or open circuit at engine speed input	
33 hex	Logical error at engine speed input	
34 hex	Short circuit to battery voltage at turbine speed input	
35 hex	Short circuit to ground or open circuit at turbine speed input	
36 hex	Logical error at turbine speed input	
37 hex	Short circuit to battery voltage at internal speed input	
38 hex	Short circuit to ground or open circuit at internal speed input	
39 hex	Logical error at internal speed input	

Number	Meaning of error code	
3A hex	Short circuit to battery voltage or open circuit at output speed input	
3B hex	Short circuit to ground or open circuit at output speed input	
3C hex	Logical error at output speed input	
71 hex	Short circuit to battery voltage at clutch K1	
72 hex	Short circuit to ground at clutch K1	
73 hex	Open circuit at clutch K1	
74 hex	Short circuit to battery voltage at clutch K2	
75 hex	Short circuit to ground at clutch K2	
76 hex	Open circuit at clutch K2	
77 hex	Short circuit to battery voltage at clutch K3	
78 hex	Short circuit to ground at clutch K3	
79 hex	Open circuit at clutch K3	
7A hex	Short circuit to battery voltage at converter clutch	not used
7B hex	Short circuit to ground at converter clutch	not used
7C hex	Open circuit at converter clutch	not used
81 hex	Short circuit to battery voltage at clutch K4	
82 hex	Short circuit to ground at clutch K4	
83 hex	Open circuit at clutch K4	
84 hex	Short circuit to battery voltage at clutch KV	
85 hex	Short circuit to ground at clutch KV	
86 hex	Open circuit at clutch KV	
87 hex	Short circuit to battery voltage at clutch KR	
88 hex	Short circuit to ground at clutch KR	
89 hex	Open circuit at clutch KR	
91 hex	Short circuit to ground at relay reverse warning alarm	
92 hex	Short circuit to battery voltage at relay reverse warning alarm	
93 hex	Open circuit at relay reverse warning alarm	
94 hex	Short circuit to ground at relay starter interlock	
95 hex	Short circuit to battery voltage at relay starter interlock	
96 hex	Open circuit at relay starter interlock	
97 hex	Short circuit to ground at park brake solenoid	
98 hex	Short circuit to battery voltage at park brake solenoid	
99 hex	Open circuit at park brake solenoid	

Number	Meaning of error code	
B1 hex	Slippage at clutch K1	
B2 hex	Slippage at clutch K2	
B3 hex	Slippage at clutch K3	
B4 hex	Slippage at clutch K4	
B5 hex	Slippage at clutch KV	
B6 hex	Slippage at clutch KR	
D1 hex	Short circuit to battery voltage at power supply for sensors	
D2 hex	Short circuit to ground at power supply for sensors	
D3 hex	Low voltage at battery	
D4 hex	High voltage at battery	
D5 hex	Error at valve power supply 1	
D6 hex	Error at valve power supply 2	
E1 hex	Short circuit to battery voltage at speedometer output	not used
E2 hex	Short circuit to ground or open circuit at speedometer output	not used
E3 hex	Short circuit to battery voltage at display output	not used
E4 hex	Short circuit to ground at display output	not used
E5 hex	Communication failure on devicenet	
F1 hex	General EEPROM fault	
F2 hex	Configuration lost	
F3 hex	Application error	

5. OPERATING LEVER AND SWITCH

1) START SWITCH



Model	A
HDF20/25/30-5	8±1.6
35DS/40DS/45DS-7 HDF50/70-7S	15
35D/40D/45D-7(#1001-) HDF50/70-7(#1001-)	6

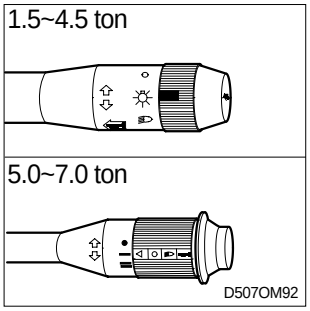
(1) There are four positions, HEAT, OFF, ON and START.

※ Before starting, set gear shift lever at N, and pull parking brake.

- HEAT : Preheating electrical circuit activates.
  - HDF15/18-5
  - 35D/40D/45D-7(-#1000)
  - HDF50/70-7(-#1000)
- OFF : None of electrical circuits activates.
- ON : All the systems of machine operate.
  Preheat the system for **A** seconds.(see left table)
- START : Use when starting the engine.
  Release key immediatly after starting.

※ Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.

2) CLEARANCE LAMP SWITCH



(1) Clearance lamp lights up

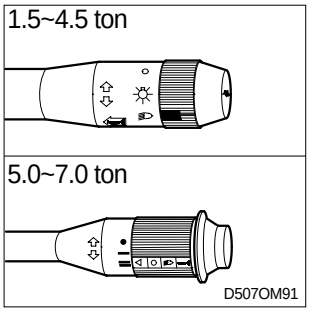
Twist the handle beneath steering wheel and make the notch align to ☼ or ━ .

(2) Clearance lamp goes out

Twist the handle just opposite until the notch being aligned to ○ or ●

※ When clearance lamp light up, then the Clearance lamp and all panel lamps light up too.

3) HEAD LAMP SWITCH



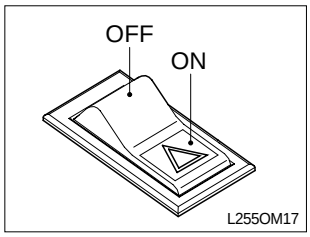
(1) Head lamp lights up

Twist the handle beneath steering wheel and make the notch align to ≡D or 〓 .

(2) Small lamp goes out

Twist the handle just the opposite direction described as above.

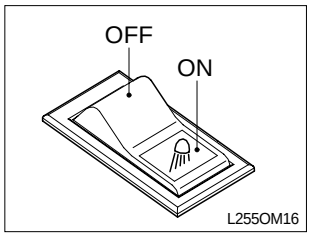
4) HAZARD SWITCH



(1) Use for parking, or loading machine.

※ **If the switch is left ON for a long time, the battery may be discharged.**

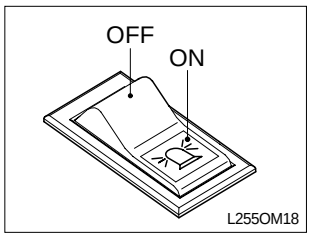
5) WORK LAMP SWITCH



(1) This switch is used to operate work lamps.
Press this switch to turn on work lamps.

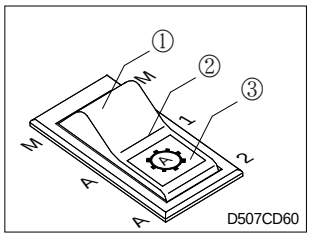
(2) 5.0 ~ 7.0 ton : Standard
1.5 ~ 4.5 ton : Option

6) BEACON SWITCH(OPTION)



(1) This switch turn ON the rotary light.

7) FULL AUTOMATIC SWITCH(HDF50/70-7S, HDF50/70-7)



(1) Manual mode(①)

Press the top of the switch fully for the manual mode of the autoshift function. The operator selects the desired speed and the desired direction in the manual mode with the gear selector lever.

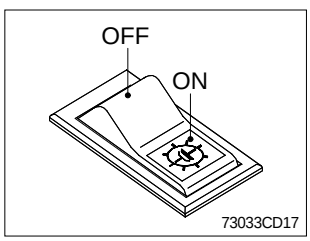
(2) Automatic 1st mode(②)

Place the switch in the middle position for the autoshift function changing from **1st** to **3rd** gear shift mode.

(3) Automatic 2nd mode(③)

Press the bottom of the switch fully for the autoshift function changing from **2nd** to **3rd** gear shift mode.

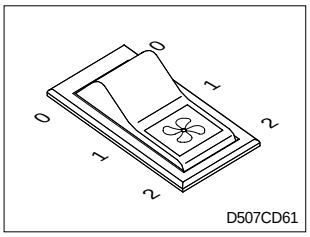
8) INCHING SWITCH(HDF50/70-7S, HDF50/70-7)



(1) This switch is pressed, it will **cut off** the clutch when brake operates.

※ **Be careful not to use this switch when driving on a slope.**

9) HEATER SWITCH(HDF50/70-7S, HDF50/70-7 OPTION)

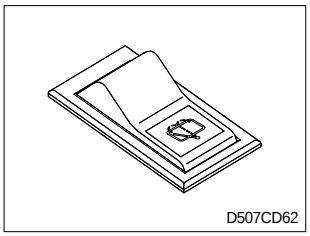


(1) Heater runs when this switch is pressed.

(2) Heater level can be adjusted by 2 steps.

- **0** : Stop
- **1** : 1st level
- **2** : 2nd level

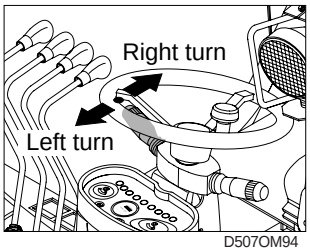
10) WIPER SWITCH(HDF50/70-7S, HDF50/70-7 OPTION)



(1) Machine with cabin offers this switch.

(2) Wiper operates when this switch is pressed.

11) TURN SIGNAL SWITCH



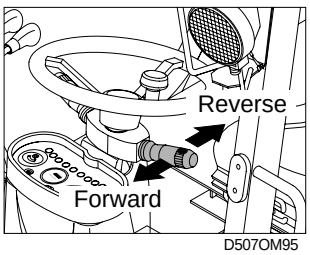
(1) This lever makes the turn signal lamp flash.

① Turning LEFT : Push lever forward

② Turning RIGHT : Pull lever backward

※ **When the steering wheel is returned to straight, the turn signal is not cancelled. Return the lever to central position by hand.**

12) DIRECTION CONTROL LEVER

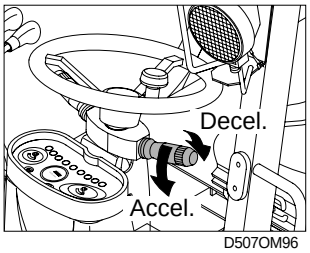


(1) Push lever for forward driving.

(2) Pull lever for reverse driving.

※ **When changing direction or speed, there can be some sound but it's nothing to do with performance.**

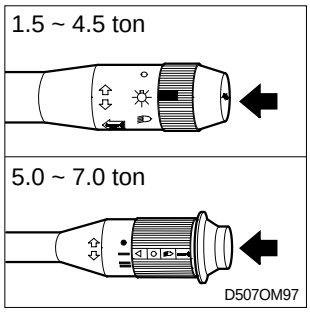
13) GEAR SELECTOR LEVER(HDF50/70-7S, HDF50/70-7 ONLY)



(1) This lever is used for gear selection, forward 3 stage and reverse 3 stage.

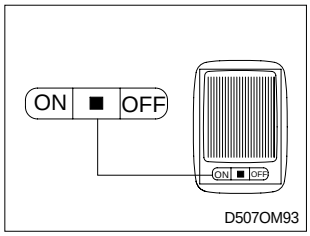
(2) If turning the gear selector lever forward, the machine increases the speed, but if turning it backward, the machine reduces the speed.

14) HORN BUTTON



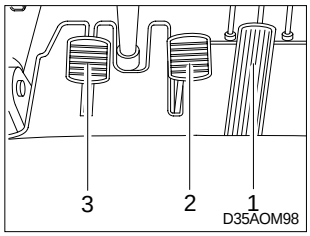
(1) The horn sounds when the button is depressed.

15) ROOM LAMP (HDF50/70-7S, HDF50/70-7, OPTION)



(1) This switch is located on the ceiling of the cabin.
(For machine with cabin)
- ON : Room lamp lights on
- ■ : Room lamp lights on automatically only when door opens.
- OFF : Room lamp goes out.

16) PEDALS



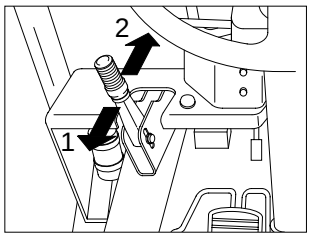
(1) **1** : Accelerator pedal
2 : Brake pedal
3 : Inching pedal

※ **The inching pedal is used for fine control of forward and reverse movement when lifting up or putting down loads.**

※ **Do not put your foot on the inching pedal or brake pedal unless using it.**

17) PARKING BRAKE LEVER

TOGGLE TYPE(2.0 ~ 7.0 ton)

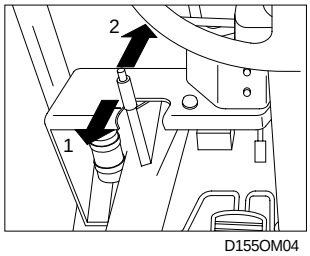


(1) Position 1
Parking brake is applied and front wheel is locked.

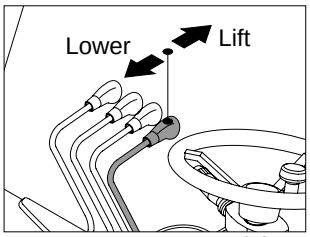
(2) Position 2
Parking brake is released.

※ **Before moving the truck be sure the parking brake is released.**

RATCHET TYPE(1.5 ~ 1.8 ton)



18) LIFT LEVER



D507OM17

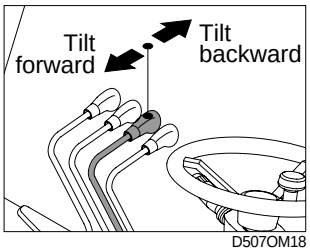
(1) LIFT
PULL the lever BACK to LIFT the load.

(2) LOWER
PUSH the lever FORWARD to LOWER the load.

(3) HOLDING
When the lever is released, the lifting or lowering action stops.

※ **Lifting speed is controlled by accelerator pedal.**
Lowering speed is controlled by lever only.

19) TILT LEVER



D507OM18

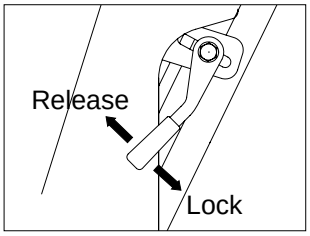
(1) TILT FORWARD
PUSH the lever FORWARD to tilt mast FORWARD.

(2) TILT BACK
PULL the lever BACK to tilt mast BACKWARD.

(3) HOLDING
When the lever is released, tilting action stops.

※ **Forward and backward tilting speeds are controlled by tilt lever and accelerator pedal.**

20) STEERING WHEEL LOCK KNOB



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(1) The angle of the steering shell can be adjusted forward and backward.
① Release : Turn the knob down.
② Lock : Turn the knob up.

※ METHOD OF ADJUSTING STEERING WHEEL ANGLE

(1) Turn the lock knob down.

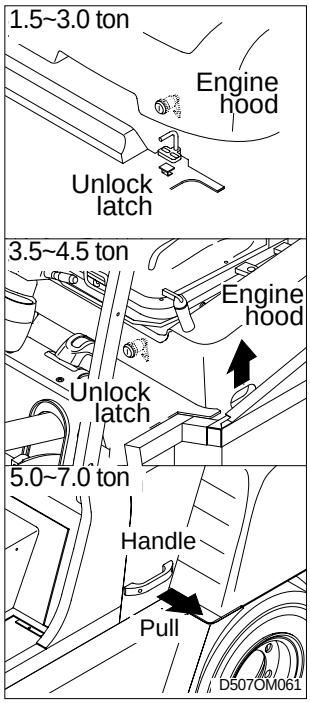
(2) Move the steering wheel forward or backward to select the most suitable position.

(3) Turn knob up to lock the steering wheel in the desired position.

※ **After adjusting, try to move the steering wheel backward and forward to check that it is locked in the selected position.**

⚠ **Always carry out the adjustment with the machine stopped.**
Never try to adjust the steering wheel when the machine is moving.

21) BONNET



(1) HDF15/18-5, HDF20/25/30-5

① Unlock latch with a key and then raise engine hood to open it.

② Inspection and maintenance can then be carried out easily.

(2) 35DS/40DS/45DS-7, 35D/40D/45D-7

① Unlock latch with a key and then raise engine hood to open it.

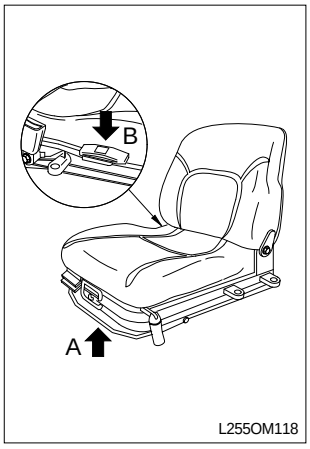
② Inspection and maintenance can then be carried out easily.

(3) HDF50/70-7S, HDF50/70-7

① Pull the handle attached on the both side of engine hood to open it.

22) SEAT ADJUSTMENT

The seat adjustable to fit the contours of the operator's body. It will reduce operator fatigue due to long works hours and enhance work efficiency.



(1) Forward/Backward adjustment (A)

① Pull lever A to adjust seat forward or backward.

② The seat can be moved forward and backward over 120mm in 10 steps.

(2) Reclining adjustment (B)

Pull lever B to adjustment seat back rest.

⚠ Always check the condition of the seat belt and mounting hardware before operating the machine.

⚠ Replace the seat belt at least once every three years, regardless of apperance.

4. OPERATOR MAINTENANCE AND CARE

1. DAILY SAFETY INSPECTION

Before using a lift truck, it is the operator's responsibility to check its condition and be sure it is safe to operate.
Check for damage and maintenance problems; have repairs made before you operate the truck. Unusual noises or problems must be reported immediately to your supervisor or other designated authority.
Do not make repairs yourself unless you are trained in lift truck repair procedures and authorized by your employer. Have a qualified mechanic make repairs using genuine HYUNDAI or HYUNDAI-approved parts.

⚠ **Do not operate a truck if it is in need of repair. If it is in an unsafe condition, remove the key and report the condition to the proper authority. If the truck becomes unsafe in any way while you are operating it, stop operating the truck, report the problem immediately, and have it corrected.**

Lift trucks should be inspected every eight hours, or at the start of each shift. In general, the daily inspection should include the visual and **functional checks** described on the followings.

⚠ **Leaking hydraulic oil may be hot or under pressure. When inspecting a lift truck, wear safety glasses and do not check for leaks with bare hands.**

1) VISUAL CHECKS

First, perform a visual inspection of the truck and its major components;

(1) Walk around your lift truck and take note of obvious damage that may have been caused by operation during the last shift.

(2) Check that all capacity, safety, and warning plates or decals are attached and legible.

(3) Check before and after starting engine for leaking fuel, engine coolant, transmission fluid, etc.

(4) Check for hydraulic oil leaks and loose fittings.

⚠ **Do not use bare hands to check. Oil may be hot or under pressure.**

(5) Be sure that the driver's overhead guard, load back rest and all other safety devices are in place, securely fastened and undamaged. Inspect for damaged or missing parts, corrosion, cracks, breaks etc.

(6) Check all of the critical components that handle or carry the load.

(7) Look the mast and lift chains over. Check for obvious wear and maintenance problems such as damaged or missing parts, leaks, slack or broken chains, rust, corrosion, bent parts, cracks, etc.

(8) Carefully inspect the load forks for cracks, breaks, bending, twists, and wear. Be sure that the forks are correctly installed and locked in their proper position.

(9) Inspect the wheels and tires for safe mounting, wear condition, and air pressure.

(10) Check the hydraulic sump oil level, engine oil level, and fuel level.

2) FUNCTIONAL CHECKS

Check the operation of the truck as follows.

※ **Before performing these checks, familiarize yourself with the starting, operating, and shutdown procedures in Section 5 of this manual. Also, know the safety rules given in Section 1 of this manual.**

(1) Test warning devices, horn, light, and other safety equipment and accessories.

(2) Start the engine and be sure all controls and systems operate freely and return to neutral properly. Check the:

① Gauges, meters, and indicator lights
② Service brakes, inching pedal, and parking brakes
③ Hydraulic controls: lift, tilt, and auxiliary(If installed)
④ Accelerator
⑤ Directional control
⑥ Steering system
⑦ Lift mechanism and any attachments.

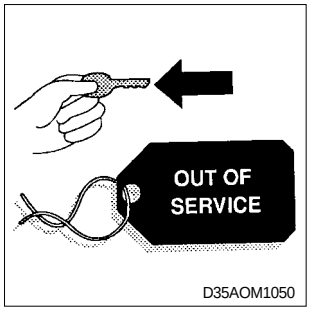
When the functional check are completed, follow the **standard shutdown procedures** given in Section 5, **Starting and operating procedures**.

3) CONCLUDING THE INSPECTION

⚠ **Do not operate a lift truck that has a maintenance problem or is not safe to operate.**

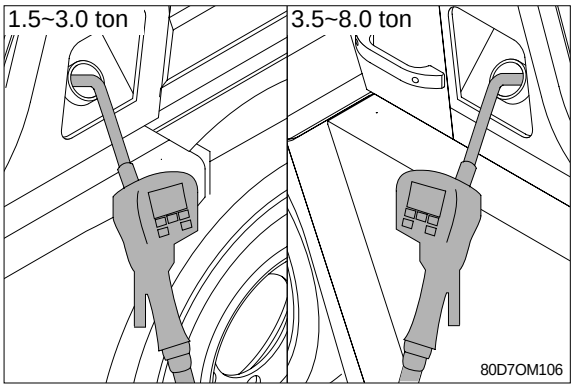
(1) Instead, remove the key from the starting switch and put an **Out of service tag** on the truck.

(2) If all of the daily inspection checks were normal or satisfactory, the truck can be operated.

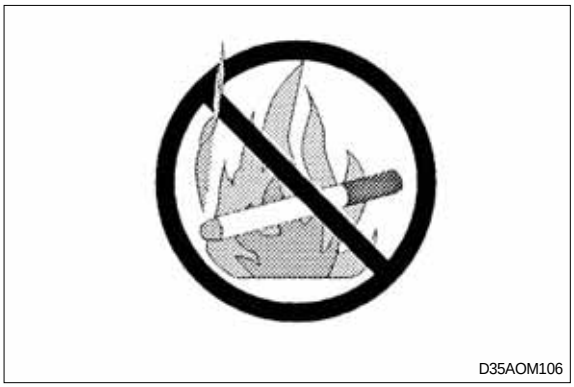


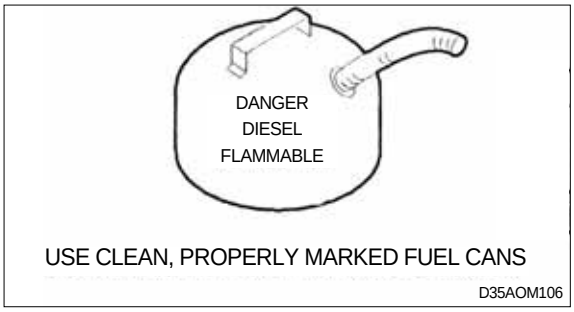
2. FUEL SAFETY PRACTICES

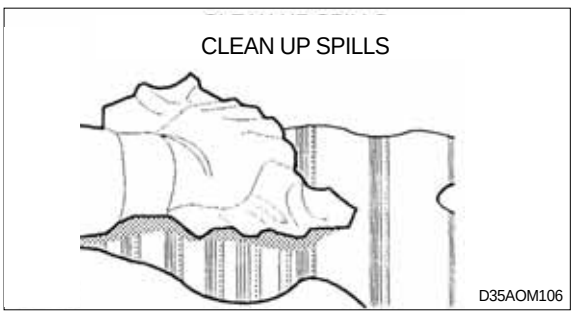
REFUELING DIESEL TRUCKS



⚠ Stop the engine when refueling.
All lights and flames shall be kept at a safe distance while refueling.







5. STARTING AND OPERATING PROCEDURES

1. BEFORE OPERATING THE TRUCK

Be sure that you have read and understand the information in this Operator's Manual and are trained and authorized before operating the lift truck.

⚠ A lift truck can be dangerous if not used properly. Safe operation is the responsibility of the operator.

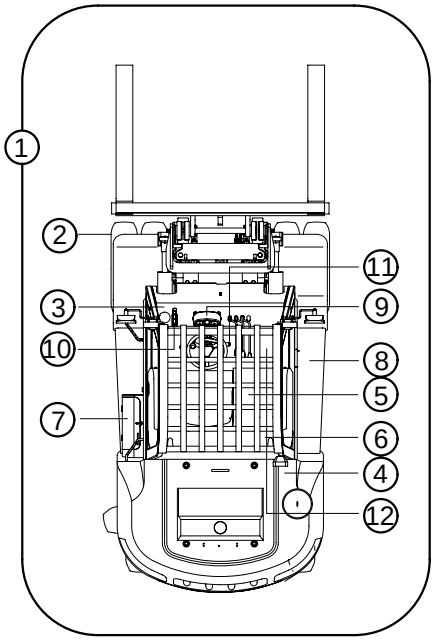
⚠ Do not start or operate the truck, or any of its functions or attachments, from any place other than the designated operator's position.

⚠ Inspect your lift truck before operating at the start of each shift. Before putting your truck to use, check the operation of the controls and all systems.

⚠ Protect yourself. Do not operate truck without a DRIVER'S OVERHEAD GUARD unless conditions prevent its use. Do not remove overhead guard unless specifically authorized. Use special care if operation without this safety device is required.

2. CHECK BEFORE STARTING

1) The Occupational Safety and Health Act(OSHA) required that truck users examine their trucks before each shifts to be sure they are in safe working order. Defects when found shall be immediately reported and corrected. The truck shall be taken out of service until it has been restored to safe operating condition.



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2) A thorough walk-around check should be made BEFORE starting engine. This is required for your personal safety and to realize maximum service life for your machine.
   ① The numbers on the inspection chart show the order of inspection
   ② These numbers correspond to the check item numbers given on the following pages.
   ③ Hang a caution sign on the truck(for example, **Do not start** or **Maintenance in progress**). This will prevent anyone from starting or moving the truck by mistake.

3. CHECK BEFORE STARTING ENGINE

1) CHECK FOR WATER OR OIL LEAKAGE

(1) Walk around your HYUNDAI truck and check for water, oil or hydraulic leakage. Examine truck for obvious damage.

(2) Check overhead guard, backrest and forks for crack or obvious damage.

(3) If any damage or leaks are detected contact your HYUNDAI dealer or tire repair shop.

2) CHECK TIRE AIR PRESSURE/CHECK TIRE RIM

(1) Front tire (Pneumatic type only)

Item	Unit	Front tire							
		Single				Double			
		1.5/1.8t	2.0/2.5t	3.0t	3.5~4.5t	1.5~3.0t	3.5~4.5t	5.0~7.0t	8.0t
Tire air pressure	kgf/cm²	9.0	8.5	8.0	8.0	8.25	7.75	8.0	7.75
	psi	128	121	114	114	117	110	114	110
	bar	8.8	8.3	7.9	7.9	8.1	7.6	7.9	7.6
Hub nut tightening torque	kgf · m	16~18	25~30		53~71	35~45	53~71	52~70	53~71
	lbf · ft	116~130	180~217		383~513	253~325	383~513	220~360	383~513
	N.m	157~176	244~294		520~696	343~441	520~696	290~490	520~696
Rim tightening torque	kgf · m	8.5~10.5	20~30		-	-	-	-	-
	lbf · ft	61~76	145~217		-	-	-	-	-
	N.m	83~103	190~294		-	-	-	-	-

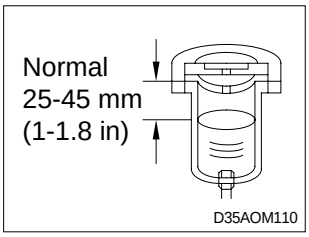
(2) Rear tire (Pneumatic type only)

Item	Unit	Rear tire					
		1.5/1.8t	2.0/2.5t	3.0t	3.5~4.5t	5.0~7.0t	8.0t
Tire air pressure	kgf/cm²	8.0	8.5	8.0	8.5	8.0	7.75
	psi	114	121	114	121	114	110
	bar	7.9	8.3	7.9	8.3	7.9	7.6
Hub nut tightening torque	kgf · m	8.5~10.5	18~24		30~40	52~70	53~71
	lbf · ft	61~76	130~174		217~289	220~360	383~513
	N.m	83~103	177~235		294~392	290~490	520~696
Rim tightening torque	kgf · m	5.2~6.2	7~9		-	-	-
	lbf · ft	38~45	51~65		-	-	-
	N.m	50~60	69~88		-	-	-

⚠ 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 personnel using the correct tools and procedures. For details of procedures, contact your HYUNDAI dealer or tire repair shop.

⚠ If there is any deformation, damage, or wear of the rim, or any doubt about the condition, always replace the rim. Never try repairing, welding, or heating.

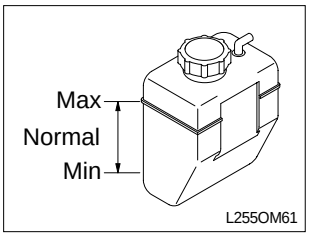
3) CHECK BRAKE FLUID



(1) Remove reservoir cap, and check level.
If necessary, add brake fluid.

Model	Brake fluid
1.5~3.0 ton, 5.0~7.0 ton	DOT III (DRY)
3.5~7.0 ton	Azola ZS10 or hyd oil SAE 10W(WET)

4) CHECK COOLANT LEVEL

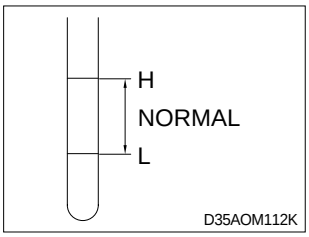


(1) If the cooling water in the radiator sub-tank is not within normal range when cool, add water to the MAX line.

⚠ In antifreeze is being used, pay careful attention to the ratio of antifreeze and water when adding coolant.

⚠ If the sub-tank is completely empty, first add water directly to the radiator. Then add water to the sub-tank.
Alway allow the radiator to cool down before adding water.
At the operating temperature, the engine cooling water is at high temperature and pressure, so it is dangerous to try to open the radiator cap. Wait until the radiator is cool enough to be touched by hand before opening the radiator cap. Loosen the radiator cap slowly to release the pressure, then loosen the cap.

5) CHECK OIL LEVEL IN ENGINE OIL PAN



(1) Stop the engine, pull out the dipstick and check the oil level.

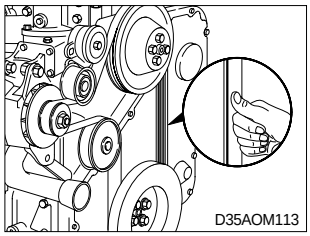
(2) The oil surface line on the dipstick should be between H and L. If below L, remove the filler cap and add engine oil through the oil level.

※ Change the oil if it is marked dirty or discolored.

⚠ Oil level is to be checked with the truck placed at flat level and at least 3 minutes after the engine stopped.

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

6) CHECK FAN BELT TENSION

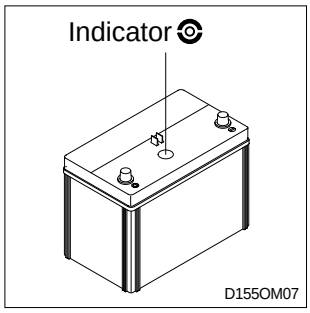


(1) The fan belt must depress the specified value when the midpoint between the generator and fan pulley is depressed.

⚠ **If the belt is stretched beyond the adjustment allowance, or there are cuts or cracks, replace the V-belt.**

- HDF15/18-5 : 7~9mm(0.28~0.35in)
- HDF20/25/30-5 : 8~12mm(0.3~0.6in)
- 35DS/40DS/45DS-7 : 10~12mm(0.4~0.5in)
- 35D/40D/45D-7, HDF50/70-7 : 10~15mm(0.4~0.6in)
- HDF50/70-7S : 10~12mm(0.4~0.5in)

7) CHECK ELECTROLYTE LEVEL(EXCEPT HDF20/25/30-5)

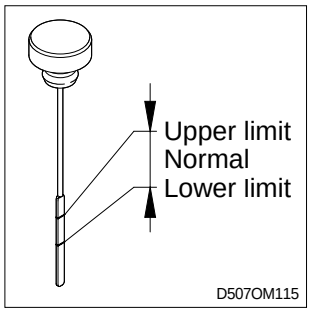


(1) Check the battery indicator( ) and add distilled water if necessary.

⚠ **Never use a metal funnel to add electrolyte or distilled water. Flames should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil or electrolyte.**

⚠ **The electrolyte is sulphuric acid, so it is dangerous. When measuring the specific gravity or temperature of the electrolyte, or when adding distilled water, be careful not to get electrolyte on your skin or clothes. If electrolyte gets on your skin or clothes, wash it off with fresh water immediately. If electrolyte gets in your eyes, wash it out with fresh water and go to a doctor immediately.**

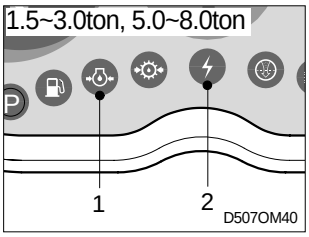
8) CHECK HYDRAULIC OIL LEVEL



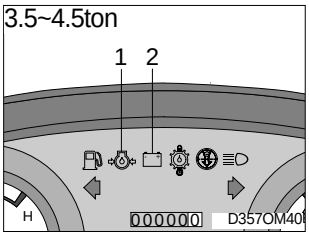
(1) Rest fork on ground and stop engine. Pull out dipstick and check oil level. If insufficient, add oil.

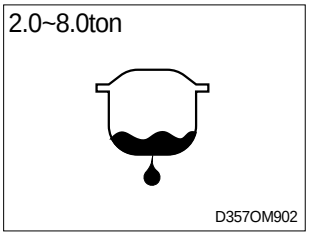
⚠ **Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.**

9) CHECK GAUGES

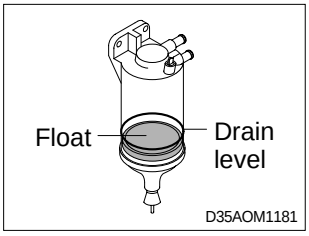


(1) When engine oil pressure warning lamp(1) or battery charge warning lamp(2) turns on, add engine oil or water respectively.





(2) Separator warning lamp(For diesel type/trucks with separator). If the warning lamp stays on, drain the water from the fuel filter.



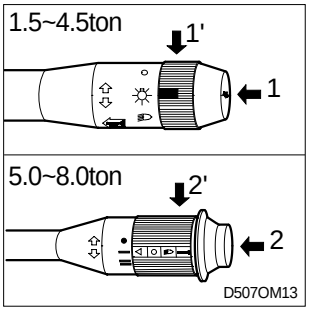
(3) When the float of separator meets the red line(drain level), drain water.

10) CHECK PARKING BRAKE

Operating force	20-30 kg (44-66 lb)

(1) If the operating force is below 20-30kg (44-66 lb), contact your HYUNDAI forklift distributor.

11) CHECK HORN AND LAMPS



(1) Check horn button and lamp switch if operate normally or not.
- 1 : Horn button (1.5~4.5 ton)
- 1' : Lamp switch (1.5~4.5 ton)
- 2 : Horn button (5.0~7.0 ton)
- 2' : Lamp switch (5.0~7.0 ton)

(2) If horn and lamp are malfunctioning, contact your HYUNDAI forklift distributor.

12) CHECK PEDALS

Check for any catching or abnormal heaviness when depressing the pedals.

(1) Inching pedal

	Unit	1.5 ~ 1.8 ton	2.0 ~ 3.0 ton	3.5 ~ 4.5 ton	5.0 ~ 7.0 ton
Free play	mm (in)	10 (0.39)	2~4 (0.08~0.16)	13~18 (0.5~0.7)	4~6.5 (0.16~0.26)
Interlock stroke with brake pedal	mm (in)	43 (1.69)	35~45 (1.4~1.8)	30~40 (1.2~1.6)	19~23 (0.73~0.90)

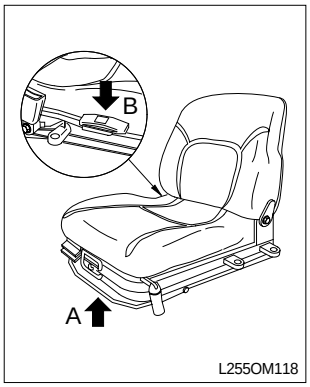
(2) Brake pedal

	Unit	1.5 ~ 1.8 ton	2.0 ~ 3.0 ton	3.5 ~ 4.5 ton	5.0 ~ 7.0 ton
Free play	mm (in)	10 (0.39)	10~15 (0.40~0.60)	13~18 (0.5~0.7)	4~6.5 (0.16~0.26)

4. SEAT ADJUSTMENT

1) SEAT ADJUSTMENT

The seat adjustable to fit the contours of the operator's body. It will reduce operator fatigue due to long works hours and enhance work efficiency.



(1) Forward/Backward adjustment(A)

① Pull lever A to adjust seat forward or back ward.

② The seat can be moved forward and backward over 12㎜ in 10 steps.

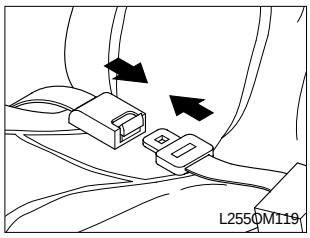
(2) Reclining adjustment(B)

Pull lever B to adjustment seat back rest.

⚠ Always check the condition of the seat belt and mounting hardware before operating the machine.

⚠ Replace the seat belt at least once every three years, regardless of apperance.

2) BUCKLING UP



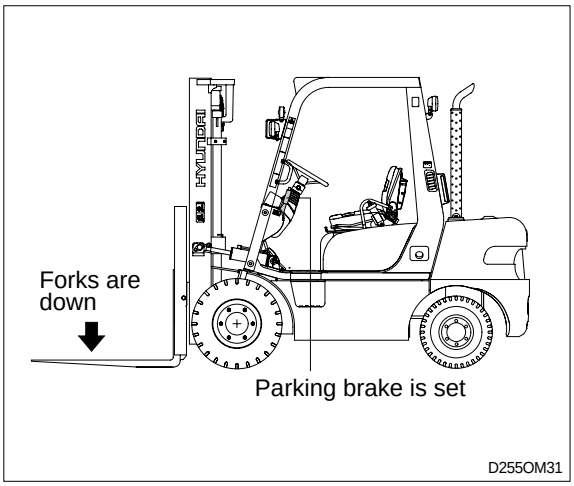
(1) Buckling up. Be sure that you put on the seat belt. Connect and adjust the seat belt strap to a snug, comfortable position.

⚠ Always wear your seat belt when operating a lift truck. Failure to wear seat belt will result in injury or death in an event of an accident.

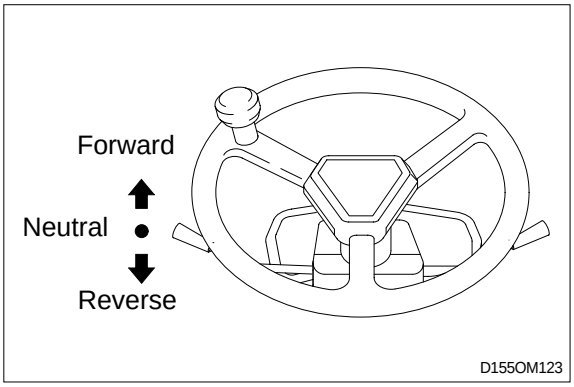
5. STARTING FROM A SAFE CONDITION

Always start from a safe condition.
Before operating a lift truck, make sure that :

- You are safely seated in the truck.
- The parking brake is applied.
- The forks are fully lowered to the floor or ground.
- You are familiar with how all the controls function.
- All controls are in neutral or other correct position.
- The truck has received its daily inspection and ready and safe to operate.



Put the direction control lever in the NEUTRAL position, before starting. The truck should start only in the NEUTRAL position. If it starts in gear, have the truck serviced.



6. GENERAL STARTING AND OPERATING TIPS

Before you start the truck, make sure that you have taken all the above-mentioned precautions, you have read this manual, you are starting from a safe condition, with the directional control in NEUTRAL, the seat adjusted, and your seat belt buckled.

⚠ **INSPECT YOUR LIFT TRUCK BEFORE OPERATING at the start of each shift. Before you put your truck to use, check the operation of the controls and all systems.**

Turn off any lights or optional electrical equipment while you crank the engine. This reduces the electrical load on your battery.

Avoid excessive starter cranking(In excess of 30 seconds). To avoid starter overheating or damage, do not crank the starter continuously for more than 30 seconds at a time. If the engine fails to start, wait two to three minutes before again attempting to start your lift truck.

If your battery is **run down**(discharged) or becomes discharged while you try to start your truck, please refer to Section 6, **Emergency Starting and Towing**, in this manual.

To avoid damage to your truck or possible harm to yourself. Follow these recommendations :

- Warm the engine up before driving or applying a load. Idle engine at low idle rpm for a few minutes to circulate and warm the oil. Then increase speed to approximately half-throttle for a short period or until the engine coolant reaches approximately 100° F. This procedure helps prolong engine life.
- Let the engine run until the normal operating temperature is reached. Then operate the controls and check all gauges and warning indicators to be sure they are functioning properly. Stop the engine and make a visual inspection for oil, water, or fuel leaks.
- Do not operate the engine at speeds above idle for more than brief periods without a load.
- Do not run the engine at maximum power continuously until the engine is fully warmed up.
- Never operate the engine at more than the regular no-load governed speed. Excessive speeds are harmful.

※ **The governor is set at the factory and should need no adjustement.**

- Avoid extended(in excess of 10 minutes) and unnecessary idling of the engine. Turn off the engine instead.
- **Carbon monoxide** is colorless and odorless, but can be present with all other exhaust fumes.

⚠ **Exhaust gases are harmful and can cause serious injury or death. Proper ventilation is always necessary for safe inside operation or warm-up.**

⚠ **Due to the precise, tolerances of diesel injection systems, it is extremely important that the diesel fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the injection pump and the injection nozzles.**

7. STARTING THE ENGINE

1) START FROM A SAFE CONDITION

Before you start the truck, safely seat yourself on the truck, fasten seat belt, apply the parking brake, make sure all controls are in neutral or other correct position, lower the forks fully to floor or ground, put the direction control lever in NEUTRAL, and make sure you know how to operate the truck and all its controls.

Cold Start Preheating(Diesel only)

With the switch in the ON position the indicator will light up showing the glow plugs are pre-heating automatically, after 6 seconds the indicator light will go out. The engine can then be started. For improved starting, pre-heating is continued for about 5 seconds after the indicator light has gone out. To repeat the preheating process turn the key to the OFF and then into the ON position.

⚠ **DO NOT USE STARTING FLUID to help start an engine. The fluid contains ether or other explosive substances that could cause serious injury. Starting fluid is especially dangerous when used on engines with glow plugs. Never use starting fluid with a glow plug equipped engine.**

2) Turn the start switch to the START position to crank the engie. Release the key the RUN position and return the accelerator to idle as soon as the engine starts.

※ **If the engine stalls or falters in starting, wait three or four seconds before re-engaging the starter. This prevents possible serious damage to the starter or engine.**

3) When starting a cold engine, increase the engine speed(rpm) slowly to be sure adequate lubrication is available to the bearings and to allow the oil pressure to stabilize.

4) Idle the engine three to five minutes at idle rpm before operating with a load.

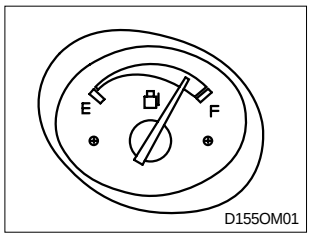
8. CHECK AFTER STARTING ENGINE

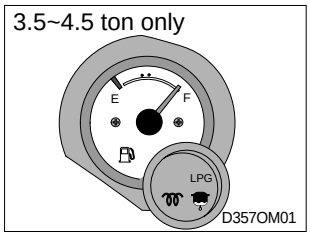
1) CHECK FOR ABNORMAL NOISE OR VIBRATION

2) CHECK ENGINE EXHAUST COLOR

Exhaust gas color	Criteria
Colorless, light blue	OK
Black	Check for incomplete combustion
White	Check for oil leakage

3) CHECK FUEL TANK LEVEL(DIESEL TYPE)



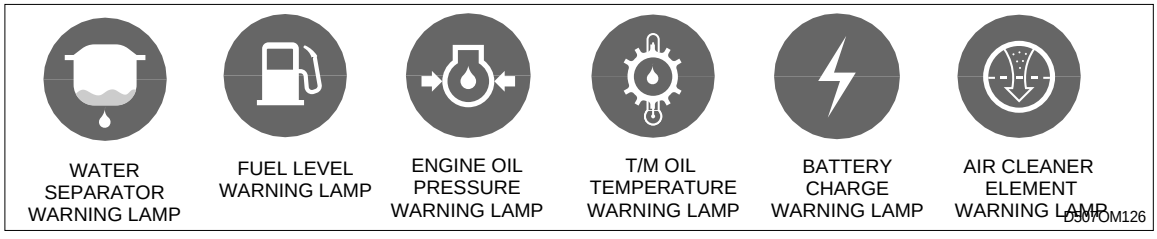


If the indicator points to **F**, the tank is full. If the indicator enters the **E** range, refill the fuel tank immediately. Do not operate the truck below this level. Do not use low quality fuel or fuel mixed with kerosene. Clean the area around the cap before adding fuel to prevent dirt from entering the tank.

Always fill the tank at the end of the day's operation. If air remains in the tank, the moisture in the air will condense inside the tank and form water in the fuel.

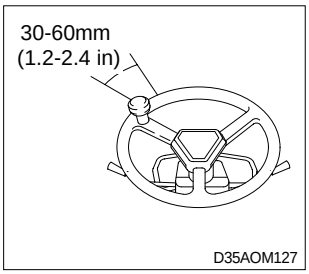
⚠ **Do not smoke or allow any flame near the truck when refilling. Refilling produces explosive fumes. The truck should be refilled only at the specified refilling point.**
Stop the engine and get off the truck when refilling.

4) CHECK MONITOR



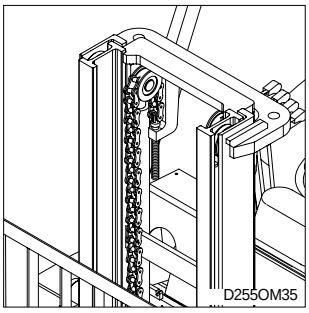
These lamps light up to indicate an abnormality.

5) CHECK STEERING WHEEL PLAY



If the steering wheel play is over 30~60mm (1.2-2.4in), check or repair it.

6) CHECK LIFT CHAIN TENSION



Raise forks 10 to 15cm(4 to 6in) from ground. Push with a rod check that both chains have approximately same amount of slack.

・Adjusting lift chain

① Loosen locknut and turn nut.

② Equalize tension on the lift chain.

⚠ Do not put hands into the mast.

7) CHECK STEERING WHEEL

Check that steering wheel does not wobble or suddenly pull to one side. Check also for any abnormal heaviness in steering.

8) CHECK REARVIEW MIRROR(Option)

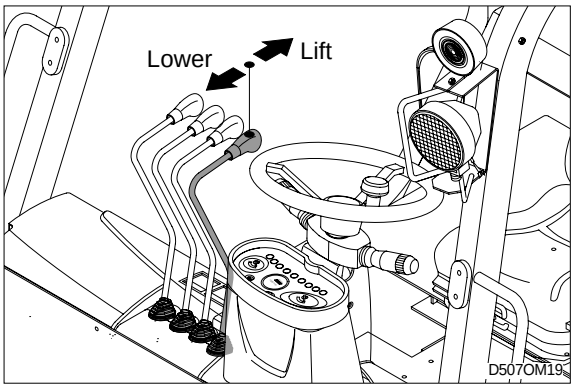
Adjust the rearview mirror for best rearward visibility.

9. LEVERS AND PEDALS

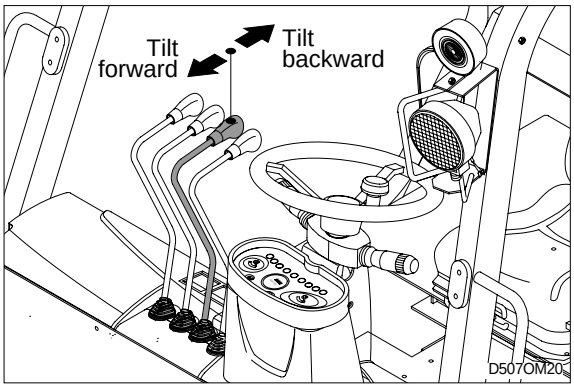
1) POSITIONING FORKS AND MAST

When driving, with or without a load, it is a good practice to always raise the forks slightly and tilt the mast (forks) backward. Raising the forks and tilting them back prevents the fork tips from catching on possible obstructions and reduce the wear on the fork blades from striking or dragging on the floor or ground. See safety messages on next page.

Pull back on the lift control lever and raise the forks 150 to 200mm(6 to 8inch) above the floor. Then, using the tilt control, tilt the mast back slightly to raise the fork tips.



The mount of forward and backward tilt to be used is governed by the application.



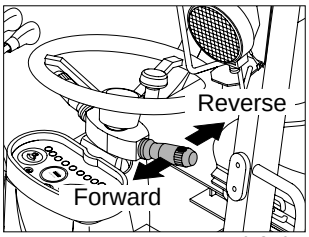
⚠ Illustrations may differ from your machine, but the operation is common each other.

⚠ When the mast(carriage and/or load) is raised into a high (Elevated) position, the stability of the truck is reduced.

Some of the other conditions that may affect stability are ground and floor conditions, grade, speed, loading, dynamic and static forces, and the judgement exercised by the operator. Trucks equipped with attachments behave as partially loaded trucks even when operated without a load on the attachment. Also, improper operation, faulty maintenance, or poor housekeeping may contribute to a condition of instability.

⚠ For stability, do not travel with the load or carriage in a highly elevated position. Travel with the lift mechanism raised only enough to clear the ground or obstacles.

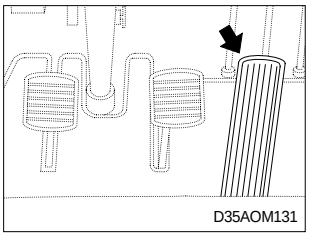
2) SELECTING DIRECTION OF TRAVEL



D507OM95

Push the direction control lever forward, center it , or pull it back for FORWARD, NEUTRAL, or REVERSE, respectively.
Traction is disabled in NEUTRAL.

3) USING THE ACCELERATOR PEDAL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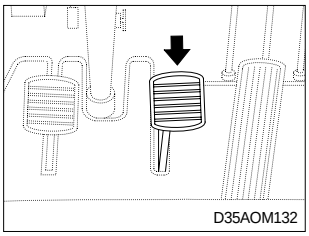
With the parking brake released and the direction control in FORWARD or REVERSE, put your foot on the accelerator pedal and push down smoothly until the truck is moving at the desired speed.

4) BRAKING PEDAL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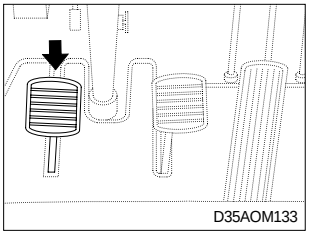
To stop the truck, lift your foot from the accelerator pedal and put it on the brake pedal. Push down on the brake pedal in a smooth, firm motion until the truck is stopped.

⚠ Stop the lift truck as gradually as practical. Hard braking and wheel sliding are dangerous, increase wear, and can cause you to loose a load and damage to the lift truck. Can cause tip-over.

5) INCHING PEDAL


D35AOM133

Use the inching pedal and the accelerator pedal in combination to vary lift and travel speeds independently. The further you depress the inching pedal, the more the driving clutch slips, reducing travel motion. With the inching pedal fully depressed, the brakes fully engage. You operate the inching pedal with your left foot for precise control of travel speed, while you operate the accelerator pedal together with the lift control to vary lift speed.

10. OPERATING SAFELY

Safe operation is the responsibility of the operator.

1) WATCH WHERE YOU ARE GOING. DON'T GO IF YOU CAN'T SEE...

(1) Before driving, check all around to be sure that your intended path of travel is clear of obstructions and pedestrians.

⚠ **LOOK WHERE YOU DRIVE. Watch out for pedestrians, other vehicles, obstructions (especially overhead), and drop-offs. If the load blocks your view, drive backwards, except up slopes.**

(2) Do not allow anyone to stand or pass under the load or raised forks.
Watch for people in your work area even if your truck has warning lights or alarms. They may not watch for you.

(3) Sound horn at intersections and wherever vision is obstructed.
Do not drive a truck up to anyone standing in front of an object.

2) PROTECT YOURSELF AND THOSE AROUND YOU...

(1) Operate the truck only from the designated operator's position. Stay within the confines of the lift truck profile dimensions. Keep all body parts inside the operator's compartment and away from the danger of passing obstructions. Keep under overhead guard.

※ **An overhead guard is intended to offer protection to the operator from falling objects, but cannot protect against every possible impact. Therefore, it should not be considered a substitute for good judgement and care in loading, handling, storage, etc.**

⚠ **Keep clear of the mast and lift mechanism. NEVER reach into or put hands, arms, legs, or head into or through the mast structure or near the carriage or lift chains. Never put any part of your body between the mast and the truck.**
Don't use the mast as a ladder.
Keep all other persons clear of the load and mast mechanism while attempting to handle a load.

3) NO RIDERS...

(1) Do not carry passengers. The operator is the only one who should be on the truck.

4) ALWAYS BE IN FULL CONTROL OF YOUR LIFT TRUCK...

(1) Never operate a lift truck or its attachments if you are not in the designated operator's position.

(2) Never operate a lift truck when your hands and feet are wet or greasy.

(3) Always pick the smoothest travel route for your lift truck. Avoid bumps, holes, slick, spots, and loose objects or debris in your path that may cause the truck to swerve or tip. If these conditions are unavoidable, slow down and carefully drive past them. Slow down for wet or slippery surfaces.

(4) Avoid any sudden movement, it can cause the machine to tip-over.
Start, stop, travel, steer, and brake smoothly.

(5) Operate your lift truck under all conditions at a speed that will permit it to be brought safely to a stop.

(6) Travel with the fork carriage tilted back and raised only enough to fully clear the ground or obstacles. When the carriage(load) is in an elevated position the stability of the truck is reduced.

(7) Do not elevate the load except during stacking.

5) GRADES, RAMPS, AND INCLINES...

(1) Use special care when operating on ramps, inclines, and uneven areas. Travel slowly. Travel straight up and down. Do not turn or drive at an angle across an incline or ramp. Do not attempt to operate on grades in excess of those specified and/or recommended by the manufacturer.

(2) When the truck is loaded, travel with the load upgrade. When the truck is empty, travel with lifting mechanism(mast) downgrade.

(3) Always brake with the right foot pedal(Not with the inching pedal) when travelling down incline.

6) PRACTICE SAFE OPERATION EVERY TIME YOU USE YOUR TRUCK...

(1) Careful driving and operation is your responsibility. Be completely familiar with all the safe driving and load handling techniques in this Operator's Manual. Use common sense. Drive carefully;do not indulge in stunt driving or horseplay. Observe traffic rules. Watch for people and hazards. Slow down, be in full control of your lift truck at all times.

(2) Follow the instructions in this manual to avoid damage to your truck or the possibility of injury to yourself of others.

(3) During your work, observe all functions of your lift truck. This allows you to immediately recognize a problem or irregularity that could affect the safe operation of your truck.

(4) Periodically check the gauges and warning indicator lights in the instrument panel to be sure they indicate a normal condition. If an abnormal condition appears bring the machine to a safe condition and safe location, shut off the starting switch immediately and report the problem.

⚠ **Do not continue to operate a truck that has a malfunction. Stop and have it fixed.**

⚠ **Always wear your seat belt when operating your truck.**

11. LOAD HANDLING

1) GENERAL

Handle only loads that are within the truck rated capacity as shown on the nameplate. This rating specifies the maximum load that should be lifted. However, other factors such as special load handling attachments, load having a high center of gravity, or uneven terrain may dictate that the safe working load be less than the rated capacity. Under these conditions, the operator must reduce the load carried so that the lift truck remains stable.

Handle only stable or safely arranged loads. Do not handle loads made up of loose, unevenly stacked, or unstable items that can easily shift and fall. Take the time to correctly stack and hand loose items. Center the load on the forks.

Do not lift anything that might fall on the operator or a bystander. Do not handle loads that are higher than the fork carriage unless the load is secured so that no part of it can fall backward.

Keep the load back against the LBR. Loads placed out on the ends of the forks can make the lift truck less stable and more likely to tip up.

Lift and lower with the mast vertical or tilted slightly back-never tilted forward.

Operate lift and tilt controls slowly and smoothly. Never tilt the mast forward when the carriage(load) is raised, except to pick up or deposit a load over a rack or stack.

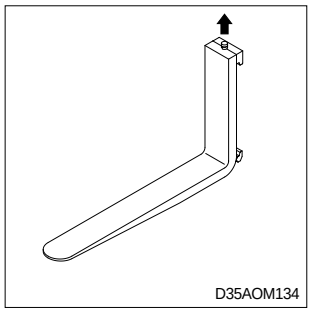
⚠ **Slack chains mean rail or carriage hang-up. Raise the mast before you move. If the mast malfunctions in any way or becomes stuck in a raised position, operate the lift control to eliminate any slack chains by raising the carriage. DO NOT go under a raised mast or forks to attempt repairs.**
DO NOT climb the mast or the truck.

Remember your truck is designed to carry loads forward of the front wheels so that the weight of the load is counterbalanced by the weight of the truck.

The farther the load is carried from the pivot point(Center of front wheels), the less the weight on the steer wheels. Therefore, always carry the load as close to the front wheels as possible(Back and flush against the face of the forks.)

The capacity load shown on the nameplate is represented by a cube in weight is evenly distributed, with the center of gravity located a standard distance from the face of the forks. If the weight of the actual load to be handled is not evenly distributed, put the heaviest part closest to the carriage.

2) ADJUSTING THE LOAD FORKS



The load forks are adjustable on the hanger, carriage. Forks should be spaced as far apart as the load will allow. Both forks should always be the same distance from the center of the fork carriage. To adjust the forks, raise the carriage slightly. Tilt the mast fully forward to reduce friction and make the fork slide easier.
Unlock the fork locking pins.
Position the forks by pushing them away from you. Secure the fork locking pins.

⚠ **Make sure the load backrest(LBR) or fork retaining bolts are fasten securely in place.**

3) TRAVELING WITH LOAD

Travel with load or carriage as low as possible and tilted back. Never travel with the load or carriage raised(elevated) in a high position. Do not elevate the load except during stacking.

Observe all traffic regulations and watch for other traffic, pedestrians, and safe clearances. Always look in the direction of travel. Keep a clear view of the path of travel and when the load blocks your visibility, travel in reverse with load trailing(Except when climbing an incline).

Avoid sudden movements when carrying a load-start, stop, travel, steer, and brake smoothly. Steer clear of bumps, holes, and loose materials or debris on the ground. Lift and tilt slowly and smoothly. Go slowly when turning. Cross railroad tracks slowly and at an angle wherever possible.

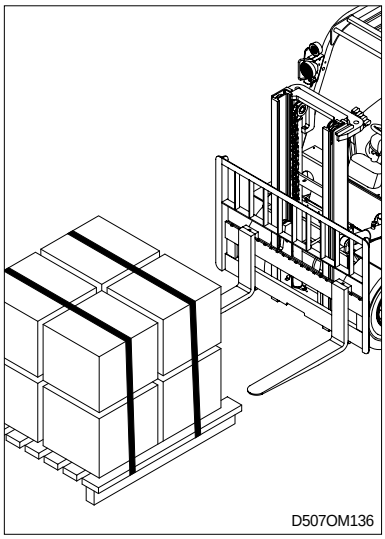
Use special care when handling and traveling with long, high, or wide loads-to avoid losing the load, striking bystanders or obstructions, or tipping the truck.

Watch clearances around the truck and load as you travel. Raise the forks or attachment only to pick up or stack a load. Look out for obstructions, especially overhead.

Be aware that exaggerated tail swing, when turning while traveling forward, is a characteristic of lift trucks that are steered by the rear wheels. Accordingly, you need to become accustomed to tail swing and always check the tail swing area of the counterweight to be sure i is clear before you turn.

Always be concerned about the stability of your lift truck. When attachments are used, extra care should be taken in securing, manipulating, positioning, and transporting the load. Because attachments generally add extra weight and complexity to the truck, operate trucks equipped with attachments as partially-loaded trucks when not handling load.

4) PICKING UP AND MOVING LOADS



When picking up a load from the ground, approach the load slowly and carefully align the truck square with the load. The forks should be adjusted to fit the load or pallet being handle and spread as wide as possible to provide good stability and balance. Before lifting, be sure the load is centered and the forks are fully under and supporting the load. Fork length should be at least 2/3 of load length. With the lift and tilt controls, adjust the forks to the correct height and angle for freely engaging the load pallet. Move forward until the forks are squarely and completely under the load.

⚠ **Be Sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved.**

If the forks are longer than the load, move the tips partially under the load without extending beyond the load. Raise the load to clear the ground. Back out several inches, or whatever distance is necessary, then set the load down and move forward until the load is positioned against the carriage.

Raise the load from the ground or stack by tilting the mast back just enough to lift the load from the surface. When stacking or tiering, use only enough backward tilt to stabilize the load.

Then raise the load to traveling height and tilt fully back to travel(Except for loads that must be transported as level as possible).

5) UNLOADING

To deposit a load on the floor after being moved into the correct position, tilt the mast forward to a vertical position and lower the load.

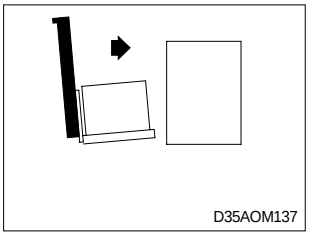
Adjust the fork height and tilt the mast forward slightly, as necessary, for smooth removal of the forks from the load(Pallet).

Carefully back away to clear the forks from the load.

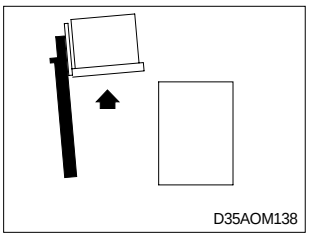
Raise the forks to traveling height and tilt forks to a level position 150~200mm(6~8in) off the floor.

6) STACKING

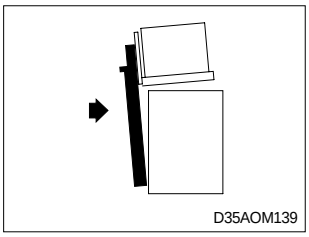
(1) To put a load on a stack



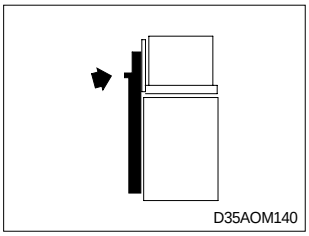
① Aproach slowly and align the lift truck and load squarely with the stack.



② Raise the load as the lift truck nears the stack.

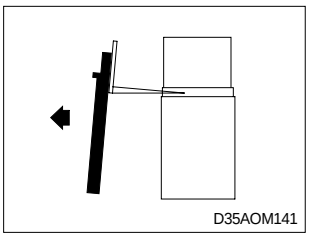


③ Move forward slowly until the load almost touches the stack. The leading edge and sides of the load pallet should line up exactly with the near edge and side of the load or rack on which you are stacking.

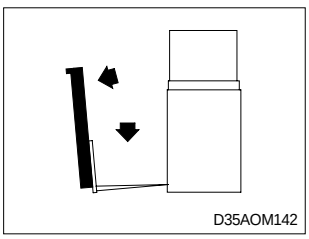


④ Stop close to the stack and further lift the load high enough to clear the top of the stack. Slowly move the load into position. Use care not to damage or move adjacent loads.

⑤ When the load is aligned with the stack beneath it, tilt the mast to the vertical position and carefully lower the load onto the top of the stack.



⑥ Lower the forks slightly to clear the load pallet. Tilt the forks forward slightly, if necessary.



⑦ Check your travel path, then carefully back away until the forks are clear of the stack. Stop and lower the forks to the travel position[150~200㎜(6~8in) above the ground], then tilt back for travel.

(2) To move a load from a stack

Approach the stack carefully, truck lined up squarely with the load. With mast vertical, raise the forks to the correct height for freely engaging the load pallet. Adjust fork angle as necessary to fit squarely under the load. Move (inch) forward until the forks are under the load.

Be sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved. If the forks are longer than the load, move the tips partially under the load without extending beyond the load.
Raise the load to clear the under surface. Back out several inches, then set the load down and move forward until the front face of the forks contacts the load. Be careful that the fork tips now clear the adjacent load or material behind the load being moved.

Raise the load from the stack by tilting the mast back just enough to lift the load from the surface. Or, with the mast still vertical, raise the forks until they begin to lift the load. at this point, apply the minimum back tilt that will stabilize the load.

Check your travel path, slowly back up until clear of the stack, stop, and then lower the load to the travel position [150~200mm(6~8in) off the ground]. Tilt full back to travel(Except for certain loads that may have to be transported as level as possible). Be sure the load is back flush against the carriage or front face of the forks.

※ **Certain loads must be transported as level as possible.**

12. SHUT DOWN PROCEDURE

※ **Always leave your lift truck in a safe condition.**

1) WHEN YOU LEAVE YOUR TRUCK, OR PARK IT, FOLLOW THESE SAFELY RULES

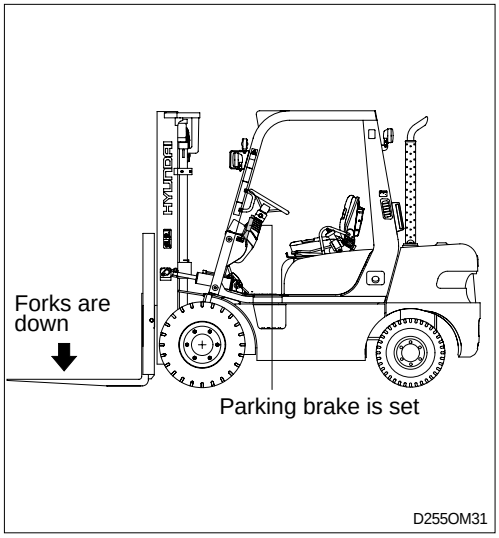
(1) Park in a safe area away from normal traffic.
(2) Never park on a grade.
(3) Never park in areas that block emergency routes or equipment, access to fire aisles, or stairways and fire equipment.

2) BEFORE LEAVING THE OPERATOR'S POSITION

(1) Bring the truck to a complete stop.
(2) Put the directional control lever in the NEUTRAL position.
(3) Apply the parking brake.
(4) Lower the lifting mechanism-carriage and forks or attachment fully to the ground.

3) IN ADDITION, WHEN LEAVING THE TRUCK UNATTENDED

(1) Tilt the mast forward until the forks are level and flat on the ground. Let the engine run at idle speed.
(2) If LPG-fueled:Close the shut-off valve at the fuel tank and let the truck run until it uses up the fuel remaining in the line.
(3) Turn the starting switch to the OFF position and remove the key.
(4) Block the wheels, if the truck must be left on an incline or you have any doubt about the truck moving from a safe position.



※ **If the lift has been working hard, let the engine idle a few minutes before shutting it off.**

⚠ CAUTION FOR TURBOCHARGER PROTECTION

In order to prevent turbocharger failure, please let the engine idle for more than 5 minutes before shutting it off.

· **Applicable models :** 35DS/40DS/45DS-7, 35D/40D/45D-7, HDF50/70-7S, HDF50/70-7

6. EMERGENCY STARTING AND TOWING

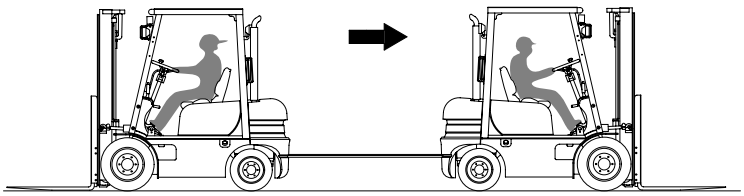
1. HOW TO TOW A DISABLED TRUCK

If your lift truck becomes disabled but it can be moved freely on its own wheels without further damage, use the following procedures to tow it safely to a repair area.

△ **It is important for your safety and the care of your lift truck to use the proper equipment and carefully follow these recommendations for safe towing.**

⚠ **DO NOT tow a lift truck if there is a problem with the brakes or tires or the steering cannot be operated. DO NOT tow up or down ramps and steep inclines. DO NOT attempt to tow a lift truck if traction or weather conditions are poor.**

1) Be sure to apply the parking brake or block the drive wheels on the disabled truck while working around it.
2) When possible, raise the carriage(forks) on the disabled truck about 300㎜(12in) from the floor or ground. Secure the carriage with a chain.
3) Obtain another lift truck of equal or larger size carrying a partial load for traction.
4) Check that the counterweight bolts are in place and properly torqued.(This bolt is made of a special high tensile steel and is not commercially available. Replace it, when necessary, only with a genuine HYUNDAI replacement part).
5) Use an approved, solid metal tow bar with towing couplers that connect to the towing pins in the counterweights.
6) Release the parking brake on the towed vehicle.
7) Transmission control is in neutral.



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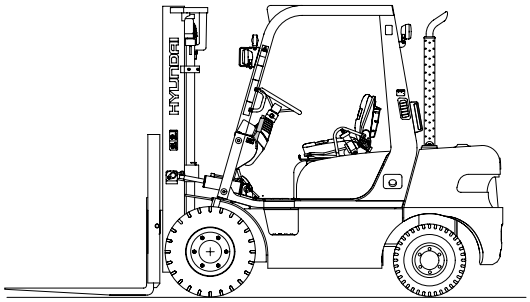
8) Tow the disabled truck backward. An operator must be on the towed truck.

   Tow the truck slowly. Careful towing is necessary to prevent injury to personnel or damage to the truck. The truck should be towed at a speed of less than 8km/h(5mph) with a driver in the seat. Do not lift the truck or any wheels off the floor or ground while the truck is being towed.

⚠ **The power steering will not operate on the disabled truck when the engine is not running.**

9) Park the disabled truck in authorized areas only. Fully lower the forks to the floor, put the directional control lever in the NEUTRAL position and turn the staring switch to the OFF position. Engage the parking brake. Remove the key and, when necessary, block the wheels to prevent the truck from rolling.

Lift truck parking



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⚠ **Always engage the parking brake when parking a lift truck. The truck can move and cause injury or death to personnel near it.**

2. HOW TO USE BATTERY JUMPER CABLES

If your lift truck battery is discharged(dead), you can start your lift truck by Jumping it from another lift truck that has a 12V(1.5~3.0Ton) or 24V(3.5~7.0Ton), negative-ground electrical system. The "Booster" battery must be fully charged and in good condition. This section explains how to perform this procedure safely. To avoid damage to your lift truck and your battery or the possibility of harm to yourself, follow the instructions and warnings carefully. If you have any doubts, ask for help from an experienced mechanic.

If your truck has a battery with terminals on the side you will need a set of jumper cables with matching connector clamps or cable adapters for side mounted battery terminals.

△ **Use only a 12V(1.5~3.0Ton) 24V(3.5~7.0Ton), NEGATIVE GROUND SYSTEM to jump your truck. You can injure yourself and permanetaly damage your truck's 12V(1.5~3.0Ton) 24V(3.5~7.0Ton), starting motor and ignition system by connecting it to a 12V(1.5~3.0Ton) 24V(3.5~7.0Ton), power supply or to a positive ground system.**

⚠ **BATTERIES CONTAIN SULFURIC ACID. Avoid acid contact with skin, eyes, or clothing. If acid contacts your eyes or skin, flush immediately with water and get medical assistance. Wear safety glasses when working near the battery to protect against possible splashing of the acid solution.**

1) If the discharged battery has filler caps, check the fluid level. Do not use an open flame to check and do not smoke. If low, add distilled water to the correct level. Be sure to install the caps before jump starting.

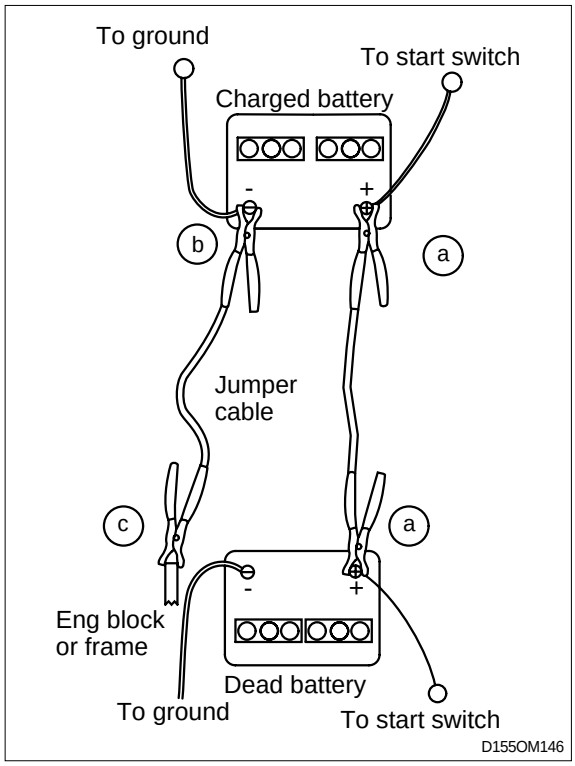
2) Do not jump start, charge, or test a sealed type battery if the test indicator looks illuminated or has a bright color. Install a new battery.

⚠ **BATTERIES EMIT EXPLOSIVE GAS. Do not smoke or have open flames or sparks in battery charging areas or near batteries. An explosion can result and cause injury or death. Hydrogen gas is produced during normal battery operation. Hydrogen can explode if flames, sparks, or lighted tobacco are brought near the battery. When charging or using a battery in an enclosed space, always provide ventilation and shield your eyes. Wear safety glasses when working around batteries.**

3) Put the truck with the booster battery as near to the other truck as necessary for the jumper cables to reach both batteries. Check and make sure that the trucks do not touch each other. Use particular care when connecting a booster battery to prevent sparks.

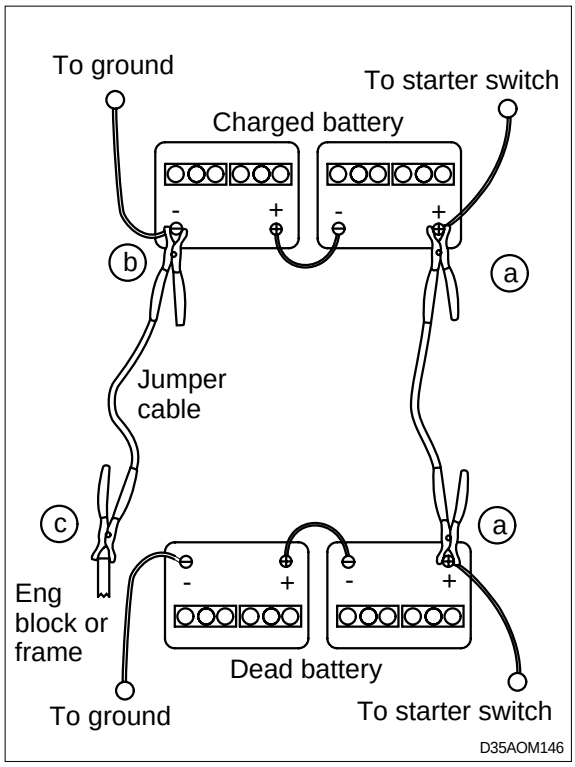
4) On both trucks:
   ① Apply the parking brake.
   ② Put the directional control lever in the NEUTRAL position.
   ③ Turn the starting switch to the OFF position.
   ④ Turn all accessories to the OFF position and leave them off until after the engine has been started and the jumper cables have been removed.

⚠ **To avoid short circuits, remove all jewelry and do not permit any metal tools to make contact between the positive battery terminal and other metal on the truck. When you connect jumper cable clamps to the positive terminals of the two batteries, make sure that neither clamp contacts any other metal. Injury can occur from electrical shock or explosion.**



STALLED VEHICLE

[12V : 1.5 ~ 3.0 ton only]



STALLED VEHICLE

[24V : 3.5 ~ 7.0 ton only]

5) Connect the jumper cables in the following sequence:

   ⓐ Connect a jumper cable from the positive(+; red) terminal on one battery to the positive(+; red) terminal on the other battery. Never connect positive(+; red) to negative(-; black), or negative to positive.

   ⓑ Connect one end of the second cable to the grounded negative(-; black) terminal of the **Jumper vehicle** battery.

   ⓒ Connect the other end of the second cable to a stationary, solid metallic point on the engine of the **Stalled vehicle**, not to the negative(-; black) terminal of its battery. Make this connection at a point at least 450㎜(18in) away from the battery, if possible. Do not connect it to pulleys, fans or other parts that move. Do not touch hot manifolds that can cause sever burns.

6) Start the engine on the **Jumper vehicle** and run the engine at a moderate speed for a minimum of five minutes.

7) Start the engine on the **Stalled vehicle**. Follow the starting instructions in section 5, **Starting and Operating Procedures** in this manual. Be sure that the engine is at idle speed before disconnecting the jumper cables.

8) Remove the jumper cables by reversing the installation sequence exactly. Start by removing the last jumper cable from the stalled vehicle first. Remove the cable end from the engine block first, then the other end of the negative(-; black) cable.

9) Remove both ends of the positive(+; red) cable.

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 planed 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. Performed on a regular basis by trained personnel, the program provides through truck. 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.

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.

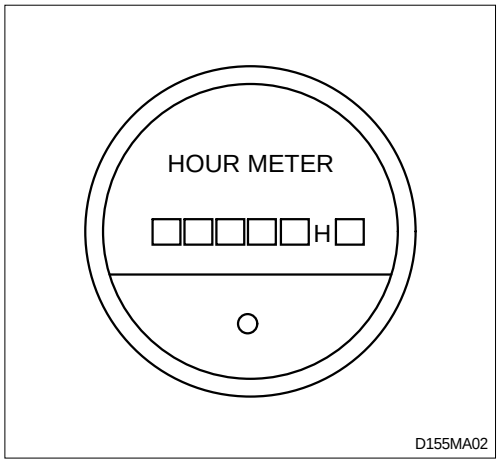
3. INSTRUCTIONS BEFORE MAINTENANCE

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the machine 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 100hours and daily sevice at the same time.



※ Time intervals between maintenances 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) SEVERE OPERATION

Prolonged operating hours or constant usage.

3) EXTREME OPERATION

(1) In sandy or dusty locations, such as cement plants, lumber mills, and coal dust or stone crushing sites.

(2) High-temperature locations, such as steel mills and foundries.

(3) Sudden temperature changes, such as constant trips from buildings into the open air, or in refrigeration plants.

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 machine.

(2) The monitor installed on this machine does not entirely guarantee the condition of the machine. 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 machine.

(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 complation 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 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.

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 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	Breake hose or tube	Every 1 to 2 years
11	Breake reservoir tank tube	Every 2 to 4 years

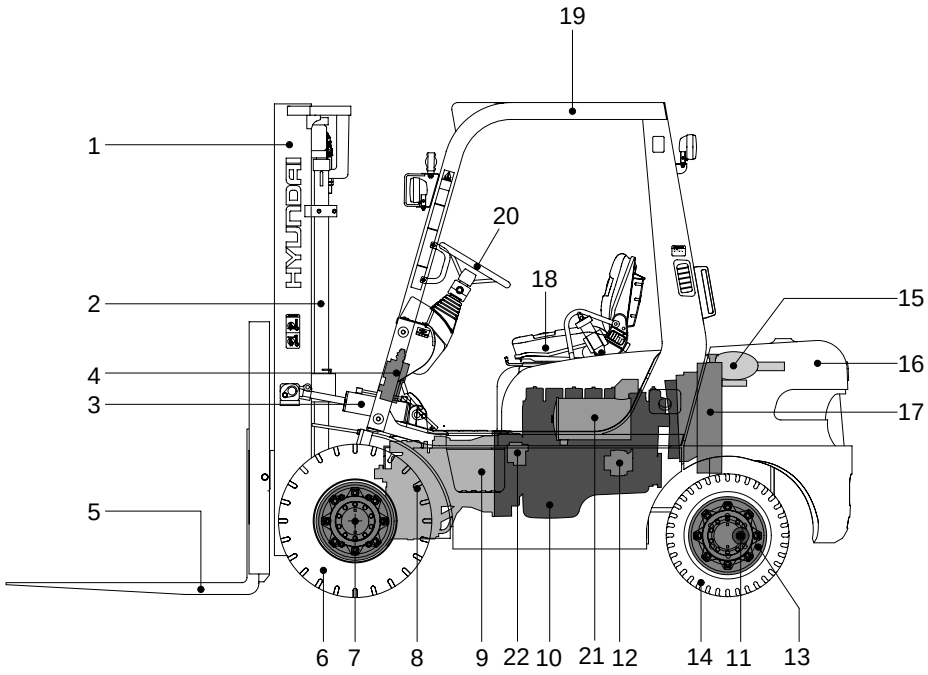
※ **Replace the O-ring and gasket at the same time when replacing the hose.**

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

4. PLANNED MAINTENANCE INTERVALS

1) MAJOR COMPONENT LOCATIONS

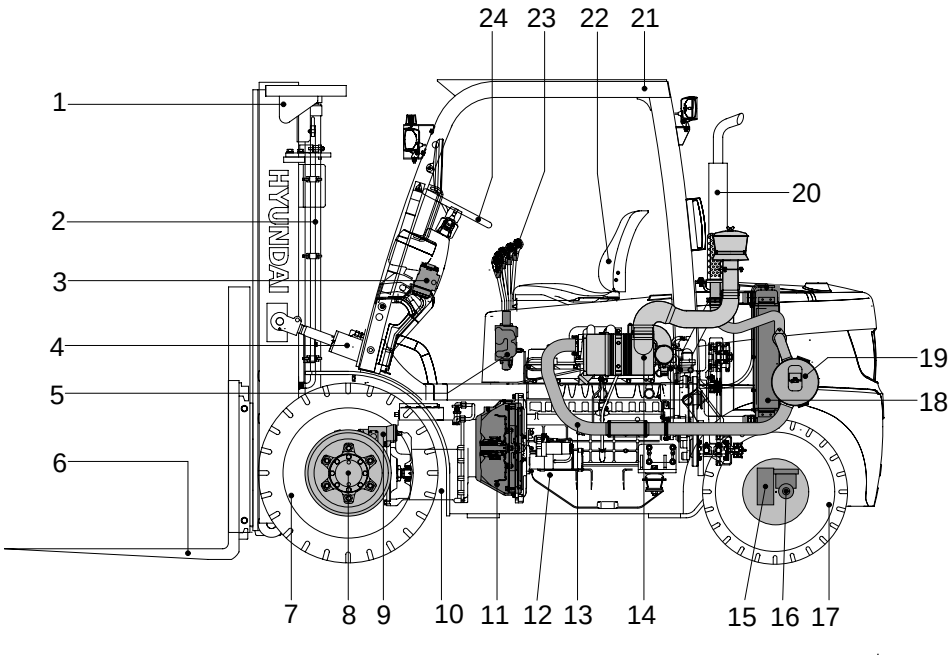
(1) HDF15/18-5, HDF20/25/30-5



D155OM21

1	Mast	8	Transmission	15	Muffler
2	Lift cylinder	9	Torque converter	16	Counterweight
3	Tilt cylinder	10	Engine	17	Radiator
4	Control valve	11	Steering cylinder	18	Operator's seat
5	Fork	12	Hydraulic pump	19	Overhead guard
6	Front wheel	13	Steering axle(Rear)	20	Steering wheel
7	Drive axle	14	Rear wheel	21	Air cleaner

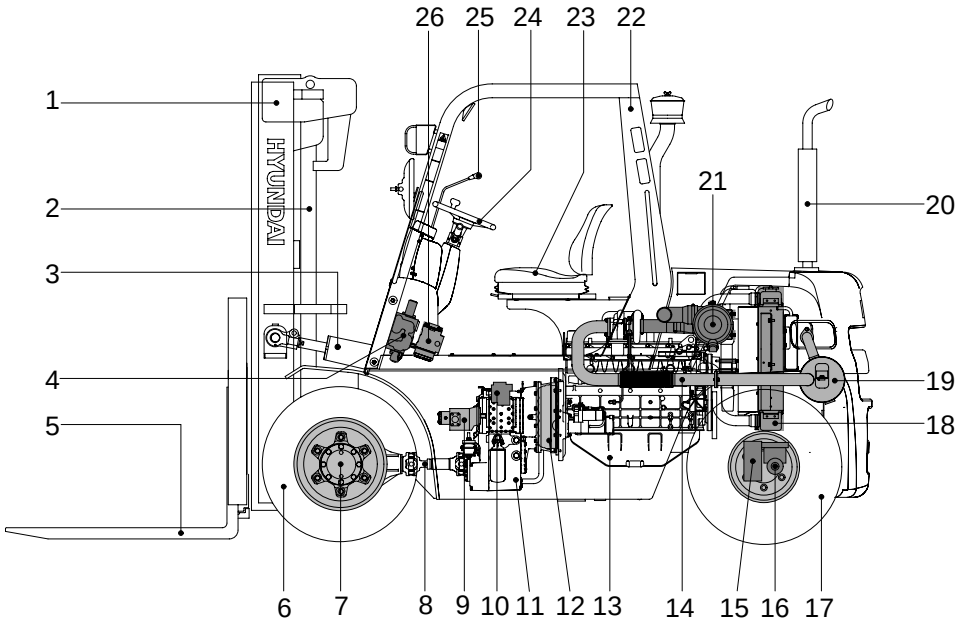
2) 35DS/40DS/45DS-7, 35D/40D/45D-7



D357OM21

1	Mast	10	Transmission	19	Muffler
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		
8	Drive axle	17	Rear wheel		
9	Hydraulic pump	18	Radiator		

3) HDF50/70-7S, HDF50/70-7



D507OM21

1	Mast	10	Priority valve	19	Muffler
2	Lift cylinder	11	Transmission	20	Silencer
3	Tilt cylinder	12	Torque converter	21	Air cleaner
4	Control valve	13	Engine	22	Overhead guard
5	Fork	14	Exhaust pipe	23	Seat
6	Front wheel	15	Steering axle	24	Steering wheel
7	Drive axle	16	Steering cylinder	25	Control lever
8	Propeller shaft	17	Rear wheel	26	Steering unit
9	Hydraulic pump	18	Radiator		

2) MAINTENANCE CHECK LIST

(1) EVERY 10 HOURS SERVICE

Check items	Service	Remarks
Visual inspection		
· Truck for obvious damage and leaks.	Check, Repair or Replace	4-1
· Warning plates and decals.	Check, Replace	3-4 ~ 3-6
· Condition of tires and wheels. Air pressure.	Check, Refill or Replace	5-3, 7-19
· Lift chain and fastener.	Check, Adjust	7-34, 7-35
· Carriage or attachment and forks.	Check, Repair or Replace	7-19
· Fuel level	Check, Refill	5-12
· Engine oil level	Check, Refill	5-4
· Coolant level(Radiator & reservoir tank).	Check, Refill	5-4
· Water separator.	Check, Clean	5-6
· Hydraulic oil level.	Check, Refill	5-5
· Transmission oil level.	Check, Refill	7-23
· Fan belt damage	Check, Replace	5-5
Function tests		
· Horn and lamp	Check, Repair or Replace	5-6
· Gauges and instrument panel.	Check, Repair or Replace	5-6
· Warning light.	Check, Repair or Replace	5-6
· Service brake and inching operation.	Check, Repair or Replace	7-29
· Parking brake operation.	Check, Repair or Replace	7-29
· Accelerator and engine speed operation.	Check, Adjust	5-15
· Directional and speed control operation.	Check, Repair or Replace	5-15
· Steering wheel operation.	Check, Repair or Replace	5-13
· Noise and vibration.	Check, Repair or Replace	5-12

(2) EVERY 50 HOURS SERVICE

Check items	Service	Remarks
Air cleaner element	Check, Clean	7-21
Air breather filter	Check, Clean	7-32, 7-33
Engine oil/filter (Initial 50 hours only)	Change/Replace	7-22
Lubrication		
· Steering axle linkage pin	Check, Clean, Lubricate	7-33
· Hydraulic pump drive spline.	Check, Clean, Lubricate	7-33
Tightening torques		
· Pump mounting bolt torque	Check, Tight	8-19, 8-20
· Drive axle mounting bolt	Check, Tight	8-19, 8-20
· Tilt cylinder mounting and yoke bolt	Check, Tight	8-19, 8-20
· Mast mounting bolt	Check, Tight	8-19, 8-20
· Drive & steering axle wheel mounting bolt & nut	Check, Tight	8-19, 8-20
· Counterweight mounting bolt	Check, Tight	8-19, 8-20
· Cabin mounting bolt	Check, Tight	8-19, 8-20
· Main pump & MCV mounting bolt	Check, Tight	8-19, 8-20
· Engine & radiator mounting bolt	Check, Tight	8-19, 8-20
· Transmission mounting bolt	Check, Tight	8-19, 8-20
· Steering axle mounting bolt	Check, Tight	8-19, 8-20

(3) INITIAL 100 HOURS SERVICE

Check items	Service	Remarks
Differential gear oil	Change	7-23
Transmission oil and filter	Replace	7-23
Drive axle cooling oil	Change	-

(4) EVERY 250 HOURS SERVICE

Check items	Service	Remarks
Engine oil*	Check, Replace	7-22
Differential gear oil	Check, Refill	7-23
Lubrication		
· Lift chain	Check, Lubricate	7-33
· Mast roller	Check, Lubricate	7-33
· Lift cylinder rod end	Check, Lubricate	7-33
· Lift cylinder tube end	Check, Lubricate	7-33
· Tilt cylinder rod end	Check, Lubricate	7-33
· Tilt cylinder tube end	Check, Lubricate	7-33
· Steering cylinder rod end	Check, Lubricate	7-33
· Steering cylinder tube end	Check, Lubricate	7-33
· Attachment option cylinder rod end	Check, Lubricate	7-33
· Attachment option cylinder tube end	Check, Lubricate	7-33
· Steering axle wheel bearing	Check, Lubricate	7-30
· Pedal pivot	Check, Lubricate	7-30

* HDF15/18-5

(5) EVERY 500 HOURS SERVICE

Check items	Service	Remarks
Trunnion bolt	Check, Tight	8-19, 8-20
Hydraulic oil return filter	Replace	7-24
Air cleaner element(*)	Replace	7-21
Fuel filter(**)	Replace	7-22
Battery	Check, Replace	7-20
Engine ignition and timing	Check, Replace	-
Engine oil and oil filter	Check, Replace	7-22
Engine oil filter	Replace	7-22

* Air cleaner element change interval may be determined by using an air restriction indicator.

** Diesel fuel filter change interval may be determined by fuel filter restriction indicator.

(6) EVERY 1000 HOURS SERVICE

Check items	Service	Remarks
Fuel filter(**)	Change	7-22
Hydraulic oil tank		
· Hydraulic oil	Change	7-24
· Suction strainer	Replace	7-24
Transmission oil & filter	Change	7-23
Differential oil	Change	7-23
Fan belt tension and damage	Replace	5-5
Drive axle cooling oil	Change	-

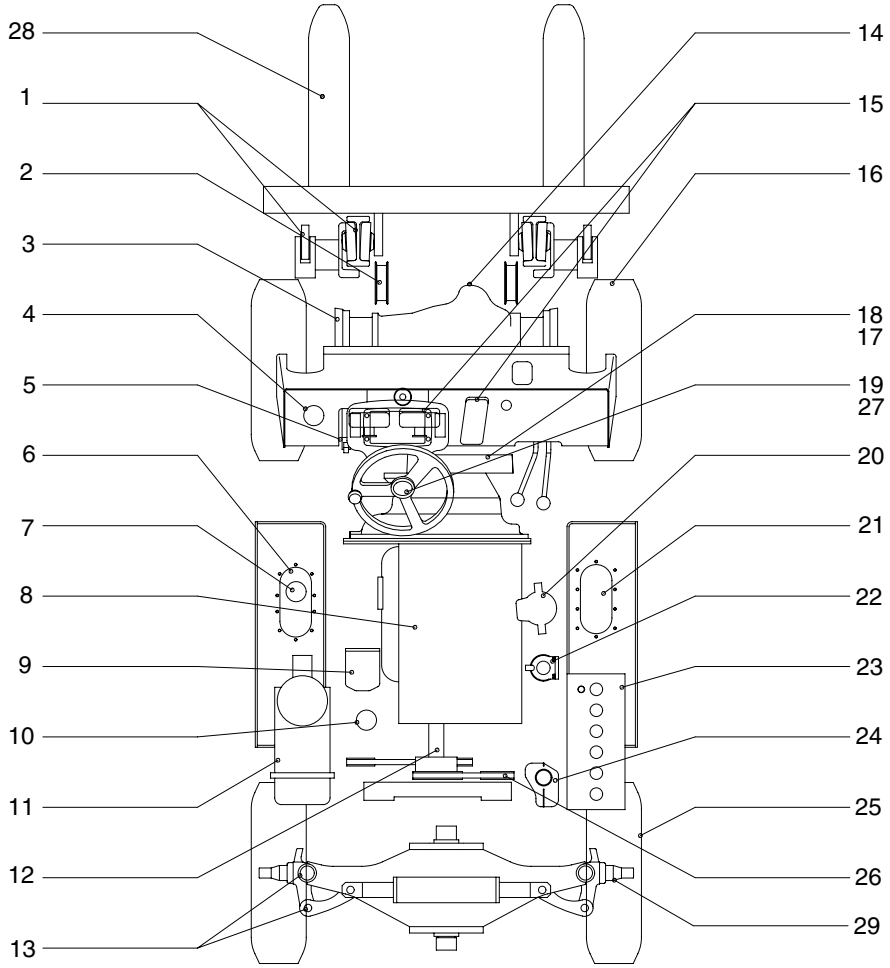
** 35D/40D/45D-7(TIER II, #1001-), HDF50/70-7(TIER II, #1001-)

(7) WHEN REQUIRED

Check items	Service	Remarks
Fuel system		
· Fuel tank	Drain or Clean	5-12
· Water separator	Drain or Clean	5-6
· Fuel filter	Replace	7-22
Engine lubrication system		
· Engine oil	Replace	7-22
· Engine oil filter cartrige	Replace	7-22
Engine cooling system		
· Coolant	Refill, Replace	7-31
· Radiator	Clean	7-25
Engine air intake system		
· Air cleaner element	Replace	7-21
Hydraulic tank		
· Hydraulic oil	Refill or Replace	7-24
· Hydraulic oil suction filter	Refill, Replace	7-24
· Return oil filter element	Refill, Replace	7-24
· Air breather filter	Refill, Replace	7-32, 7-33
Tire air pressure	Check, Refill	5-3

5. MAINTENANCE CHART

1) MAINTENANCE LOCATIONS



D357MA01

※ 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, please it by a new one.

※ For other details, refer to the service manual.

2) MAINTENANCE CHART

(1) HDF15/18-5, HDF20/25/30-5

Service interval	Item No.	Description	Service Action	Oil symbol	Capacity(ℓ)		Service point No.
					1.5~1.8ton	2.0~3.0ton	
10 Hours or daily	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	4	Brake oil	Check, Add	BF	0.5	0.5	1
	5	Parking brake operation	Check, Adjust	-	-	-	1
	6	Hydraulic oil level	Check, Add	HO	34	50	1
	8	Engine oil level	Check, Add	EO	9.5	9.6	1
	15	Pedal linkage operation	Check, Adjust	-	-	-	1
	16	Drive rim & Tire air pressure	Check, Add	-	-	-	2
	17	Transmission oil level	Check, Add	MO	7	10	1
	19	Lamp operation	Check, Replace	-	-	-	9
	21	Fuel level	Check, Add	DF	38	64	1
	22	Water separator	Check, Drain	-	-	-	1
	24	Radiator coolant	Check, Add	C	9.4	9.4	1
	25	Steer rim & Tire air pressure	Check, Add	-	-	-	2
	26	Fan belt tension	Check, Adjust	-	-	-	1
	27	Horn operation	Check, Replace	-	-	-	1
50 Hours or weekly	10	Hyd. oil air breather element	Check, Clean	-	-	-	1
	11	Air cleaner element	Check, Clean	-	-	-	1
	12	Hydraulic pump drive	Check, Add	G	-	-	1
	13	Steering axle linkage	Check, Add	G	-	-	1
Initial 100 Hours	14	Differential gear oil	Replace	GO	5	5	1
	17	Transmission oil	Replace	MO	7	10	1
	18	Transmission oil filter	Replace	-	-	-	1
250 Hours or monthly	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	8	Engine oil (*)	Replace	EO	9.5	9.6	1
	14	Differential gear oil	Check, Add	GO	5	5	1
	28	Fork condition and wear	Check, Replace	-	-	-	2
500 Hours or 3 monthly	3	Trunnion bolt	Check, Adjust	-	-	-	4
	7	Hydraulic oil return filter	Replace	-	-	-	1
	8	Engine oil (**)	Replace	EO	9.5	9.6	1
	9	Engine oil filter	Replace	-	-	-	1
	11	Air cleaner element	Replace	-	-	-	1
	20	Fuel filter	Replace	-	-	-	1
	23	Battery electrolyte	Check, Add	-	-	-	1(2)
1000 Hours or 6 monthly	4	Brake oil	Replace	BF	0.5	0.5	1
	6	Hydraulic oil & Strainer	Replace	HO	34	50	1
	14	Differential Gear oil	Replace	GO	5	5	1
	17	Transmission oil	Replace	MO	7	10	1
	18	Transmission oil filter	Replace	-	-	-	1
	16	Brake condition and wear	Check, Replace	-	-	-	2
	24	Radiator coolant	Replace	C	9.4	9.4	1
	29	Steering axle wheel bearing	Check, Add	G	-	-	2

* HDF15/18-5 ** HDF20/25/30-5

※ 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 : Break fluid C : Coolant G : Grease

(2) 35D/40D/45D-7, 35DS/40DS/45DS-7

Service interval	Item No.	Description	Service Action	Oil symbol	Capacity(ℓ)		Service point No.
					HMC ENG	MHI ENG	
10 Hours or daily	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	4	Brake oil	Check, Add	BF	0.5	0.5	1
	5	Parking brake operation	Check, Adjust	-	-	-	1
	6	Hydraulic oil level	Check, Add	HO	66	66	1
	8	Engine oil level	Check, Add	EO	8.5	17.5	1
	15	Pedal linkage operation	Check, Adjust	-	-	-	1
	16	Drive rim & Tire air pressure	Check, Add	-	-	-	2
	17	Transmission oil level	Check, Add	MO	12	12	1
	19	Lamp operation	Check, Replace	-	-	-	9
	21	Fuel level	Check, Add	DF	100	100	1
	22	Water separator	Check, Drain	-	-	-	1
	24	Radiator coolant	Check, Add	C	21.5	21.5	1
	25	Steer rim & Tire air pressure	Check, Add	-	-	-	2
	26	Fan belt tension	Check, Adjust	-	-	-	1
	27	Horn operation	Check, Replace	-	-	-	1
50 Hours or weekly	10	Hyd. oil air breather element	Check, Clean	-	-	-	1
	11	Air cleaner element	Check, Clean	-	-	-	1
	12	Hydraulic pump drive	Check, Add	G	-	-	1
	13	Steering axle linkage	Check, Add	G	-	-	1
Initial 100 Hours	14	Differential gear oil	Replace	GO	10.5	10.5	1
	17	Transmission oil	Replace	MO	12	12	1
	18	Transmission oil filter	Replace	-	-	-	1
250 Hours or monthly	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	14	Differential gear oil	Check, Add	GO	10.5	10.5	1
	28	Fork condition and wear	Check, Replace	-	-	-	2
500 Hours or 3 monthly	3	Trunnion bolt	Check, Adjust	-	-	-	4
	4	Brake oil	Replace	BF	0.5	0.5	1
	7	Hydraulic oil return filter	Replace	-	-	-	1
	8	Engine oil	Replace	EO	8.5	17.5	1
	9	Engine oil filter	Replace	EO	-	-	1
	11	Air cleaner element	Replace	-	-	-	1
	14	Differential gear oil	Replace	GO	10.5	10.5	1
	20	Fuel filter	Replace	-	-	-	1
	23	Battery electrolyte	Check, Add	-	-	-	1(2)
1000 Hours or 6 monthly	4	Brake oil	Replace	BF	0.5	0.5	1
	6	Hydraulic oil & Strainer	Replace	HO	66	66	1
	14	Differential gear oil	Replace	GO	10.5	10.5	1
	17	Transmission oil	Replace	MO	12	12	1
	18	Transmission oil filter	Replace	-	-	-	1
	16	Brake condition and wear	Check, Replace	-	-	-	2
	20	Fuel filter(**)	Replace	-	-	-	1
	24	Radiator coolant	Replace	C	21.5	21.5	1
	29	Steering axle wheel bearing	Check, Add	G	-	-	2

** 35D/40D/45D-7(TIER II, #1001-)

※ 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 : Break fluid C : Coolant G : Grease

(3) HDF50/70-7S, HDF50/70-7

Service interval	Item No.	Description	Service Action	Oil symbol	Capacity(ℓ)		Service point No.
					HMC ENG	MHI ENG	
10 Hours or daily	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	4	Brake oil	Check, Add	BF	0.5	0.5	1
	5	Parking brake operation	Check, Adjust	-	-	-	1
	6	Hydraulic oil level	Check, Add	HO	105	105	1
	8	Engine oil level	Check, Add	EO	8.5	17.5	1
	15	Pedal linkage operation	Check, Adjust	-	-	-	1
	16	Drive rim & Tire air pressure	Check, Add	-	-	-	2
	17	Transmission oil level	Check, Add	EO	15.6	15.6	1
	19	Lamp operation	Check, Replace	-	-	-	9
	21	Fuel level	Check, Add	DF	150	150	1
	22	Water separator	Check, Drain	-	-	-	1
	24	Radiator coolant	Check, Add	C	17	17	1
	25	Steer rim & Tire air pressure	Check, Add	-	-	-	2
	26	Fan belt tension	Check, Adjust	-	-	-	1
	27	Horn operation	Check, Replace	-	-	-	1
50 Hours or weekly	10	Hyd. oil air breather element	Check, Clean	-	-	-	1
	11	Air cleaner element	Check, Clean	-	-	-	1
	12	Hydraulic pump drive	Check, Add	G	-	-	1
	13	Steering axle linkage	Check, Add	G	-	-	1
Initial 100 Hours	14	Differential gear oil	Replace	GO	12.5	12.5	1
	17	Transmission oil	Replace	EO	15.6	15.6	1
	18	Transmission oil filter	Replace	-	-	-	1
250 Hours or monthly	1	Tilt pin & Mast roller	Check, Add	G	-	-	2
	2	Lift chain	Check, Add	EO	-	-	2
	14	Differential gear oil	Check, Add	GO	12.5	12.5	1
	28	Fork condition and wear	Check, Replace	-	-	-	2
500 Hours or 3 monthly	3	Trunnion bolt	Check, Adjust	-	-	-	4
	4	Brake oil (WET)	Replace	BF	0.5	0.5	1
	7	Hydraulic oil return filter	Replace	-	-	-	1
	8	Engine oil	Replace	EO	8.5	17.5	1
	9	Engine oil filter	Replace	-	-	-	1
	11	Air cleaner element	Replace	-	-	-	1
	14	Differential Gear oil (WET)	Replace	GO	12.5	12.5	1
	20	Fuel filter	Replace	-	-	-	1
	23	Battery electrolyte	Check, Add	-	-	-	1(2)
1000 Hours or 6 monthly	4	Brake oil (DRY)	Replace	BF	0.5	0.5	1
	6	Hydraulic oil & Strainer	Replace	HO	105	105	1
	14	Differential Gear oil (DRY)	Replace	GO	12.5	12.5	1
	17	Transmission oil	Replace	EO	15.6	15.6	1
	18	Transmission oil filter	Replace	-	-	-	1
	16	Brake condition and wear	Check, Replace	-	-	-	2
	20	Fuel filter(**)	Replace	-	-	-	1
	24	Radiator coolant	Replace	C	17	17	1
	29	Steering axle wheel bearing	Check, Add	G	-	-	2

** HDF50/70-7(TIER II, #1001-)

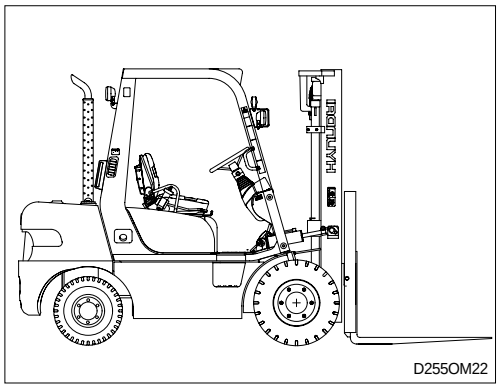
※ Oil symbol
Refer to the recommended lubricants for specification.
DF : Diesel fuel HO : Hydraulic oil EO : Engine oil GO : Gear oil
MO : Transmission oil BF : Break fluid C : Coolant G : Grease

6. HOW TO PERFORM PLANNED MAINTENANCE

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.



D255OM22

※ **NAMEPLATES AND DECALS: Do not operate a lift truck with damage or lost decals and nameplates. Replace them immediately. They contain important information.**

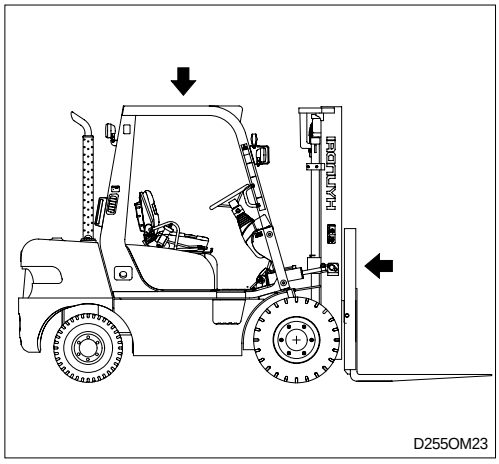
Inspect the truck, before and after starting the engine, for any sign of external leakage of fuel, engine coolant, transmission fluid, etc..

Check for hydraulic oil leaks and loose fittings.

⚠ **HYDRAULIC FUILD 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.



D255OM23

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

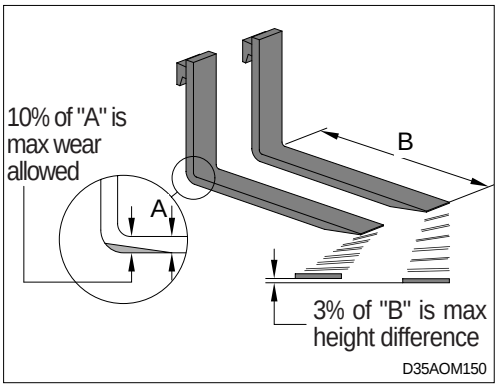
Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips should be no more than 3% of the fork length.

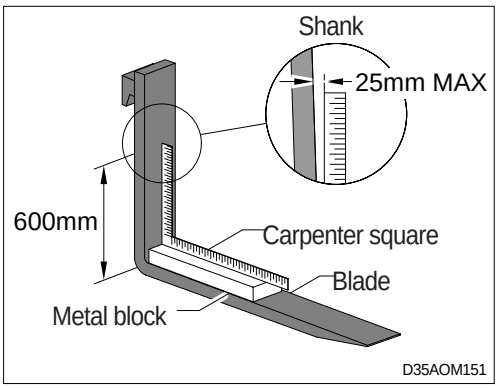
⚠ **If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.**

Inspect the forks for twists and bends. Put a 5㎝(2in) thick metal block, at least 10㎝(4in) wide by 61㎝(24in) long with parallel sides, on the blade of the fork with the 10㎝(4in) surface against the blade. Put a 61㎝(24in) carpenter's square on the top of the block and against the shank. Check the fork 51㎝(20in) above the blade to make sure it is not bent more than 25.4㎜(1in) 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.





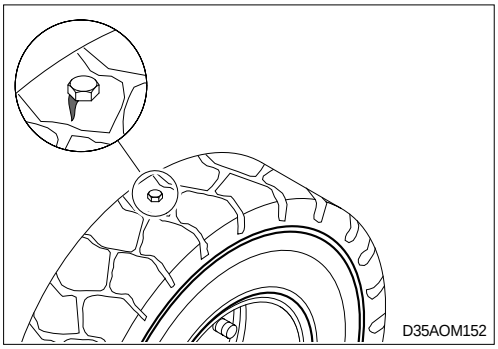
5) WHEEL AND TIRES

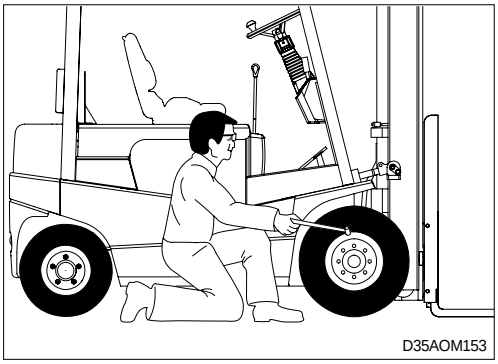
Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or **chunking out**.

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 689kpa(100psi).

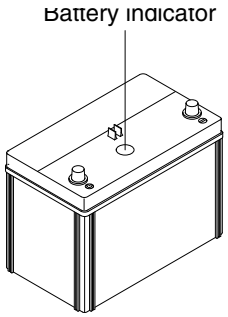




7. REPLACEMENT AND CHECK

Check the battery condition per the table below.
Add water, or recharge as shown by the indicator.

Battery condition	Mark	Color
Normal		Green
Insufficient distilled water		White
Insufficient charge		Red



Indicator : Except 2.0 ~ 3.0 ton

D155OM08

⚠ BATTERIES EMIT EXPLOSIVE GAS. Do not smoke or have open flames or sparks in battery charging areas or near batteries. An explosion can result and cause injury or death.
Hydrogen gas is produced during normal battery operation. Hydrogen can explode if flames, sparks, or lighted tobacco are brought near the battery. When charging or using a battery in an enclosed space, always provide ventilation and shield your eyes. Wear safety glasses when working around batteries.

⚠ The electrolyte is sulphuric acid, so it is dangerous. When measuring the specific gravity or temperature of the electrolyte, or when adding distilled water, be careful not to get electrolyte on your skin or clothes. If electrolyte gets on your skin or clothes, wash it off with fresh water immediately. If electrolyte gets in your eyes, wash it out with fresh water and go to a doctor immediately.

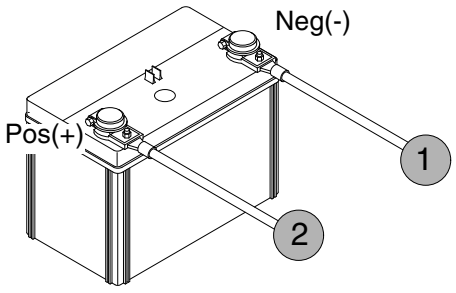
1) REMOVING AND INSTALLING

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

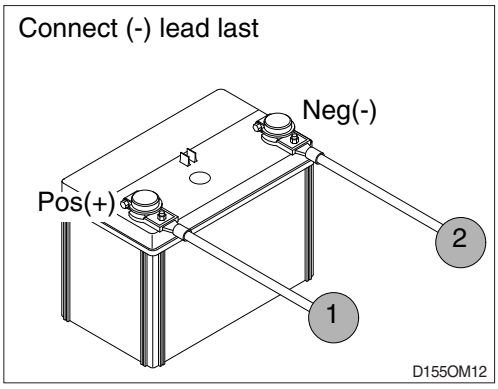
⚠ Do not allow tools to touch the (+) terminal and the body of the truck at the same time. This can cause sparking and explosion.
When reinstalling the cables after replaced the battery, pay close attention to maintaining the same alignment state of the cables as it was when supplied. Otherwise, the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

Remove (-) lead first



D155OM09

⚠ **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.**



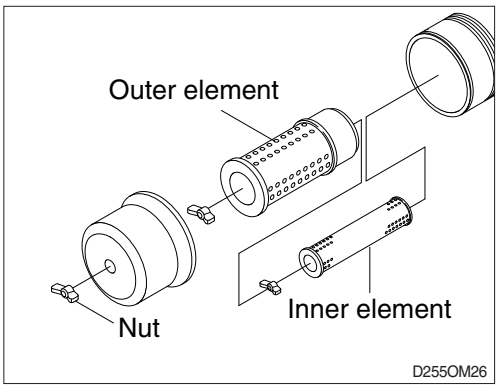
2) **AIR CLEANER ELEMENT**

(1) **Removal**

① **Double element type**

Remove wing nut and pull out outer element.

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



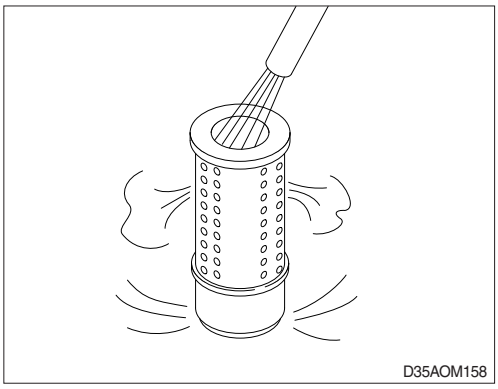
(2) **Cleaning**

① **Cleaning with compressed air**

Blow dry compressed air(Max 30psi) 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.



(3) **Installation**

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

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

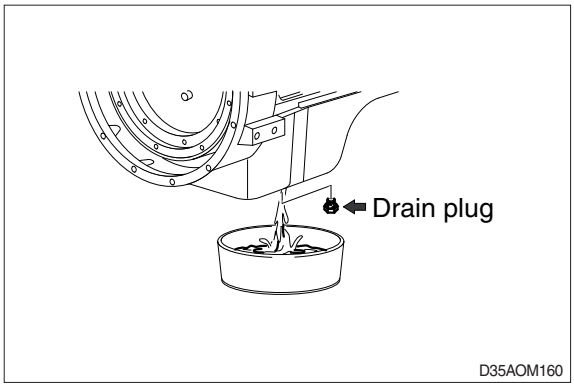
⚠ OSHA approved eye protection rated for 200kPa(30psi) is required for air cleaning operation. Replace element if exhaust is black, or if lack of engine power is noted even after cleaning or element. When cleaning the element or element housing, cover the air flow outlet port of the housing with a clean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

3) **ENGINE**

(1) **Engine oil change**

Warm up engine oil then park the truck in level place with forks lowered. Stop the engine and apply parking brake.

Remove drain plug and drain engine oil.



⚠ Also replace the engine oil filter. Check oil level using dipstick after changing the engine oil. Dispose of old oil in locally approved manner.

(2) **Engine oil filter replacement**

- Remove the filter using a filter wrench.
- Clean the filter by removing dust and oil from the filter base bottom.
- Install the new filter after thinly coating the packing surface with engine oil.

⚠ After replacing the engine oil filter element, start the engine to check for oil leakage from the filter mounting surface. Check the engine oil level using the dipstick. When adding engine oil, do not let the oil overflow from the filler port.

(3) **Fuel filter replace**

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 Using a filter wrench, remove the cartridge.

② Fit the new cartridge with fuels coat the surface of the packing lightly with engine oil, then istall.

4) 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. Then stop the engine and apply the parking brake.

(2) Oil level check

① Open inspection plate, and oil level can be checked using dipstick.

② Add oil through oil filler plug if necessary.

③ Always check oil level using dipstick after add oil.

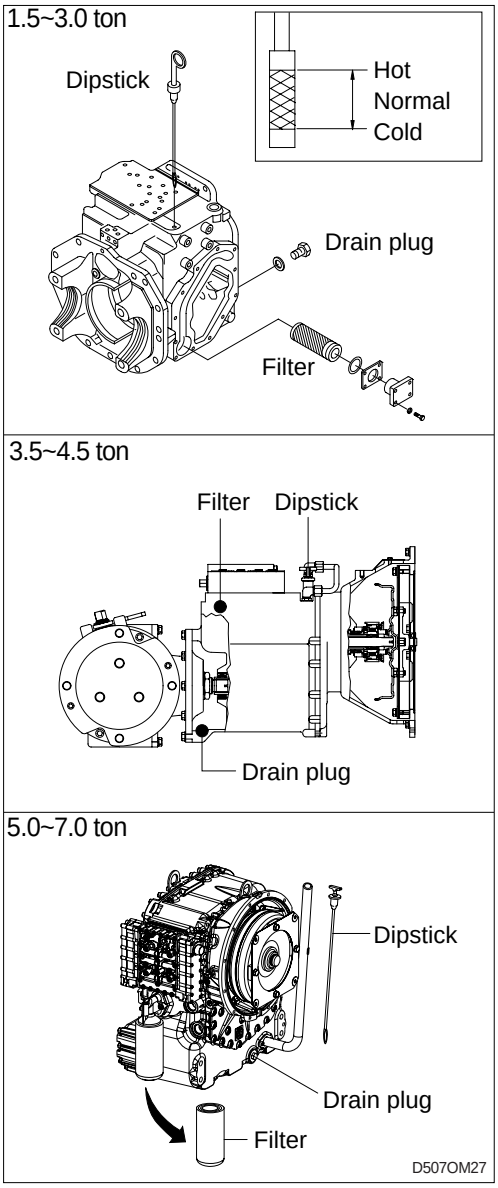
(3) Change

① Remove drain plug.

② When changing oil, remove strainer and clean it with flushing oil.

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

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



5) DIFFERENTIAL CASE

(1) Differential oil

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

Then stop the engine and apply the parking brake.

(2) Oil level check

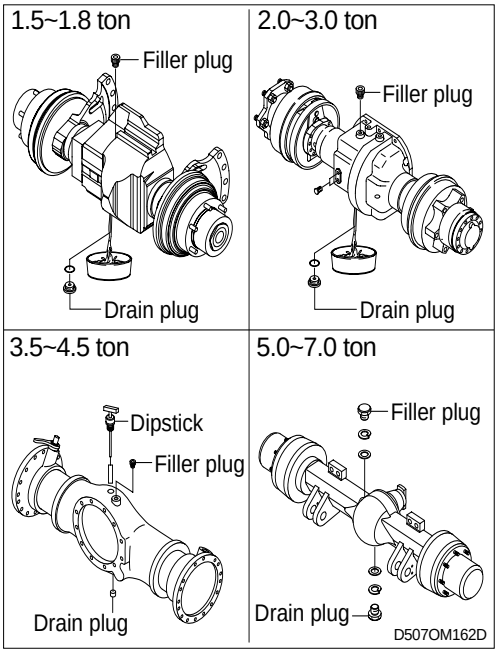
Remove level plug, and check that oil is filled up to hole.

(3) Change

Change oil after removing drain plug.

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

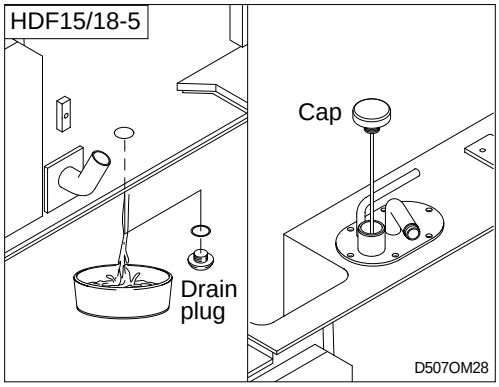
Dispose of old oil in locally approved manner.

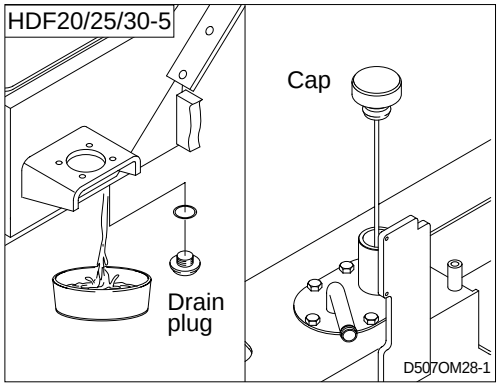


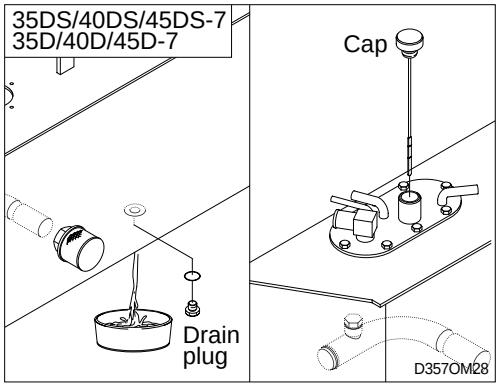
6) HYDRAULIC TANK

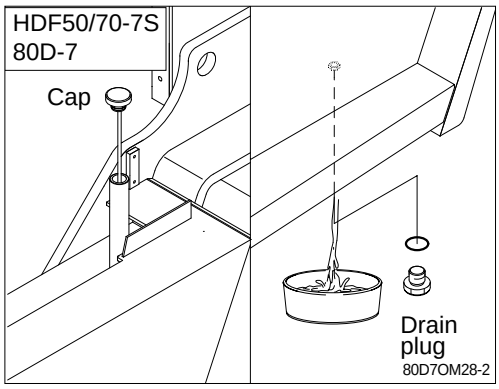
(1) Hydraulic oil change

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 200kPa(30psi) 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.

7) 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 207kPa(30psi). Nozzle of cleaning device should be held about 5cm(2in) from radiator fins. Also, check rubber hose connected to radiator. Replace if cracked or deteriorated. Check that hose clamps are tight.

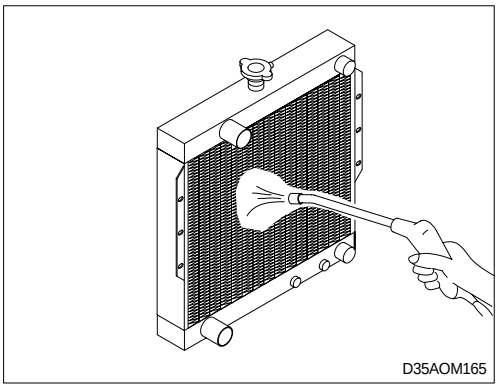
⚠ **Be sure to keep air or steam nozzle at right angles to radiator. Wear safety glasses and a face shield when using compressed air.**

(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.

⚠ **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.**

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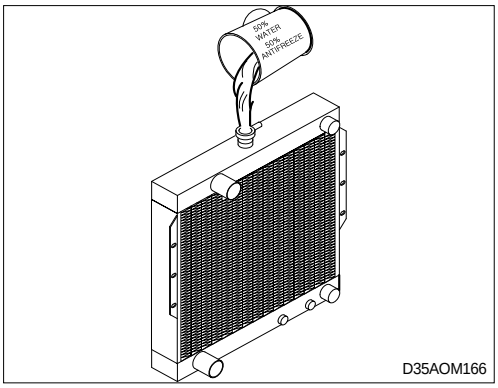

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8) TIRE REPLACEMENT

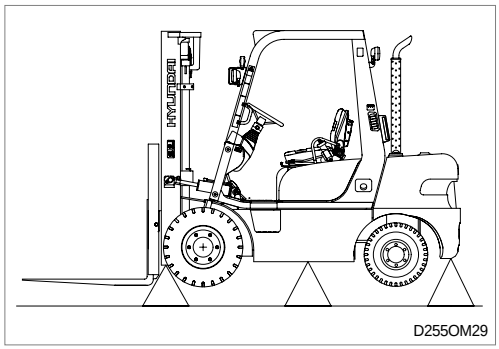
① Park the truck in a safe and level place suitable for changing the tire. Then lower the forks, stop the engine, and apply the parking brake.

⚠ **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.



⑤ Replace the tire and tighten the lug nuts partially. The mounting faces of the wheel, lug muts 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 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 extermely careful when carrying out this work.

9) FUSES REPLACEMENT

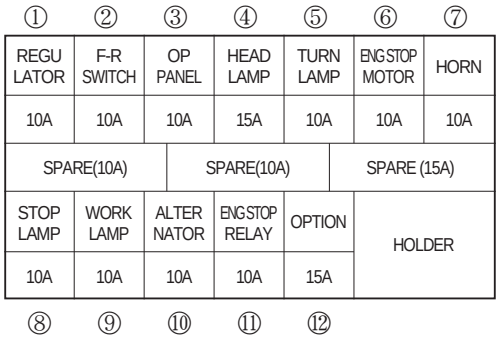
(1) HDF15/18-5, HDF20/25/30-5

No.	Capacity	Color	Related electrical component
①	5A/10A	Red	Fuel stop solenoid
②	10A	Yellow	Rear work lamp
③	10A	White	Operating panel
④	10A	Blue	F-R switch
⑤	10A	Yellow	Turn lamp
⑥	15A	Brown	Lamp switch
⑦	10A	Red	Start signal
⑧	10A	Brown	QGS control IG
⑨	15A	Red	Option IG
⑩	10A	White	Option
⑪	10A	Green	Horn
⑫	10A	Blue	Stop lamp

①	②	③	④	⑤	⑥	⑦
FUEL STOP SOL.	REAR WORK LAMP	OPER. PANEL	F-R SW.	TURN LAMP	LAMP SW.	START SIG.
5A/10A	10A	10A	10A	10A	15A	10A
SPARE (5A)		SPARE (10A)			SPARE (15A)	
EMERG WARN	OPT. IG	OPT. B+	HORN	STOP LAMP	FUSE HOLDER	
10A	15A	10A	10A	10A		
⑧	⑨	⑩	⑪	⑫		

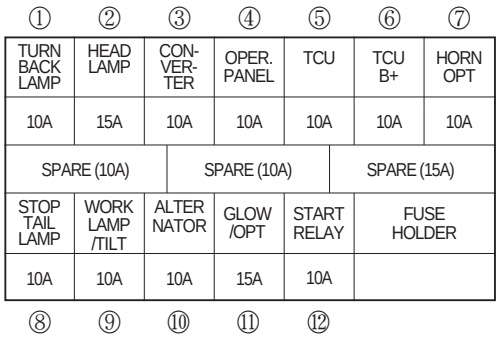
(2) 35DS/40DS/45DS-7, 35D/40D/45D-7

No.	Capacity	Color	Related electrical component
①	10A	Red	Regulator
②	10A	Red	F-R switch
③	10A	Red	OP panel
④	15A	Green	Head lamp
⑤	10A	Red	Turn lamp
⑥	10A	Red	ENG stop motor
⑦	10A	Red	Horn
⑧	10A	Red	Stop lamp
⑨	10A	Red	Work lamp
⑩	10A	Red	Alternator
⑪	10A	Red	ENG stop relay
⑫	15A	Green	Option



(3) HDF50/70-7S, HDF50/70-7

No.	Capacity	Color	Related electrical component
①	10A	Violet	Turn lamp
②	15A	Brown	Head lamp
③	10A	Red	Converter
④	10A	Red	Operator panel
⑤	10A	Red	TCU
⑥	10A	Br/Gold	TCU / B+
⑦	10A	Violet	Horn
⑧	10A	Gold	Stop lamp
⑨	10A	Orange	Work lamp / Tilt
⑩	10A	Lime	Alternator
⑪	15A	White	Glow / Opt
⑫	10A	Violet	Eng stop relay



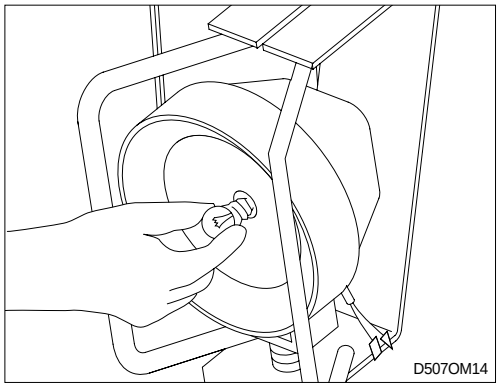
① Turn the starting swich OFF.

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.

10) LAMP BULBS REPLACEMENT

Lamp	Spec(for 12V)	Spec(for 24V)
Head lamp	55W	70W
Turn signal lamp	21W	25W
Clearance lamp	5W	10W
Stop lamp	21W	25W
Backup lamp	10W	←
Warning lamp	1.4W	←
Meter lighting lamp	3.4W	←
License lamp (option)	3.4W	←
Beacon lamp (option)	Strobe type	←
Rear work lamp	55W	70W



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

11) 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

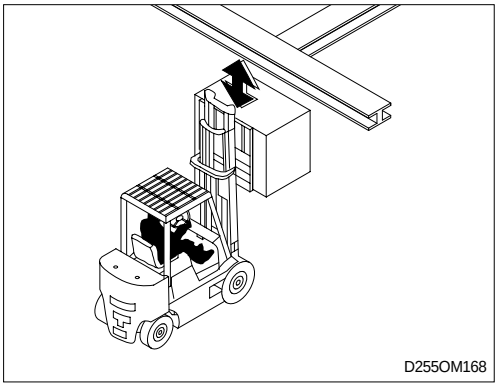
With the direction control in NEUTRAL and the engine running, push the sevice brake pedal fully down and hold. The brakes should apply before the pedal reaches the floorplate. If the pedal continues to creep downward, report the failure immediately. Do not operate the truck until the brakes are repaired. 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 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.**

12) 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 deposite on tube or hose surfaces indicate a leak.

Change or service the air cleaner element every 1000 operating hours, depending upon your application. Service intervals may also be determined by the air restriction indicator.

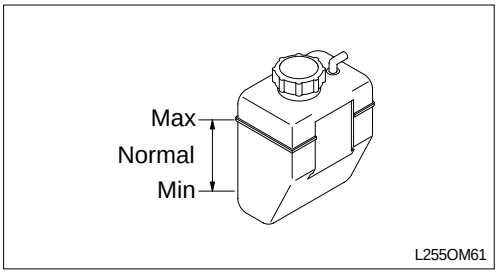
(3) Battery

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.

⚠ 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:

- Drain and replace the engine crankcase oil every 50 to 250 operating hours(Depending on application).
- Replace the LPG engine oil filter every 500 hours, diesel engine every 250 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 LPG and diesel engines, HYUNDAI recommends that you use motor oil that meets API service classification CD, CC/SG, SF and API CH4 SAE 15W-40 for diesel engines, gas engines use API SG, SAE 10W-30 oil or better.

(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 (replace) the oil as necessary.

(7) Hydraulic fluid and filter change

Drain and replace the hydraulic sump fluid every 2000 operating hours.(Severe service or adverse conditions may require more frequent fluid change). 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 500 hours thereafter. Check for leaks after installation of the filter. Also, check that the hydraulic line connections at the filter adapter are tightened correctly. The procedure for draining hydraulic sump tank is in your service manual.

(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 150 to 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.**

13) 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.

14) 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 207kPa (30psi), 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.

15) 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.

16) 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

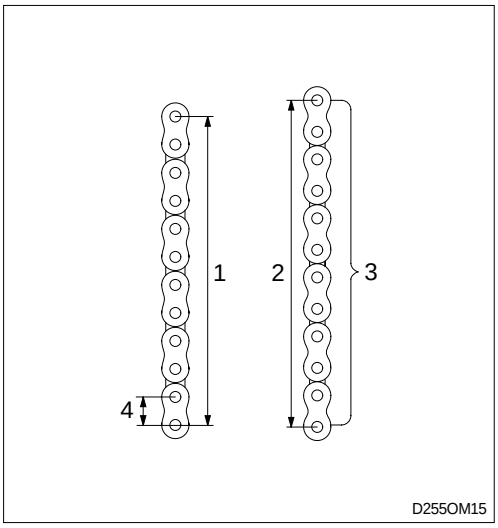
Inspect and lubricate the lift chains every PM (50~250 hours). When operating in corrosive environments, inspect the chains every 50 hours. During the inspection, check for the following conditions:

- 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 masured 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**

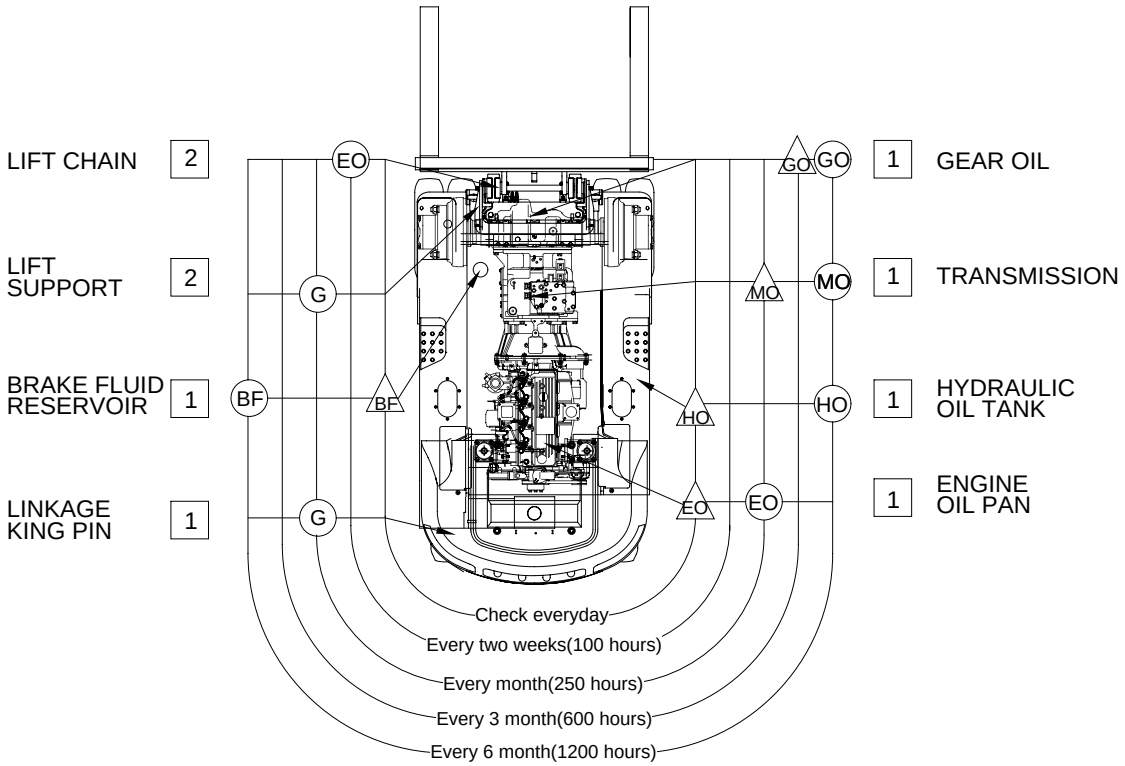
The distance from the center of one pin to the center of the next pin.

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.**

8. LUBRICATION CHART

1) HDF15/18-5, HDF20/25/30-5



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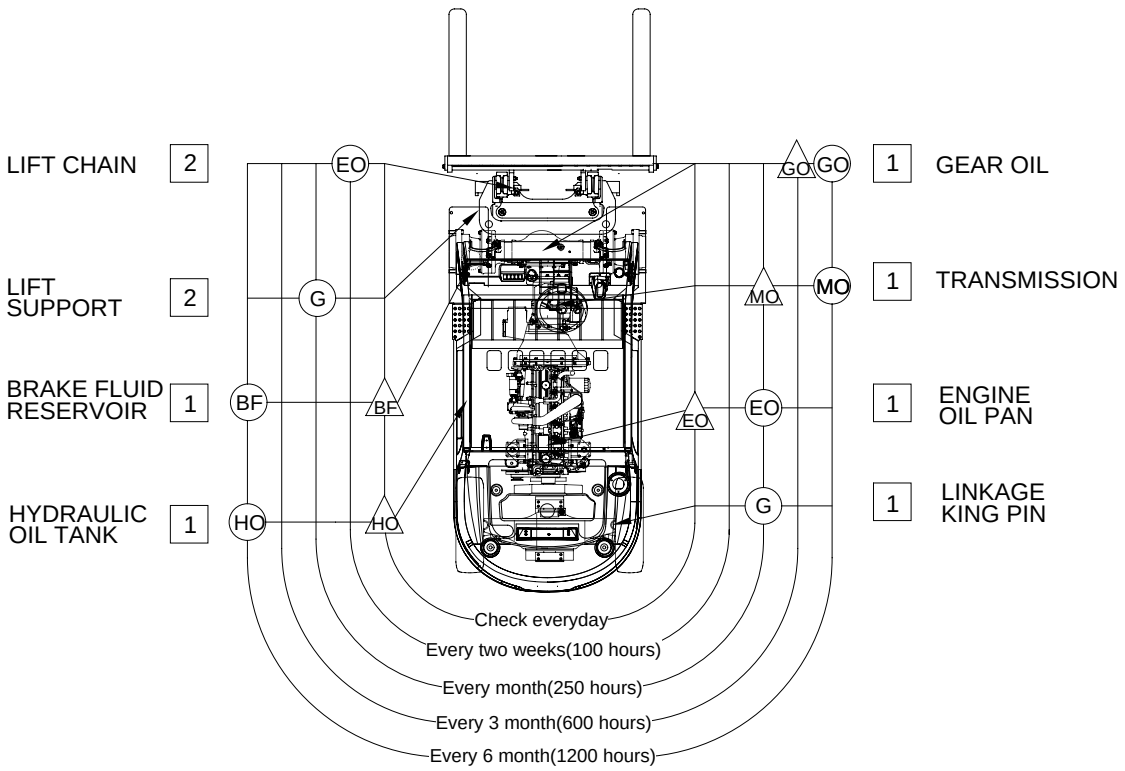
NOTES

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	In freezing weather (below-20° C)
EO	Engine oil	API CH4 class or better	
MO	T/M oil	ATF DEXRON III	
GO	Gear oil	SAE 80W-90/API GL-5	
HO	Hydraulic oil	ISO VG 68	ISO VG 32
BF	Brake fluid	DOT III	
G	Grease	NLGI No. 2	NLGI No.1

2) 35DS/40DS/45DS-7, 35D/40D/45D-7



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NOTES

① △: Check, add oil when needed.

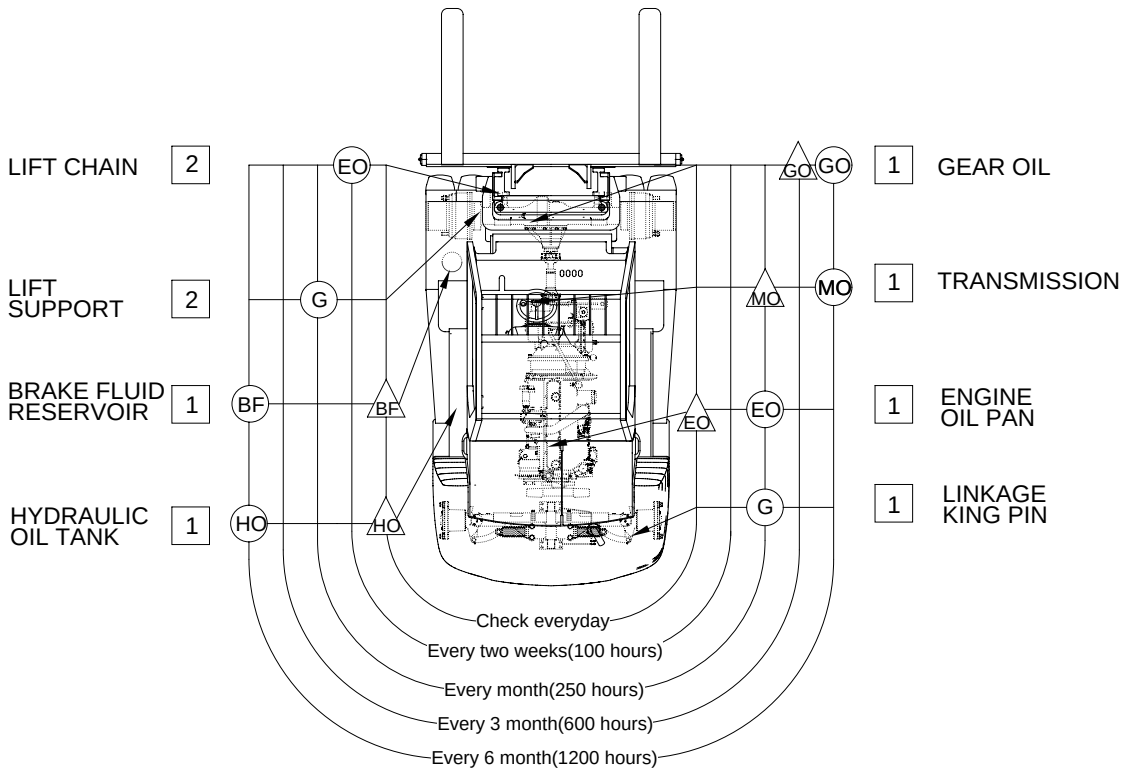
② ○: Change oil or add oil.

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	In freezing weather (below-20˚C)
EO	Engine oil	API CH4 class or better	
MO	T/M oil	ATF DEXRON III	
GO	Gear oil	MOBILFLUID 424	
HO	Hydraulic oil	ISO VG 68	ISO VG 32
BF	Brake fluid	AZOLA ZS10(Hydraulic oil SAE 10W)	
G	Grease	NLGI No. 2	NLGI No.1

3) HDF50/70-7S, HDF50/70-7



D507LUB01

NOTES

① △: Check, add oil when needed.

② ○: Change oil or add oil.

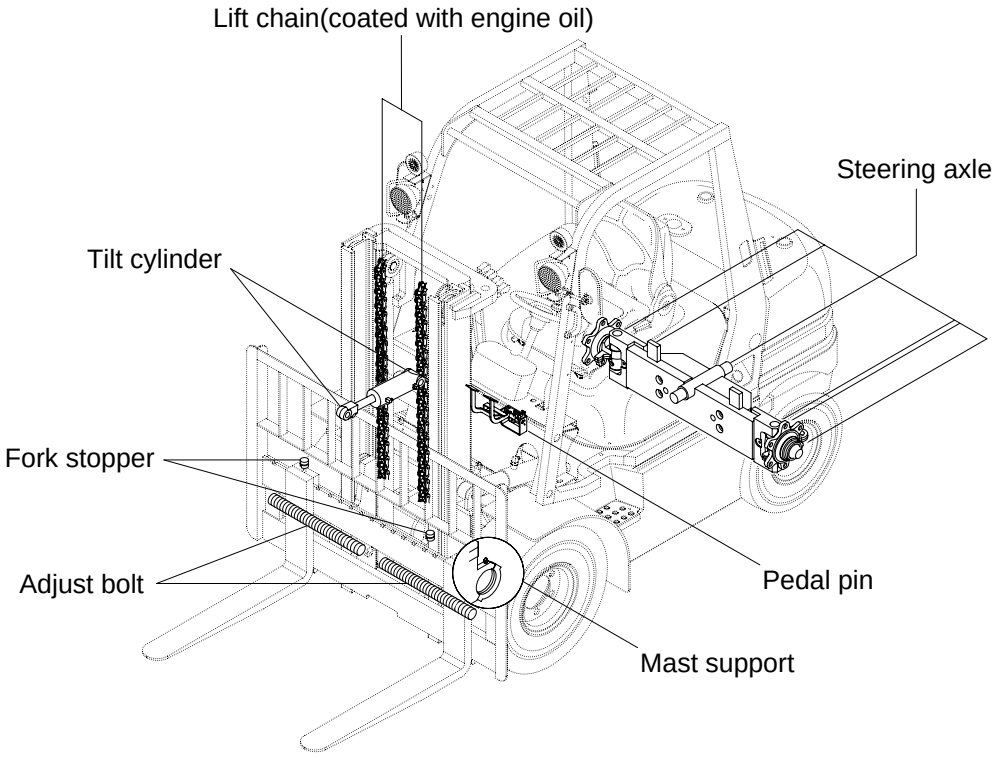
③ Figures in squares indicate number of lubricating points.

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	In freezing weather (below-20° C)
EO	Engine oil	API CH4 class or better	
MO	Engine oil	API CF4 class or better	
GO	Gear oil	SAE 80W-90/API GL-5(DRY), MOBILFLUID 424(WET)	
HO	Hydraulic oil	ISO VG 68	ISO VG 32
BF	Brake fluid	DOT3(DRY), AZOLA ZS10(Hydraulic oil SAE 10W : WET)	
G	Grease	NLGI No. 2	NLGI No.1

9. GREASING POINT

1) HDF15/18-5, HDF20/25/30-5



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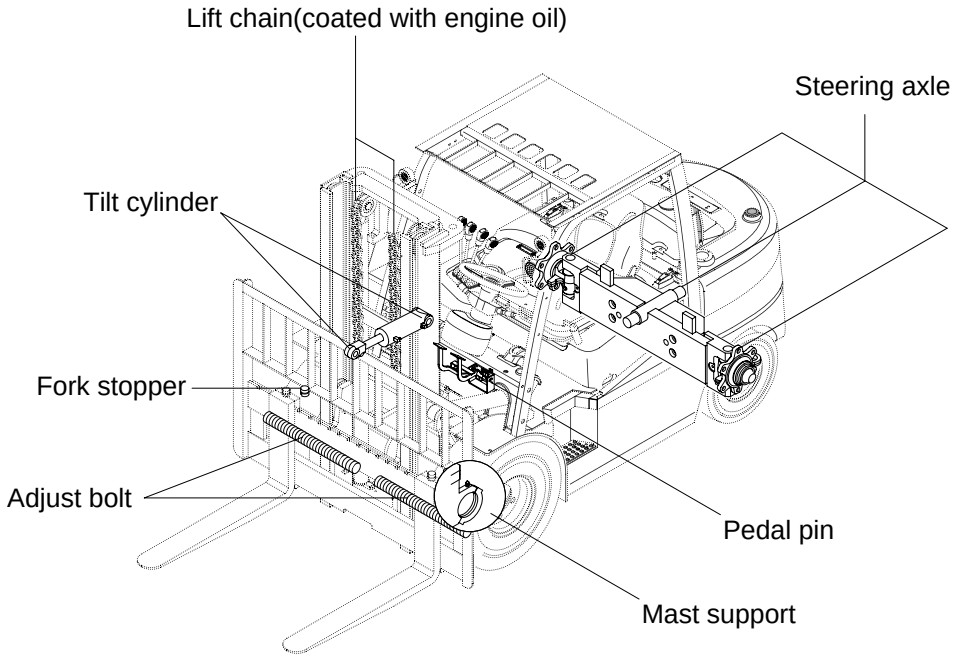
2) 35DS/40DS/45DS-7, 35D/40D/45D-7



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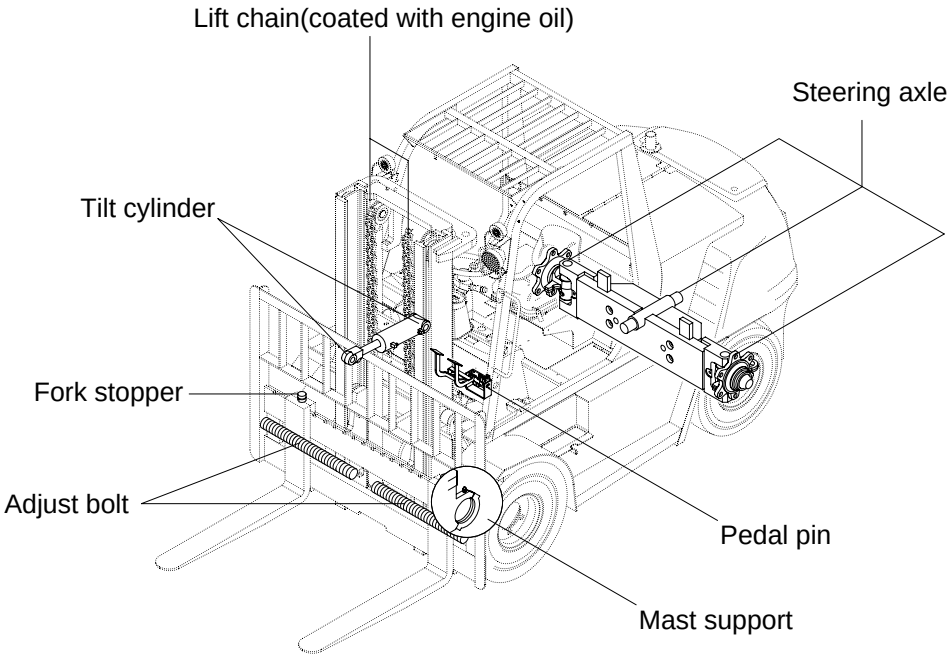
3) HDF50/70-7S, HDF50/70-7



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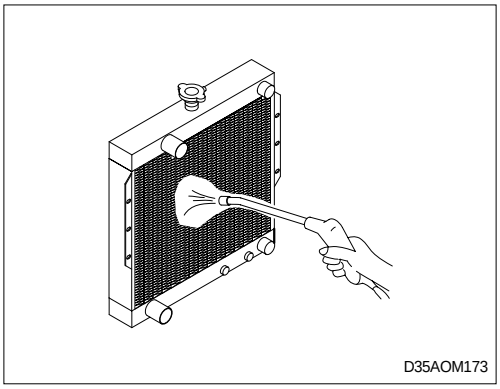
10. HANDLING MACHINE IN EXTREMELY HOT PLACES

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



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 : 2kgf/cm^2(30psi)
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.

11. 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℃.

(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 (℃)	-5	-10	-15	-20	-25	-30
Amount of antifreeze(%)	25	30	35	40	45	50
Amount of water(%)	75	70	65	60	55	50

⚠ 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.

12. 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℃, 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.

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.

13. 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.

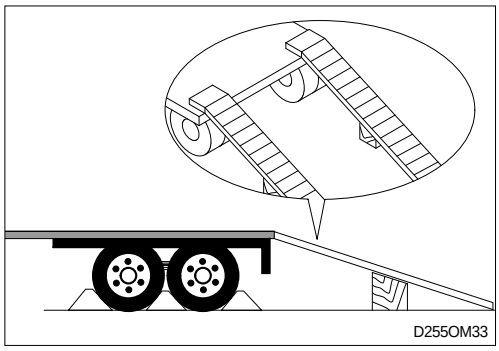
⚠ Check travel route for overpass clearance.
Make sure there is adequate clearance if the lift truck being transported is equipped with a high mast or cab.

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.)

(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.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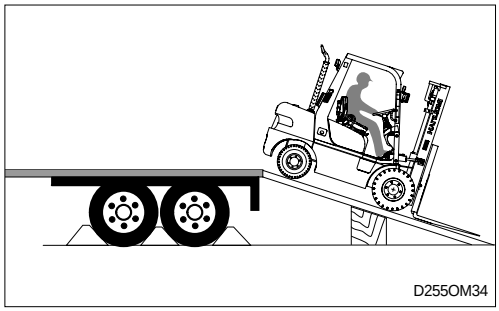
⚠ When on the loading ramps, never change direction. If it is necessary to change direction, drive off the ramp and realign the machine.
Block the wheels and secure the lift truck with tiedowns.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14. LOADING AND UNLOADING BY CRANE

1) Check the weight, length, width and height of the truck referring to the chapter 8, specifications 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.

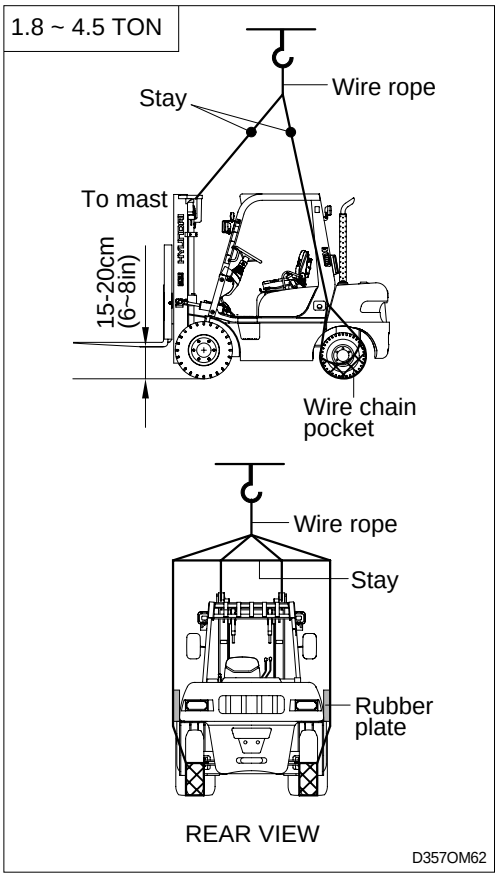
⚠ **Make sure wire rope is proper size.**

⚠ **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.**

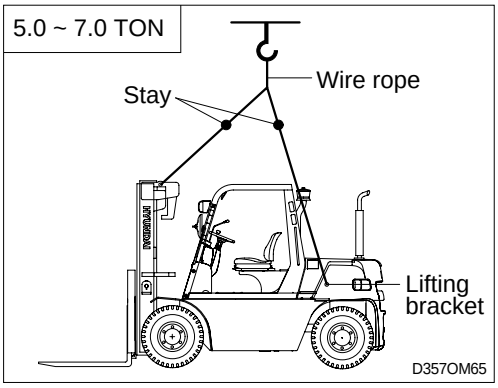
⚠ **Keep area clear of personnel.**



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

6) Refer to illustration at the right side only for the trucks such as HDF50-7(S) or HDF70-7(S).

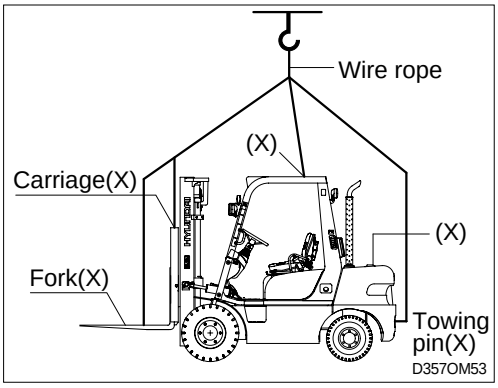
⚠ **Use appropriate method for your forklift truck.**



⚠ **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.**



15. RECOMMENDATION TABLE FOR LUBRICANTS

1) NEW MACHINE

New machine uses following fuel, coolant and lubricant.

(1) HDF15/18-5, HDF20/25/30-5

Description	Specification
Engine oil	SAE 10W-30/15W-40(API CH4 class or better)
T/M oil	ATF DEXRON III
Gear oil	SAE 80W-90/API GL-5
Hydraulic oil	ISO VG32/VG46/VG68
Brake oil	DOT 3
Grease	Lithium base grease NLGI No.2
Fuel	ASTM D975-No.2
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water

(2) 35DS/40DS/45DS-7, 35D/40D/45D-7

Description	Specification
Engine oil	SAE 10W-30(API CH4 class or better)
T/M oil	ATF DEXRON III
Gear oil	MOBILFLUID 424
Hydraulic oil	ISO VG32/VG46/VG68
Brake oil	AZOLA ZS10 (Hydraulic oil, SAE 10W)
Grease	Lithium base grease NLGI No.2
Fuel	ASTM D975-No.2
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water

(3) HDF50/70-7(S)(DRY+WET)

Description	Specification
Engine oil	SAE 10W-30(API CH4 class or better)
T/M oil	Engine oil SAE 10W-30(API CF4 Class or better)
Gear oil	SAE 80W-90/API GL-5(DRY), MOBILFLUID 424(WET)
Hydraulic oil	ISO VG32/VG46/VG68
Brake oil	DOT3(DRY), AZOLA ZS10(Hydraulic oil, SAE 10W : WET)
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

16. FUEL AND LUBRICANTS

1) HDF15/18-5, HDF20/25/30-5

Service point	Kind of fluid	Capacity ℓ (U.S.gal)		Ambient temperature °C (°F)
		1.5~1.8ton	2.0~3.0ton	-20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	9.5 (2.5)	7.5 (1.9)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Torque converter transmission	ATF Engine oil	7 (1.8)	10 (2.6)	ATF DEXRON III
Axle	Gear oil	5 (1.3)	5 (1.3)	SAE 80W-90/API GL-5
Hydraulic tank	Hydraulic oil	34(9.0) Option 37(9.8)	50 (13.2)	ISO VG32 ISO VG46 ISO VG68
Fuel tank	Diesel fuel	38 (10.0)	64 (16.9)	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)	0.5 (0.13)	DOT 3
Radiator	Antifreeze:Water 50:50	9.4 (2.48)	9.4 (2.48)	Ethylene glycol base permanent type

NOTES :

① SAE numbers given to engine oil should be selected according to ambient temperature.

② For engine oil used in engine oil pan, use SAE 10W oil when the temperature at the time of engine start up is below 0°C, even if the ambient temperature in daytime is expected to rise to 10°C or more.

③ If any engine oil of API service class CF is used instead of class CH4 engine oil, the frequency of oil change must be doubled.

2) 35DS/40DS/45DS-7, 35D/40D/45D-7

Service point	Kind of fluid	Capacity ℓ (U.S.gal)	Ambient temperature ¡ÆC (¡ÆF)
			-20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	MMC : 17.5(4.6) HMC : 8.5(2.2)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Torque converter transmission	T/M oil	12 (3.2)	ATF DEXRON III
Axle	Gear oil	10.5 (2.8)	MOBILFLUID 424
Hydraulic tank	Hydraulic oil	66 (17.4)	ISO VG32 ISO VG46 ISO VG68
Fuel tank	Diesel fuel	100 (26.4)	ASTM D975 No.1 ASTM D975 No.2
Fitting (Grease nipple)	Grease	-	NLGI No.1 NLGI No.2
Brake reservoir tank	Hyd oil	-	AZOLA ZS10 (Hydraulic oil SAE 10W)
Radiator	Antifreeze:Water 50:50	21.5 (5.7)	Ethylene glycol base permanent type

NOTES :

¤ SAE numbers given to engine oil should be selected according to ambient temperature.

¤£ For engine oil used in engine oil pan, use SAE 10W oil when the temperature at the time of engine start up is below 0 ¡ÆC, even if the ambient temperature in daytime is expected to rise to 10 ¡ÆC or more.

¤ø If any engine oil of API service class CF is used instead of class CH4 engine oil, the frequency of oil change must be doubled.

3) HDF50/70-7(S)(DRY + WET)

Service point	Kind of fluid	Capacity ℓ (U.S.gal)	Ambient temperature °C (°F) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	17.5 (4.6)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Torque converter transmission	Engine oil	15.6 (4.1)	SAE 10W-30
Axle	Gear oil	12.5 (3.3)	SAE 80W-90/API GL-5(DRY), MOBILFLUID 424(WET)
Hydraulic tank	Hydraulic oil	105 (27.7)	ISO VG32 ISO VG46 ISO VG68
Fuel tank	Diesel fuel	150 (39.6)	ASTM D975 No.1 ASTM D975 No.2
Fitting (Grease nipple)	Grease	-	NLGI No.1 NLGI No.2
Brake reservoir tank	Hyd oil	-	DOT 3(DRY), AZOLA ZS10(Hydraulic oil SAE 10W : WET)
Radiator	Antifreeze:Water 50:50	17 (4.5)	Ethylene glycol base permanent type

NOTES :

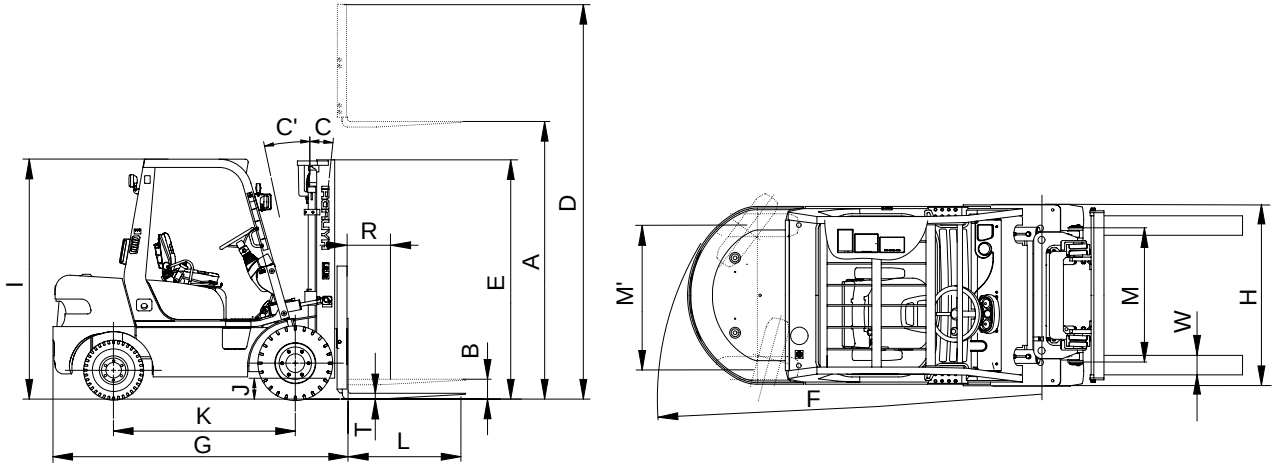
① SAE numbers given to engine oil should be selected according to ambient temperature.

② For engine oil used in engine oil pan, use SAE 10W oil when the temperature at the time of engine start up is below 0°C, even if the ambient temperature in daytime is expected to rise to 10°C or more.

③ If any engine oil of API service class CF is used instead of class CH4 engine oil, the frequency of oil change must be doubled.

1. SPECIFICATION TABLE

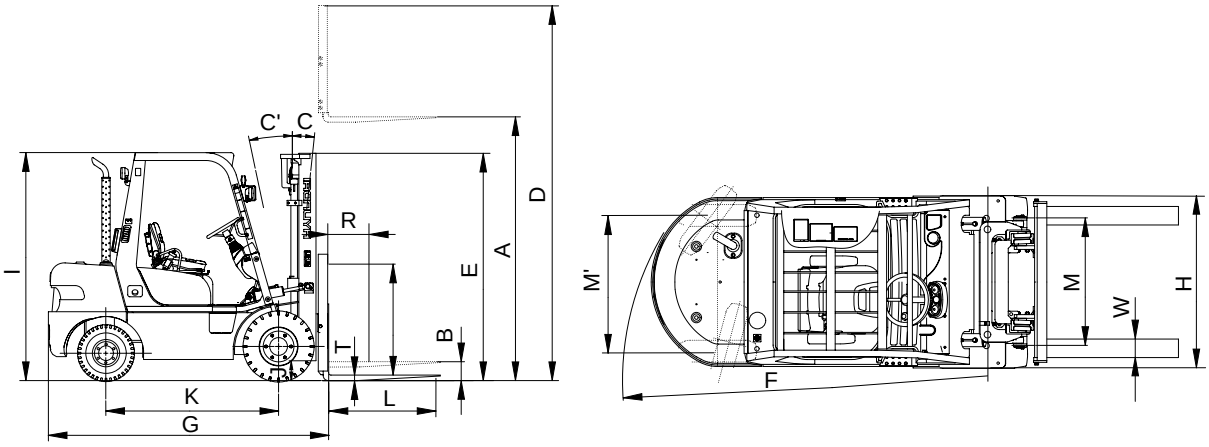
1) HDF15/18-5



D155SP01

Model			Unit	HDF 15-5	HDF 18-5
Capacity			kg	1500	1750
Load center		R	mm	500	←
Weight(Unloaded)			kg	2818	2998
Fork	Lifting height	A	mm	3300	←
	Free lift	B	mm	145	←
	Lifting speed(Unload/Load)		mm/sec	650/590	650/580
	Lowering speed(Unload/Load)		mm/sec	450/500	←
	L × W × T	L,W,T	mm	900 × 100 × 35	←
Mast	Tilt angle (forward/backward)	C/C'	degree	6/10	←
	Max height	D	mm	4332	←
	Min height	E	mm	2155	←
Body	Travel speed		km/h	20.0	←
	Gradeability		degree	18.2	16.4
	Min turning radius(Outside)	F	mm	1940	1970
ETC	Max hydraulic pressure		kgf/cm²	185	←
	Hydraulic oil tank		ℓ	30	←
	Fuel tank		ℓ	38	←
Overall length		G	mm	2170	2200
Overall width		H	mm	1090	←
Overhead guard height		I	mm	2110	←
Ground clearance		J	mm	120	←
Wheel base		K	mm	1360	←
Wheel tread front/rear		M, M'	mm	912/912	←

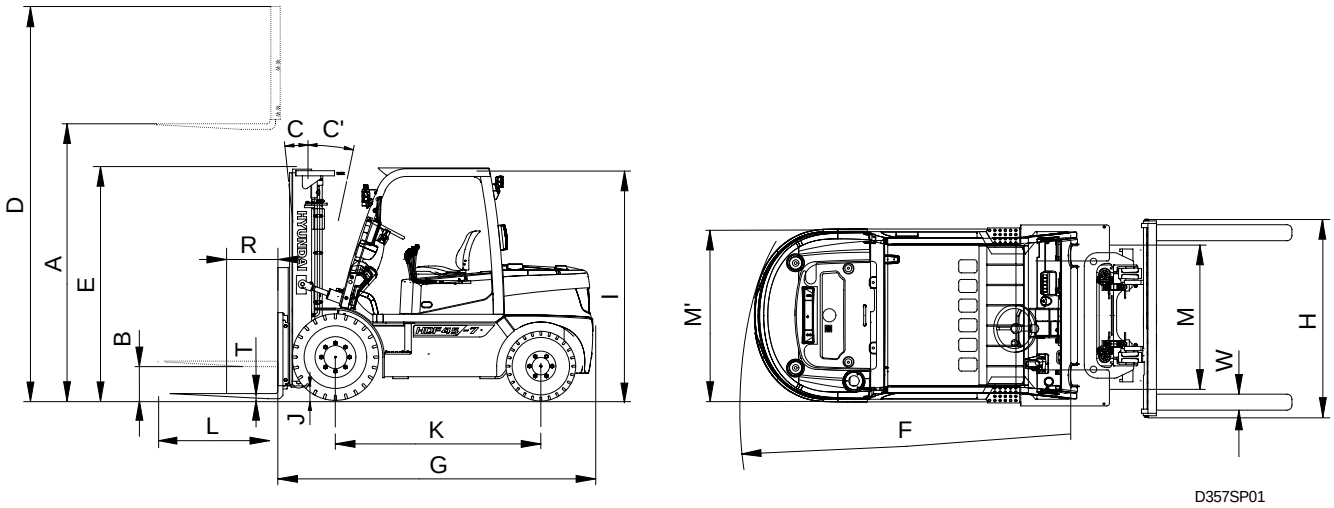
2) HDF20/25/30-5



D255SP01

Model			Unit	HDF 20-5	HDF 25-5	HDF 30-5
Capacity			kg	2000	2500	3000
Load center		R	mm	500	←	←
Weight(Unloaded)			kg	3695	3995	4460
Fork	Lifting height	A	mm	3300	←	←
	Free lift	B	mm	155	←	←
	Lifting speed(Unload/Load)		mm/sec	690/670	←	580/530
	Lowering speed(Unload/Load)		mm/sec	450/500	←	←
	L × W × T	L,W,T	mm	1050 × 100 × 45	←	1050 × 125 × 45
Mast	Tilt angle (forward/backward)	C/C'	degree	6/10	←	←
	Max height	D	mm	4485	←	←
	Min height	E	mm	2175	←	2190
Body	Travel speed		km/h	19.4	←	20.2
	Gradeability		degree	19.2	16.9	13.6
	Min turning radius(Outside)	F	mm	2273	2325	2380
ETC	Max hydraulic pressure		kgf/cm^2	200	←	←
	Hydraulic oil tank		ℓ	50	←	←
	Fuel tank		ℓ	64	←	←
Overall length		G	mm	2550	2605	2675
Overall width		H	mm	1160	←	1235
Overhead guard height		I	mm	2180	←	2195
Ground clearance		J	mm	130	←	145
Wheel base		K	mm	1650	←	←
Wheel tread front/rear		M, M'	mm	965/1000	←	1005/1000

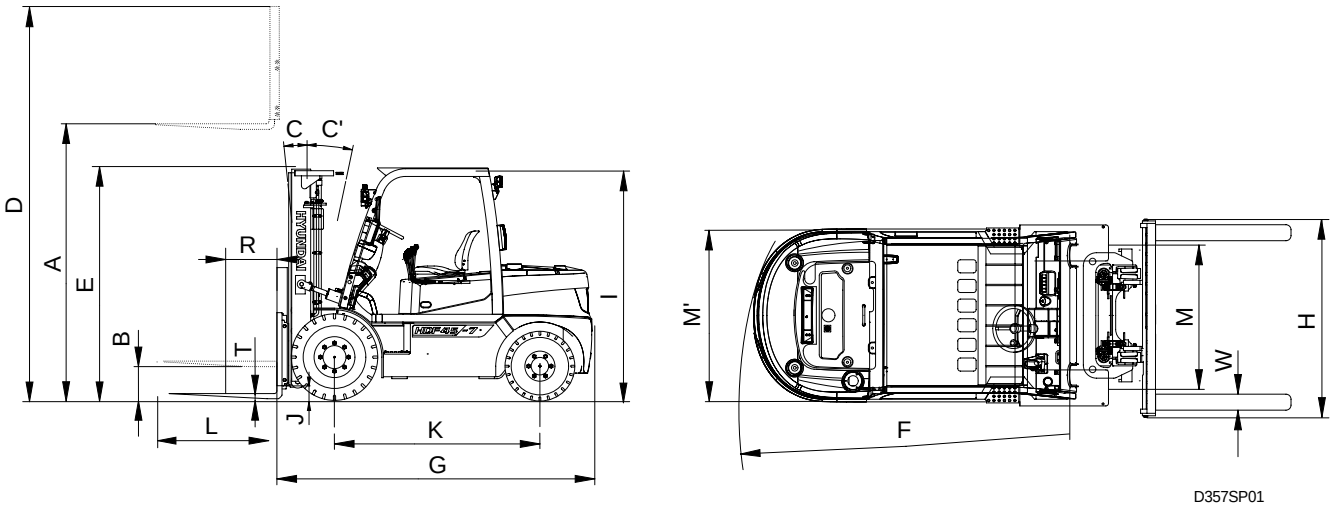
3) 35DS/40DS/45DS-7 (MHI ENGINE)



D357SP01

Model			Unit	35DS-7	40DS-7	45DS-7
Capacity			kg	3500	4000	4500
Load center		R	mm	600	←	←
Weight(Unloaded)			kg	5915	6460	6875
Fork	Lifting height	A	mm	3000	←	←
	Free lift	B	mm	120	←	←
	Lifting speed(Unload/Load)		mm/sec	600/570	600/560	600/550
	Lowering speed(Unload/Load)		mm/sec	450/500	←	←
	L × W × T	L,W,T	mm	1070 × 122 × 50	1070 × 150 × 50	1220 × 150 × 50
Mast	Tilt angle (forward/backward)	C/C'	degree	8/10	←	←
	Max height	D	mm	4236	←	4246
	Min height	E	mm	2235	←	2220
Body	Travel speed		km/h	26.4	25.4	←
	Gradeability		degree	23.3	21.3	19.6
	Min turning radius(Outside)	F	mm	2770	2830	2890
ETC	Max hydraulic pressure		kgf/cm²	250	←	←
	Hydraulic oil tank		ℓ	66	←	←
	Fuel tank		ℓ	100	←	←
Overall length		G	mm	3070	3125	3185
Overall width		H	mm	1400	1776	←
Overhead guard height		I	mm	2240	←	←
Ground clearance		J	mm	170	155	←
Wheel base		K	mm	2000	←	←
Wheel tread front/rear		M, M'	mm	1162/1140	1312/1140	←

4) 35D/40D/45D-7 (HMC ENGINE)



D357SP01

Model			Unit	35D-7	40D-7	45D-7
Capacity			kg	3500	4000	4500
Load center		R	mm	600	←	←
Weight(Unloaded)			kg	5890	6460	6875
Fork	Lifting height	A	mm	3000	←	←
	Free lift	B	mm	120	←	←
	Lifting speed(Unload/Load)		mm/sec	600(570)/550	600(570)/540	600(570)/530
	Lowering speed(Unload/Load)		mm/sec	450/500	←	←
	L×W×T	L,W,T	mm	1070×122×50	1070×150×50	1220×150×50
Mast	Tilt angle (forward/backward)	C/C'	degree	8/10	←	←
	Max height	D	mm	4236	←	4246
	Min height	E	mm	2235	←	2220
Body	Travel speed		km/h	29.1(28.0)	28.0(27.0)	←
	Gradeability		degree	21.8(23.8)	19.9(21.7)	18.3(21.1)
	Min turning radius(Outside)	F	mm	2770	2830	2890
ETC	Max hydraulic pressure		kgf/cm^2	250	←	←
	Hydraulic oil tank		ℓ	66	←	←
	Fuel tank		ℓ	100	←	←
Overall length		G	mm	3070	3125	3185
Overall width		H	mm	1400	1776	←
Overhead guard height		I	mm	2240	←	←
Ground clearance		J	mm	170	155	←
Wheel base		K	mm	2000	←	←
Wheel tread front/rear		M, M'	mm	1162/1140	1312/1140	←

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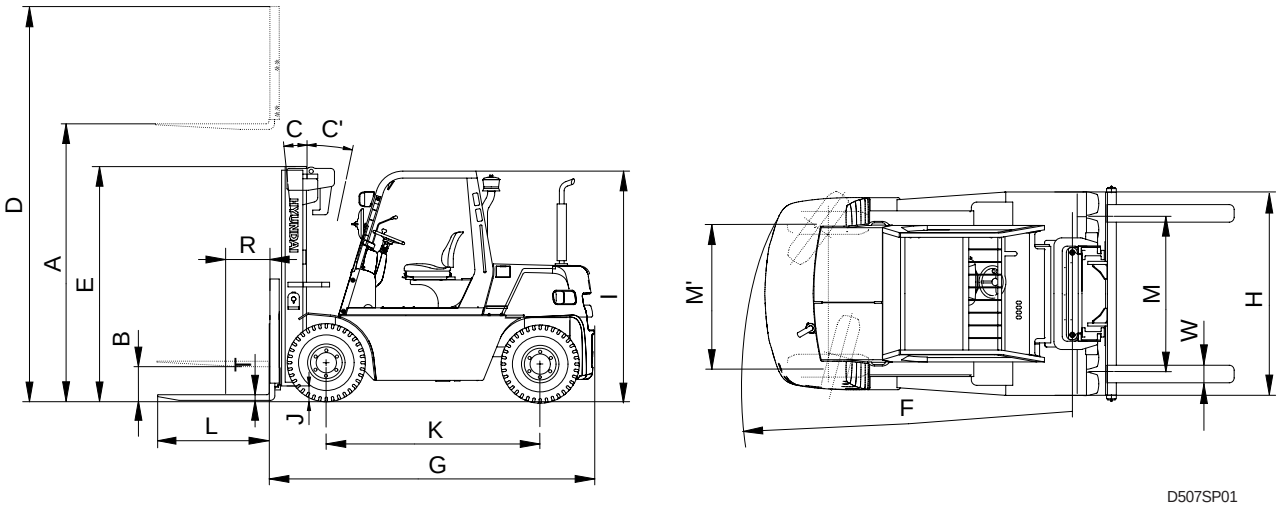
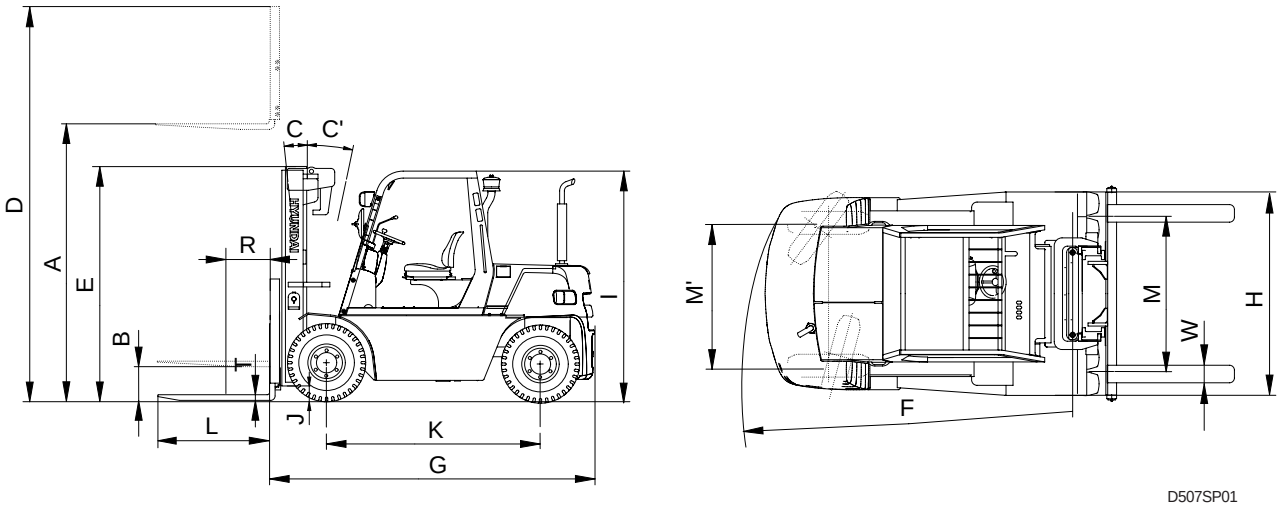
5) HDF50/70-7S (MHI ENGINE)



D507SP01

Model			Unit	HDF 50-7S	HDF 70-7S
Capacity			kg	5000	7000
Load center		R	mm	600	←
Weight(Unloaded)			kg	8347	9680
Fork	Lifting height	A	mm	3000	←
	Free lift	B	mm	140	←
	Lifting speed(Unload/Load)		mm/sec	500/470	500/450
	Lowering speed(Unload/Load)		mm/sec	450/500	←
	L × W × T	L,W,T	mm	1200 × 150 × 60	1200 × 180 × 60
Mast	Tilt angle (forward/backward)	C/C'	degree	15/10	←
	Max height	D	mm	4275	←
	Min height	E	mm	2515	←
Body	Travel speed		km/h	33.1	32.6
	Gradeability		degree(%)	27.9(53)	22.2(40.9)
	Min turning radius(Outside)	F	mm	3290	3370
ETC	Max hydraulic pressure		kgf/cm^2	185	←
	Hydraulic oil tank		l	105	←
	Fuel tank		l	150	←
Overall length		G	mm	3540	3620
Overall width		H	mm	2087	←
Overhead guard height		I	mm	2523	←
Ground clearance		J	mm	195	←
Wheel base		K	mm	2300	←
Wheel tread front/rear		M, M'	mm	1580/1604	←

6) HDF50/70-7 (HMC ENGINE)



D507SP01

Model			Unit	HDF 50-7	HDF 70-7
Capacity			kg	5000	7000
Load center		R	mm	600	←
Weight(Unloaded)			kg	8321(8598)	9682(9839)
Fork	Lifting height	A	mm	3000	←
	Free lift	B	mm	140	←
	Lifting speed(Unload/Load)		mm/sec	500(450)/450(430)	500(450)/430(410)
	Lowering speed(Unload/Load)		mm/sec	450/500	←
	L × W × T	L,W,T	mm	1200 × 150 × 60	1200 × 180 × 60
Mast	Tilt angle (forward/backward)	C/C'	degree	15/10	←
	Max height	D	mm	4275	←
	Min height	E	mm	2515	←
Body	Travel speed		km/h	35.1(33.5)	32.6(33.1)
	Gradeability		degree / %	29.4(29.6)/56.3(56.8)	22.7(23.8)/41.8(44.1)
	Min turning radius(Outside)	F	mm	3290	3370
ETC	Max hydraulic pressure		kgf/cm^2	185	←
	Hydraulic oil tank		ℓ	105	←
	Fuel tank		ℓ	150	←
Overall length		G	mm	3540	3620
Overall width		H	mm	2087	←
Overhead guard height		I	mm	2523	←
Ground clearance		J	mm	195	←
Wheel base		K	mm	2300	←
Wheel tread front/rear		M, M'	mm	1580/1604	←

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2. SPECIFICATION FOR MAJOR COMPONENTS

1) HDF15/18-5

(1) ENGINE

Item	Unit	Specification
Model	-	KUBOTA V2203-M
Type	-	4-cycle, in-line overhead valve
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	4 cylinders, in line
Firing order	-	1-3-4-2
Combustion chamber type	-	In direct injection
Cylinder bore X stroke	mm(in)	87×92.4(3.4 ×3.6)
Piston displacement	cc(cu in)	2197(134.1)
Compression ratio	-	22.6
Rated gross horse power	ps/rpm	43.1/2400
Maximum gross torque at rpm	kgf · m/rpm	14.4/1600
Engine oil quantity	ℓ (U.S.gal)	9.5(2.5)
Dry weight	kg(lb)	211(465)
High idling speed	rpm	2600±50
Low idling speed	rpm	850±50
Rated fuel consumption	g/ps.hr	180
Starting motor	V-kW	DENSO12V, 2.0kW
Alternator	V-A	DENSO 12V, 40A
Battery	V-AH	12V, 75AH
Fan belt deflection	mm(in)	7~9(0.28~0.35)

(2) MAIN PUMP

Item	Unit	Specification
Type	-	Fixed displacement gear pump
Capacity	cc/rev	22
Maximum operating pressure	bar	210
Rated speed (Max/Min)	rpm	2650/500

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Mechanical
Main relief valve pressure	bar	185/150
Flow capacity	lpm	70

(4) POWER TRAIN DEVICES

Item			Specification
Torque converter	Model		Z80-D1(KOREA POWERTRAIN)
	Type		3 Element, 1 stage, 2 phase
	Stall ratio		2.8 : 1
Transmission	Type		Power shift
	Gear shift(FR/RR)		1/1
	Adjustment		Electrical single lever type, kick-down system
	Overhaul ratio	FR	13.720 : 1
		RR	14.090 : 1
Axle	Type		Front-wheel drive type, fixed location
	Gear		Hypoid gear type
Wheels	Q'ty(FR/RR)		Single : 2/2
	Front(drive)		6.50-10-12 PR
	Rear(steer)		5.00-8-8 PR
Brakes	Travel		Front wheel, duo-servo & auto adjustment type
	Parking		Ratchet, internal expanding mechanical type
Steering	Type		Full hydraulic, power steering
	Steering algle		81.7° to both right and left angle, respectively

2) HDF20/25/30-5

(1) ENGINE

Item	Unit	Specification
Model	-	YANMAR 4TNE98-HYF(IDI)
Type	-	4-cycle, in-line overhead valve
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	4 cylinders, in-line
Firing order	-	1-3-4-2
Combustion chamber type	-	In-direct injection
Cylinder bore X stroke	mm(in)	98×110(3.9×4.3)
Piston displacement	cc(cu in)	3319(202.5)
Compression ratio	-	18.6 : 1
Rated gross horse power	ps/rpm	62/2300
Maximum gross torque at rpm	kgf·m/rpm	20.3±0.5/1700
Engine oil quantity	ℓ (U.S.gal)	7.5(1.9)
Dry weight	kg(lb)	225(496)
High idling speed	rpm	2575
Low idling speed	rpm	750
Rated fuel consumption	g/ps.hr	195
Starting motor	V-kW	HITACHI 12V, 2.3kW
Alternator	V-A	DENSO 12V, 40A
Battery	V-AH	12V, 90AH
Fan belt deflection	mm(in)	8~12(0.31~0.47)

(2) MAIN PUMP

Item	Unit	Specificaton
Type	-	Fixed displacement gear pump
Capacity	cc/rev	27
Maximum operating pressure	bar	230
Rated speed (Max/Min)	rpm	3000/500

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Mechanical
Main relief valve pressure	bar	200/150
Flow capacity	lpm	90

(4) POWER TRAIN DEVICES

Item			Specification
Torque converter	Model		Z80-D1(KOREA POWERTRAIN)
	Type		3 Element, 1 stage, 2 phase
	Stall ratio		2.8
Transmission	Type		Power shift
	Gear shift(FR/RR)		1/1
	Adjustment		Electrical single lever type, kick-down system
	Overhaul ratio	FR	16.028 : 1
		RR	18.317 : 1
Axle	Type		Front-wheel drive type, fixed location
	Gear		Hypoid gear type
Wheels	Q'ty(FR/RR)		Single : 2/2, Double : 4/2
	Front(drive)	2.0-2.5	7.0-12-12 PR, Double : 6.0-15-10 PR
		3.0	Single : 28x9-15-12 PR, Double : 6.0-15-10 PR
	Rear(steer)	2.0-2.5	6.00-9-10 PR
		3.0	6.5-10-10 PR
Brakes	Travel		Front wheel, duo-servo & auto adjustment type
	Parking		Toggle, internal expanding mechanical type
Steering	Type		Full hydraulic, power steering
	Steering algle		77.8° to both right and left angle, respectively

3) 35DS/40DS/45DS-7

(1) ENGINE

Item	Unit	Specification
Model	-	MITSUBISHI S6S-DT
Type	-	4-cycle, in-line, Vertical OHV
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	6 cylinders, in line
Firing order	-	1-5-3-6-2-4
Combustion chamber type	-	Direct injection
Cylinder bore X stroke	mm(in)	94×120(3.7×4.7)
Piston displacement	cc(cu in)	4996(305)
Compression ratio	-	19.5
Rated gross horse power	ps/rpm	88/2200
Maximum gross torque at rpm	kgf·m/rpm	34.8/1400
Engine oil quantity	ℓ (U.S.gal)	17.5(4.6)
Dry weight	kg(lb)	350(772)
High idling speed	rpm	2400±50
Low idling speed	rpm	875±50
Rated fuel consumption	g/ps.hr	180
Starting motor	V-kW	24-5.0
Alternator	V-A	24-50
Battery	V-AH	12-80×2
Fan belt deflection	mm(in)	10~12(0.4~0.5)

(2) MAIN PUMP

Item	Unit	Specification
Type	-	Fixed displacement gear pump
Capacity	cc/rev	72±9
Maximum operating pressure	bar	250
Rated speed (Max/Min)	rpm	3000/600

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Semi - mono block
Operating method	-	Mechanical
Main relief valve pressure	bar	210/150
Flow capacity	lpm	125

(4) POWER TRAIN DEVICES

Item			Specification	
Torque converter	Model		DE 280 (KAPEC)	
	Type		3 Element, 1 stage, 2 phase	
	Stall ratio		2.25 : 1	
Transmission	Type		Power shift	
	Gear shift(FR/RR)		2/2	
	Adjustment		Electrical single lever type	
	Overhaul ratio	FR	1 : 2.550	2 : 1.151
		RR	1 : 2.550	2 : 1.151
Axle	Type		Front-wheel drive type, fixed location	
	Gear ratio		11.692	
Wheels	Q'ty(FR/RR)		Single : 2/2	Double : 4/2
	Front(drive)	Single	3.5 ton : 8.25-15-14 PR	4.0/4.5 ton : 300-15-18 PR
		Double	7.5-16-12 PR	
	Rear(steer)		7.0-12-12 PR	
Brakes	Travel		Front wheel, wet disc brake	
	Parking		Toggle, internal expanding mechanical type	
Steering	Type		Full hydraulic, power steering	
	Steering algle		74.8° to both right and left angle, respectively	

4) 35D/40D/45D-7

(1) ENGINE

Item	Unit	Specification	
Model	-	HYUNDAI D4DA-C1	**D4DD-C1
Type	-	4 cycle turbocharged diesel type	
Cooling Method	-	Water cooling	
Number of cylinders and arrangement	-	4 cylinders, In-line	
Firing order	-	1-3-4-2	
Combustion chamber type	-	Direct injection	
Cylinder bore X stroke	mm(in)	104 × 115(4.1 × 4.5)	
Piston displacement	cc(cu in)	3907(238)	
Compression ratio	-	16.5 : 1	**17.5 : 1
Rated gross horse power	hp/rpm	95/2400	**92/2300
Maximum torque at rpm	kgf · m/rpm	31/1700	**33/1600
Engine oil quantity	ℓ (U.S.gal)	8.5(2.2)	
Dry weight	kg(lb)	350(772)	**353(778)
High idling speed	rpm	2640 ± 20	**2625 ± 25
Low idling speed	rpm	850 ± 50	**800 ± 50
Rated fuel consumption	g/ps.hr	157	
Starting motor	V-kW	24-5	
Alternator	V-A	24-40	**24-50
Battery	V-AH	24-75	
Fan belt deflection	mm(in)	10~15(0.39~0.59)	

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(2) MAIN PUMP

Item	Unit	Specification
Type	-	Fixed displacement gear pump
Capacity	cc/rev	72 ± 9
Maximum operating pressure	bar	250
Rated speed (Max/Min)	rpm	3000/600

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Semi - mono block
Operating method	-	Mechanical
Main relief valve pressure	bar	210/150
Flow capacity	lpm	125

(4) POWER TRAIN DEVICES

Item			Specification	
Torque converter	Model		DE 280 (KAPEC)	
	Type		3 Element, 1 stage, 2 phase	
	Stall ratio		2.25 : 1	
Transmission	Type		Power shift	
	Gear shift(FR/RR)		2/2	
	Adjustment		Electrical single lever type	
	Overhaul ratio	FR	1 : 2.550	2 : 1.151
		RR	1 : 2.550	2 : 1.151
Axle	Type		Front-wheel drive type, fixed location	
	Gear ratio		11.692	
Wheels	Q'ty(FR/RR)		Single : 2/2	Double : 4/2
	Front(drive)	Single	3.5 ton : 8.25-15-14 PR	4.0/4.5 ton : 300-15-18 PR
		Double	7.5-16-12 PR	
	Rear(steer)		7.0-12-12 PR	
Brakes	Travel		Front wheel, wet disc brake	
	Parking		Toggle, internal expanding mechanical type	
Steering	Type		Full hydraulic, power steering	
	Steering algle		74.8° to both right and left angle, respectively	

5) HDF50/70-7S

(1) ENGINE

Item	Unit	Specification
Model	-	MITSUBISHI S6S-DT
Type	-	4-cycle, in-line, Vertical OHV
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	6 cylinders, in line
Firing order	-	1-5-3-6-2-4
Combustion chamber type	-	In direct injection
Cylinder bore X stroke	mm(in)	94×120(3.7×4.7)
Piston displacement	cc(cu in)	4996(305)
Compression ratio	-	19.5
Rated gross horse power	ps/rpm	88/2200
Maximum gross torque at rpm	kgf·m/rpm	34.8/1400
Engine oil quantity	ℓ (U.S.gal)	17.5(4.6)
Dry weight	kg(lb)	350(772)
High idling speed	rpm	2400±50
Low idling speed	rpm	875±50
Rated fuel consumption	g/ps.hr	180
Starting motor	V-kW	24-5.0
Alternator	V-A	24-50
Battery	V-AH	12-80×2
Fan belt deflection	mm(in)	10~12(0.4~0.5)

(2) MAIN PUMP

Item	Unit	Specification
Type	-	Fixed displacement gear pump
Capacity	cc/rev	72±9
Maximum operating pressure	bar	250
Rated speed (Max/Min)	rpm	3000/600

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Mechanical
Main relief valve pressure	bar	185/150
Flow capacity	lpm	163

(4) POWER TRAIN DEVICES

Item			Specification
Torque converter	Model		F&S 300*16/4/-1(ZF SACH)
	Type		3 Element, 1 stage, 2 phase
	Stall ratio		2.5 : 1
Transmission	Type		Full auto, Power shift
	Gear shift(FR/RR)		3/3
	Adjustment		Electrical single lever type
	Overhaul ratio	FR	1 : 4.578 2 : 2.396 3 : 0.994
		RR	1 : 4.593 2 : 2.404 3 : 0.996
Axle	Type		Front-wheel drive type, fixed location
	Gear ratio		10.545
Wheels	Q'ty(FR/RR)		Double : 4/2
	Front(drive)		8.25-15-14 PR
	Rear(steer)		8.25-15-14 PR
Brakes	Travel		Front wheel, Duo-servo/dry, wet disc brake/wet
	Parking		Toggle, internal expanding mechanical type
Steering	Type		Full hydraulic, power steering
	Steering algle		75.87° to both right and left angle, respectively

6) HDF50/70-7

(1) ENGINE

Item	Unit	Specification	
Model	-	HYUNDAI D4DA-C2	*D4DD-C2
Type	-	4 cycle turbocharged diesel type	
Cooling Method	-	Water cooling	
Number of cylinders and arrangement	-	4 cylinders, In-line	
Firing order	-	1-3-4-2	
Combustion chamber type	-	Direct injection	
Cylinder bore X stroke	mm(in)	104 × 115(4.1 × 4.5)	
Piston displacement	cc(cu in)	3907(238)	
Compression ratio	-	16.5 : 1	**17.5 : 1
Rated gross horse power	ps/rpm	98/2300	
Maximum torque at rpm	kgf · m/rpm	33/1700	**35/1600
Engine oil quantity	ℓ (U.S.gal)	8.5(2.2)	
Dry weight	kg(lb)	350(772)	**345(760)
High idling speed	rpm	2510±20	**2500±50
Low idling speed	rpm	960±40	**850±50
Rated fuel consumption	g/ps.hr	155	
Starting motor	V-kW	24-5	
Alternator	V-A	24-40	**24-40
Battery	V-AH	24-75	
Fan belt deflection	mm(in)	10~15(0.39~0.59)	

** : TIER II(#1001-)

(2) MAIN PUMP

Item	Unit	Specification
Type	-	Fixed displacement gear pump
Capacity	cc/rev	68±9
Maximum operating pressure	bar	250
Rated speed (Max/Min)	rpm	3000/600

(3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Mechanical
Main relief valve pressure	bar	185/150
Flow capacity	lpm	163

(4) POWER TRAIN DEVICES

Item			Specification
Torque converter	Model		F&S 300*16/4/-1(ZF SACH)
	Type		3 Element, 1 stage, 2 phase
	Stall ratio		2.5 : 1
Transmission	Type		Full auto, Power shift
	Gear shift(FR/RR)		3/3
	Adjustment		Electrical single lever type
	Overhaul ratio	FR	1 : 4.578 2 : 2.396 3 : 0.994
		RR	1 : 4.593 2 : 2.404 3 : 0.996
Axle	Type		Front-wheel drive type, fixed location
	Gear ratio		10.545
Wheels	Q'ty(FR/RR)		Double : 4/2
	Front(drive)		8.25-15-14 PR
	Rear(steer)		8.25-15-14 PR
Brakes	Travel		Front wheel, Duo-servo/dry, wet disc brake/wet
	Parking		Toggle, internal expanding mechanical type
Steering	Type		Full hydraulic, power steering
	Steering algle		75.87° to both right and left angle, respectively

3. TIGHTENING TORQUE

1) HDF15/18-5

No	Item		Size	kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M16×2.0	7.5	54
2		Radiator mounting bolt, nut	M 8×1.25	2.5±0.5	18.1±3.6
3	Hydraulic system	Torque converter mounting bolt	M 8×1.25	4.17	30
4		MCV mounting bolt, nut	M10×1.25	7.43±1.5	54±10.8
5		Steering unit mounting bolt	M10×1.5	6.9±1.4	50±10
6	Power train system	Transmission mounting bolt, nut	M12×1.75	12.8±3.0	93±22
7		Drive axle mounting bolt, nut	M20×1.5	62.8±9.4	454±68
8		Steering axle mounting bolt, nut	M20×2.5	58±8.7	420±63
9		Front wheel mounting nut	M14×1.5	17±1.0	123±7.2
10		Rear wheel mounting nut	M10×1.25	7.43±1.5	54±10.8
11	Others	Counterweight mounting bolt	M30×2.5	215±33	1555±239
12		Operator's seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6
13		Head guard mounting bolt	M10×1.5	6.9±1.4	50±10

2) HDF20/25/30-5

No	Item		Size	kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M16×2.0	7.5	54
2		Radiator mounting bolt, nut	M10×1.5	6.9±1.4	50±10
3	Hydraulic system	Torque converter mounting bolt	M10×1.5	6.9±1.4	50±10
4		MCV mounting bolt, nut	M10×1.5	6.9±1.4	50±10
5		Steering unit mounting bolt	M10×1.5	6.9±1.4	50±10
6	Power train system	Transmission mounting bolt, nut	M12×1.75	12.8±3.0	93±22
7		Drive axle mounting bolt, nut	M12×1.75	12.8±3.0	93±22
8		Steering axle mounting bolt, nut	M20×2.5	58±8.7	420±63
9		Front wheel mounting nut	M20×1.5	28±3	203±22
10		Rear wheel mounting nut	M14×1.5	21±3	152±22
11	Others	Counterweight mounting bolt	M30×3.0	215±33	1555±239
12		Operator's seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6
13		Head guard mounting bolt	M12×1.75	12.8±3.0	93±22

3) 35DS/40DS/45DS-7, 35D/40D/45D-7

NO	Item		Size	kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M16×2.0	7.5	54
2		Radiator mounting bolt, nut	M10×1.5	6.9±1.4	50±10
3		Torque converter mounting bolt	M10×1.5	6.9±1.4	50±10
4	Hydraulic system	MCV mounting bolt, nut	M14×2.0	19.6±2.9	142±21
5		Steering unit mounting bolt	M10×1.5	6.9±1.4	50±10
6	Power train system	Drive axle mounting bolt, nut	M22×2.5	77.4±11.6	560±84
7		Steering axle mounting bolt, nut	M14×2.0	19.6±2.9	142±21
8		Front wheel mounting nut	M22×1.5	61.2±9.2	448±67
9		Rear wheel mounting nut	M20×1.5	60.0±5.0	434±36
10	Others	Counterweight mounting bolt	M30×3.5	120±15	1555±239
11		Operator's seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6
12		Head guard mounting bolt	M12×1.75	12.8±3.0	93±22

4) HDF50/70-7S, HDF50/70-7

NO	Item		Size	kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M16×2.0	7.5	54
2		Radiator mounting bolt, nut	M10×1.5	6.9±1.4	50±10
3		Torque converter mounting bolt	M10×1.5	6.9±1.4	50±10
4	Hydraulic system	MCV mounting bolt, nut	M12×1.75	12.8±3.0	93±22
5		Steering unit mounting bolt	M10×1.5	6.9±1.4	50±10
6	Power train system	Transmission mounting bolt, nut	M16×2.0	7.5	54
7		Drive axle mounting bolt, nut	M24×3.0	100±15	723±108
8		Steering axle mounting bolt, nut	M18×2.5	41.3±6.2	300±45
9		Front wheel mounting nut	M22×1.5	61.2±9.2	448±67
10		Rear wheel mounting nut	M22×1.5	61.2±9.2	448±67
11	Others	Counterweight mounting bolt	M30×3.5	120±15	1555±239
12		Operator's seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6
13		Head guard mounting bolt	M12×1.75	12.8±3.0	93±22

9 . TROUBLESHOOTING

1. ENGINE SYSTEM

Trouble symptom	Probable cause	Remedy
Oil pressure caution lamp fails to go out.	· Low oil level in oil pan. · Oil filter element clogged. · Loose or worn oil pipe joint leaks oil.	· Add oil. · Replace element. · Check and repair.
Radiator pressure valve spouts steam.	· Lack of cooling water or water leakage. · Loosen fan belt. · Dust and scale accumulated in, cooling system.	· Add water or repair. · Adjust belt. · Change water and clean the interior of cooling system.
Water temp gauge indicates red range, on right.	· Radiator fin clogged or fin damaged. · Thermostat or water temp gauge faulty. · Radiator filler cap loosening.	· Clean or repair. · Replace · Retighten cap or replace packing.
Water temp gauge indicates red range, on left.	· Thermostat faulty. · Water temperature gauge faulty.	· Replace · Replace
Engine fails to start.	· Lack of fuel. · Air mixed in fuel system. · Fuel injection pump or nozzle defective. · Starting motor rotates slowly. · Engine compression insufficient. · Valve clearance out of adjustment.	· Addfuel. · Repair. · Replace. · See " Electrical system." · Adjust clearance
Engine emits whitish or bluish smoke.	· Excessive quantity of oil in oil pan. · Poor quality of fuel.	· Reduce oil quantity. · Replace with specified fuel.
Engine emits blackish smoke.	· Air cleaner element clogged.	· Clean or replace element.
Irregular fuel feeding sound heard.	· Fuel feed pump faulty.	· Replace pump.
Abnormal sound heard. (Fuel combustion or mechanical sound)	· Poor quality of fuel. · Overheating · Muffler interior damaged. · Excessively large valve clearance.	· Replace with specified fuel. · See Symptom "Radiator pressure valve spouts steam". · Replace · Adjust clearance.

2. ELECTRICAL SYSTEM

Trouble symptom	Probable cause	Remedy
Lamps dimming even at maximum engine speed.	· Faulty wiring.	· Check for loose terminal and disconnected wire.
Lamps flicker during engine operation.	· Improper belt tension.	· Adjust belt tension.
Charge lamp does not light du-ring normal engine operation.	· Charge lamp defective. · Faulty wiring.	· Replace. · Check and repair.
Alternator makes abnormal sounds.	· Alternator defective.	· Replace
Starting motor fails to run.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Starting motor pinion repeats going in and out.	· Insufficient battery voltage.	· Recharge battery.
Excessively low starting motor speed.	· Insufficient battery voltage. · Starting motor defective.	· Recharge battery. · Replace
Starting motor comes to a stop before engine starts up.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Heater signal does not become red.	· Faulty wiring. · Glow plug damaged.	· Check and repair. · Replace
Engine oil pressure caution lamp does not light when enigne is stopped (with starting switch left in"ON" position).	· Caution lamp defective. · Caution lamp switch defective.	· Replace · Replace

3. TORQUE FLOW SYSTEM

Trouble symptom	Probable cause	Remedy
1. Excessive oil temperature rise		
1) Torque converter	· Improper oil level.	· Check oil level. Add or drain oil as necessary.
	· Impeller interfering with surroundings.	· After draining oil from oil tank and transmission, check and replace interfering parts.
	· Stator and free wheel malfunctioning.	· Check enigne (stalling) speed. If necessary, replace.
	· Air sucked in.	· Check the inlet side joint or pipe. If necessary, retighten joint or replace gasket.
	· Water intruding into transmission case	· Check drained oil. If necessary, change oil.
	· Bearing worn or seizing.	· Disassemble, inspect, repair or replace.
	· Gauge malfunctioning.	· Check and, if necessary, replace.
2) Transmission	· Clutch dragging.	· Check to see whether or not machine moves even when transmission is placed in neutral position. If so, replace clutch plate.
	· Bearing worn or seized.	· Disassemble, check and replace.
2. Noise operation		
1) Torque converter	· Cavitation produced.	· Change oil, replace parts leaking air.
	· Flexible plate damaged.	· Listen to rotating sound at lowspeed operation. If necessary, repacle flexible plate.
	· Bearing damaged or worn.	· Disassemble, check and replace.
	· Gear damaged.	· Disassemble, check and replace.
	· Impeller interfering with surroundings.	· Check impeller or check drained oil for mixing of foreign matter. If necessary, change oil.
	· Bolt loosening.	· Disassemble and check. If necessary, retighten or repalce.
	· Spline worn.	· Disassemble, check and replace.
	· Noise gear pump operation.	· Disassemble, check and replace.
2) Transmission	· Dragging caused by seizing clutch.	· Check to see whether or not machine moves even when transmission is in neutral position. If so, replace clutch plate.
	· Bearing worn or seizing.	· Disassemble, check and replace
	· Gear damaged.	· Disassemble, check and replace
	· Bolt loosening.	· Disassemble, check and retighten or replace
	· Spline worn.	· Disassemble, check and replace

Trouble symptom	Probable cause	Remedy
3.Low output power		
1) Torque converter	· Insufficient hydraulic pressure :	
	- Low oil level.	- Check oil level and add oil
	- Air sucked in.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Oil filter clogging.	- Check and replace
	- Oil pump worn. (Low delivery flow)	- Check oil pressure. If necessary replace pump.
	- Regulator valve coil spring fatigued.	- Check spring tension. If necessary, replace.
	- Control valve spool malfunctioning.	- Disassemble, check and repair or replace.
	- Piston or O-ring worn.	- Disassemble, check measure and replace.
	· Stator free wheel cam damaged.	- Check stalling speed. (Increased engine load will cause excessive drop of stalling speed.)
		- Check oil temperature rise. If any, replace free wheel.
2) Transmission	· Flexile plate deformed	· Replace flexible plate
	· Stator free wheel seizing.	- Check temperature plate. (No-load will cause temperature rise)
		- Replace free wheel if a drop of starting output is found.
	· Impeller damaged for interfering with the surroundings.	- Check drained oil for foreign matter. If any, change oil.
	· Use of poor quality of oil or arising of air bubbles.	- Check and change oil.
	- Air sucked in from inlet side.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Low torque converter oil pressure accelerates generation of air bebbles.	- Check oil pressure.
	- Oil mixing with water.	- Check drained oil and change oil.
	- Inching rod out of adjustment.	- Check and adjust.
	· Clutch slipping	
	- Lowering of weight.	- Check oil pressure.
	- Piston ring or O-ring worn.	- Disassemble, check, measure and replace.
	- Clutch piston damaged.	- Disassemble, check and replace.
	- Clutch plate seizing or dragging.	- Check to see whether or not machine moves even when transmission is in neutral position. If so, replace.

Trouble symptom	Probable cause	Remedy
4.Unusual oil pressure		
1) Oil pressure is high	· Control valve malfunctioning.	(1)Check for spool operation. If necessary, replace valve. (2)Check for clogging of small hole in valve body. If necessary, clean or repair.
	· Cold weather. (high oil viscosity)	· When atmospheric temp is below freezing point (when normal oil pressure is recovered if heated to 60 ~ 80℃), change oil.
2) Oil pressure is low	· Use of improper oil.	· Check and change oil.
	· Gear pump malfunctioning(worn).	· Disassemble, check and replace.
	· Oil leaks excessively : (1)Control valve oil spring defective.	· Check spring tension (see spring specification). If necessary replace.
	(2)Control valve spool defective.	· Disassemble, check, and repair or replace valve.
	· Air sucked in.	· Check joints and pipes. If necessary, retighten joint or replace packing.
	· Low oil level.	· Check oil level and add oil.
	· Oil filter clogging.	· Check and replace.
3) Transmission	· Oil leaks excessively.	· Disassemble, check (piston ring and O-ring for wear and other defects), and replace.
5.Power is not transmitted		
1) Torque converter	· Clutch plate damaged.	· Check for damage by listening to abnormal sounds at a low converter speed and replace.
	· Low oil level.	· Check oil level and add oil
	· Oil pump driving system faulty.	· Disassemble and check for wear of pump gear, shaft and spline. Replace defective parts.
	· Shaft broken.	· Check and replace.
	· Lack of oil pressure.	· Check oil pump gear for wear and for oil suction force. If necessary, replace pump.
2) Transmission	· Low oil level.	· Check oil level and add oil.
	· Inching valve and link lever improperly positioned.	· Check measure and adjust.
	· Forward/reverse spool and link lever improperly positioned.	· Check and adjust.
	· Clutch fails to disengage : (1)Clutch case piston ring defective.	· Disassemble, check and replace
	(2)Main shaft plug slipping out.	· Disassemble, check and repair or replace
	· Clutch seizing.	· Check to see whether or not machine moves even then transmission is in neutral position. If so, replace.
	· Shaft broken off.	· Disassemble, check(main shaft, etc.), and replace.
	· Clutch drum damaged (spring groove).	· Disassemble, check and replace.
	· Clutch snap ring broken.	· Disassemble, check and repair or replace.

Trouble symptom	Probable cause	Remedy
5. Power is not transmitted (Continue)	· Foreign matter intruding into oil passage to clutch. · Shaft spline worn.	· Disassemble, check and repair or replace. · Disassemble, check and replace.
6. Oil leakage (Transmission and torque converter)	· Oil leaks from oil seal.	· Disassemble and check for wear of seal lips and mating sliding surfaces (pump boss, coupling etc.) Replace oil seal, pump boss, coupling, etc.
	· Oil leaks from case joining surfaces.	· Check and retighten or replace packing.
	· Oil leaks from joint or pipe.	· Check and repair or replace gasket.
	· Oil leaks from drain plug.	· Check and retighten or gasket.
	· Oil leaks from a crack.	· Check and replace cracked part.

4. STEERING SYSTEM

Trouble symptom	Probable cause	Remedy
1. Steering wheel drags.	· Low oil pressure. · Bearing faulty. · Spring spool faulty. · Reaction plunger faulty. · Ball-and-screw assembly faulty. · Sector shaft adjusting screw excessively tight. · Gears poorly meshing. · Flow divider coil spring fatigued. · Brake valve spool malfunctioning.	· Check locknut. Repair. · Clean or replace. · Clean or replace. · Replace. · Clean or replace. · Adjust. · Check and correct meshing. · Replace. · Clean or replace.
2. Steering wheel fails to return smoothly.	· Bearing faulty. · Reaction plunger faulty. · Ball-and-screw assy faulty. · Gears poorly meshing.	· Clean or replace. · Replace. · Clean or replace. · Check and correct meshing.
3. Steering wheel turns unsteadily. Steering system makes abnormal sound or vibration.	· Locknut loosening. · Metal spring deteriorated. · Gear backlash out of adjustment. · Locknut loosening. · Air in oil circuit.	· Retighten. · Replace. · Adjust. · Retighten. · Bleed air.
4. Abnormal sound heard when steering wheel is turned fully	Valve · Faulty. (Valve fails to open.) Piping · Pipe (from pump to power steering cylinder) dented or clogged.	· Adjust valve set pressure and check for specified oil pressure. · Repair or replace.
5. Piping makes abnormal sounds.	Oil pump · Lack of oil. · Oil inlet pipe sucks air. · Insufficient air bleeding.	· Add oil. · Repair. · Bleed air completely.
6. Valve or valve unit makes abnormal sounds.	Oil pump · Oil inlet pipe sucks air. Valve · Faulty. (Unbalance oil pressure) Piping · Pipe (from pump to power steering) dented or clogged. · Insufficient air bleeding.	· Repair or replace. · Adjust valve set pressure and check specified oil pressure. · Repair or replace. · Bleed air completely.
7. Insufficient or variable oil flow.	· Flow control valve orifice clogged.	· Clean.
8. Insufficient or variable discharge pressure.	Piping · Pipe (from tank to pipe) dented or clogged.	· Repair or replace.

5. BRAKE SYSTEM

Trouble symptom	Probable cause	Remedy
1. Insufficient braking force	· Hydraulic system leaks oil. · Hydraulic system leaks air. · Lining surface soiled with water or oil. · Lining surface roughened or in poor contact with drum. · Lining worn. · Brake valve or wheel cylinder mal-functioning. · Hydraulic system clogged.	· Repair and add oil. · Bleed air. · Clean or replace. · Repair by polishing or replace. · Replace. · Repair or replace. · Clean.
2. Brake acting unevenly. (Machine is turned to one side during braking.)	· Tires unequally inflated. · Brake out of adjustment. · Lining surface soiled with water or oil. · Earth intruding into brake drum. · Lining surface roughened. · Lining in poor contact with drum. · Lining worn. · Brake drum worn or damaged (distortion or rusting). · Wheel cylinder malfunctioning. · Brake shoe poorly sliding. · Back plate mounting bolt loose. · Back plate deformed. · Wheel bearing out of adjustment. · Hydraulic system clogged.	· Adjust tire pressure. · Adjust. · Clean or replace. · Clean. · Repair by polishing or replace. · Repair by polishing. · Replace. · Repair or replace. · Repair or replace. · Adjust. · Retighten or replace. · Replace. · Adjust or replace. · Clean.
3. Brake trailing.	· Pedal has no play. · Brake shoe poorly sliding. · Wheel cylinder mal-functioning. · Piston cup faulty. · Return spring fatigued or bent. · Parking brake fails to return or out of adjustment. · Brake valve return port clogged. · Hydraulic system clogged. · Wheel bearing out of adjustment.	· Adjust. · Adjust. · Repair or replace. · Replace. · Replace. · Repair or adjust. · Clean. · Clean. · Adjust or replace.
4. Brake chirps	· Brake trailing. · Piston fails to return. · Lining worn. · Lining surface roughened.	· See 3. Brake trailing. · Replace. · Replace. · Repair by polishing or replace.
5. Brake squeaks	· Lining surface roughened. · Lining worn. · Poor shoe to lining contact. · Excessively large friction between shoe and back plate. · Foreign matter on drum sliding surface. · Drum sliding surface damaged or distorted. · Brake shoe deformed or poorly installed. · Back plate mounting bolt loosening. · Worn anchor or other contact portion.	· Repair by polishing or replace. · Replace. · Replace. · Clean and apply brake grease. · Clean · Replace. · Replace or repair. · Retighten. · Replace.

Trouble symptom	Probable cause	Remedy
5. Brake squeaks (continue)	· Lining poor contact with drum. · Anti-rattle spring poorly installed.	· Repair or replace. · Repair or replace.
6. Brake rapping	· Drum sliding surface roughened. · Drum eccentric or excessively distorted. · Lining surface roughened.	· Repair by polishing or replace. · Replace. · Repair by polishing or replace.
7. Large pedal stroke	· Brake out of adjustment. · Hydraulic line sucking air. · Oil leaks from hydraulic line, or lack of oil. · Lining worn. · Shoe tilting or does not return completely. · Lining in poor contact with brake drum.	· Adjust. · Bleed air. · Check and repair or add oil. · Replace. · Repair. · Repair.
8. Pedal dragging.	· Twisted push rod caused by improperly fitted brake valve. · Brake valve seal faulty. · Flow control valve orifice clogged.	· Adjust. · Replace. · Clean or replace.

6. HYDRAULIC SYSTEM

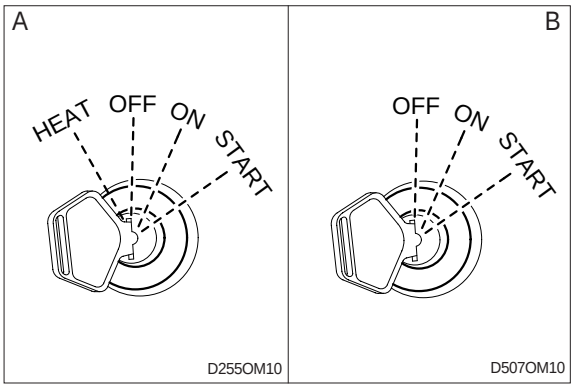
Trouble symptom	Probable cause	Remedy
1. Large fork lowering speed.	· Seal inside control valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Replace spool or valve body. · Replace. · Replace packing.
2. Large spontaneous tilt of mast.	· Tilting backward : Check valve defective. · Tilting forward : tilt lock valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Clean or replace. · Clean or replace. · Replace. · Replace seal.
3. Slow fork lifting or slow mast tilting.	· Lack of hydruilc oil. · Hydrauic oil mixed with air. · Oil leaks from joint or hose. · Excessive restriction of oil flow on pump suction side. · Relief valve fails to keep specified pressure. · Poor sealing inside cylinder. · High hydraulic oil viscosity. · Mast fails to move smoothly. · Oil leaks from lift control valve spool. · Oil leaks from tilt control valve spool.	· Add oil. · Bleed air. · Replace. · Clean filter. · Adjust relief valve. · Replace packing. · Change to SAE10W, class CF engine oil. · Adjust roll to rail clearance. · Replace spool or valve body. · Replace spool or valve body.
4. Hydraulic system makes abnormal sounds.	· Excessive restriction of oil flow pump suction side. · Gear or bearing in hydraulic pump defective.	· Clean filter. · Replace gear or bearing.
5. Control valve lever is locked	· Foreign matter jammed between spool and valve body. · Valve body defective.	· Clean. · Tighten body mounting bolts uniformly.
6. High oil temperature.	· Lack of hydraulic oil. · High oil viscosity. · Oil filter clogged.	· Add oil. · Change to SAE10W, class CF engine oil. · Clean filter.

1. ENGINE SYSTEM

1) EASE OF STARTING, NOISE

(1) Set gear shift lever at N, and pull parking brake.
(2) Turn start switch ON.
(3) Turn start switch to HEAT. (A)
(4) When heater signal lamp goes out, turn key to START, and start engine.
(5) When engine starts, check if it starts smoothly, and if it makes any abnormal noise.

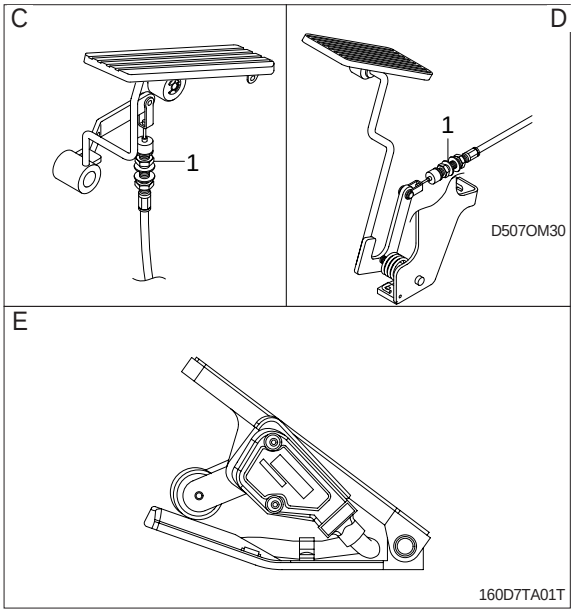
※ **Refer to 3-20**



A	B
HDF15/18-5	HDF20/25/30-5
35D/40D/45D-7(-#1000)	35DS/40DS/45DS-7
HDF50/70-7(-#1000)	HDF50/70-7S
	35D/40D/45D-7(#1001-)
	HDF50/70-7(#1001-)

2) IDLING

(1) After warming up engine, run at idling.
(2) Check that engine maintains steady, smooth rotation without gasping, abnormal noise, abnormal explosions, or irregular vibration.
(3) Check that idling speed is within specified range. If it is not within specified range, adjust rod(1) of accelerator pedal.
(4) Idle rpm : SEE 8.SPECIFICATION



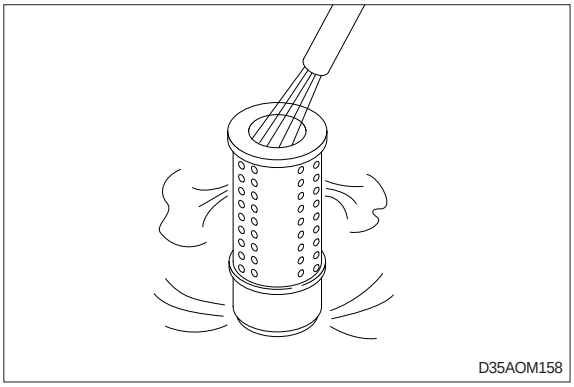
C	D	E
HDF15/18-5	35DS/40DS/45DS-7	35D/40D/45D-7(#1001-)
HDF20/25/30-5	HDF50/70-7S	HDF50/70-7(#1001-)
	35D/40D/45D-7(-#1000)	
	HDF50/70-7(-#1000)	

3) WHEN ACCELERATOR PEDAL IS DEPRESSED

(1) Check that accelerator pedal does not catch when depressed.
(2) Check that engine speed increases in accordance with amount pedal is depressed.
(3) When doing this, check that engine speed changes without gasping, abnormal noise, abnormal explosions, or irregular vibration.
(4) Check that exhaust gas is colorless when the engine is idling, and a thin black color when accelerator pedal is depressed.
(5) Set height of stopper bolt according to following table, then adjust with accelerator rod on trucks and stopper bolt so that engine speed is within specified range when accelerator pedal is fully depressed.
(6) Max speed : SEE 8.SPECIFICATION

4) AIR CLEANER ELEMENT

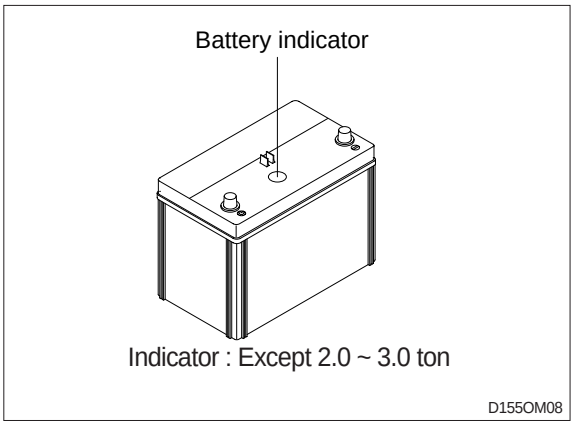
(1) Blow dry compressed air (max 7kgf/cm^2, 7bar, 100psi) from inside along pleats. Next blow air from outside along pleats, then blow from inside again.
(2) Replace element if it is dirty, clogged or damaged.


D35AOM158

5) BATTERY

Check electrolyte color.
Adding and charging distilled water of battery shall be performed by the following table of battery indicator.

Battery condition	Mark	Color
Normal		Green
Insufficient distilled water		White
Insufficient charge		Red

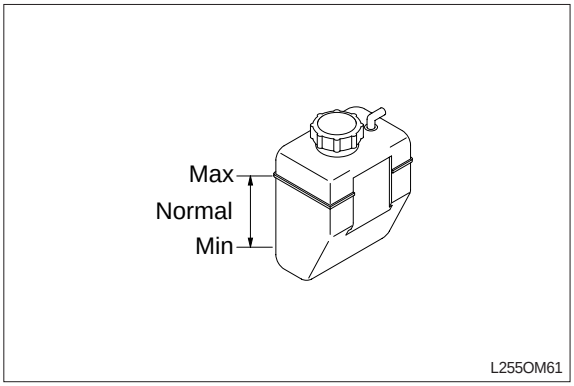


Indicator : Except 2.0 ~ 3.0 ton
D155OM08

6) COOLANT

Check coolant level. If the cooling water in the radiator sub-tank is not within the normal range, add water to the MAX line.

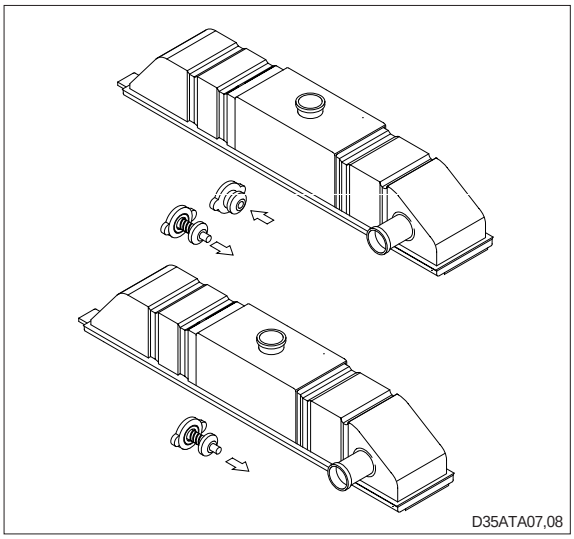
※ **If antifreeze is being used, pay careful attention to the ratio of antifreeze and water when adding coolant.**



L255OM61

7) RADIATOR CAP

(1) Push pressure regulator spring with finger and check that tension is correct.
(2) Pull negative pressure valve, and check that it is closed when released.
(3) If packing is damaged, replace whole radiator cap assembly.



8) FUEL FILTER(DIESEL)

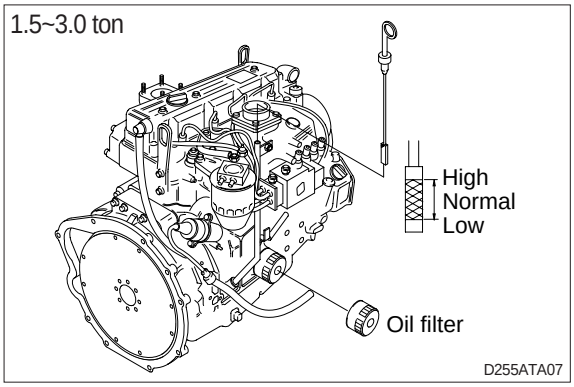
(1) The fuel filter element cannot be inspected from the outside, so replace it periodically.
(Refer to 7.PLANNED MAINTENANCE AND LUBRICATION)
Always use HYUNDAI Forklift genuine parts when replacing the element. After replacing the element, run the engine and check for oil leakage from the filter mount.

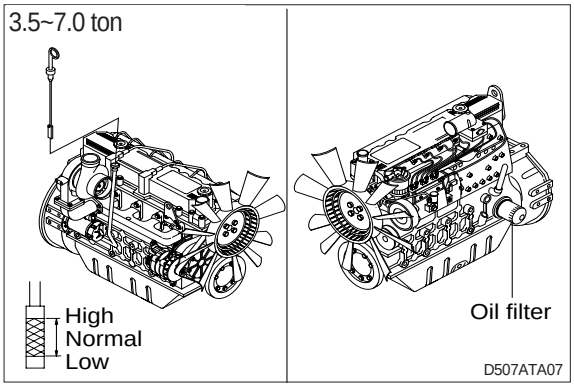
9) ENGINE OIL

(1) Check oil level with dipstick and add oil if necessary.
(2) Check oil for discoloration or deterioration. Change oil if discolored or deteriorated.
(3) Engine oil quantity : SEE 8.SPECIFICATION

10) ENGINE OIL FILTER(DIESEL)

The condition of the oil filter element cannot be inspected from the outside so replace the engine oil filter periodically. Refer to 7. PLANNED MAINTENANCE AND LUBRICATION.
Use a filter wrench and remove the whole cartridge assembly.

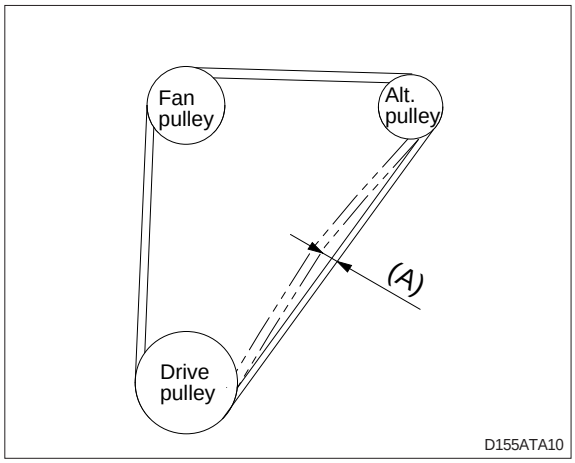




11) FAN BELT

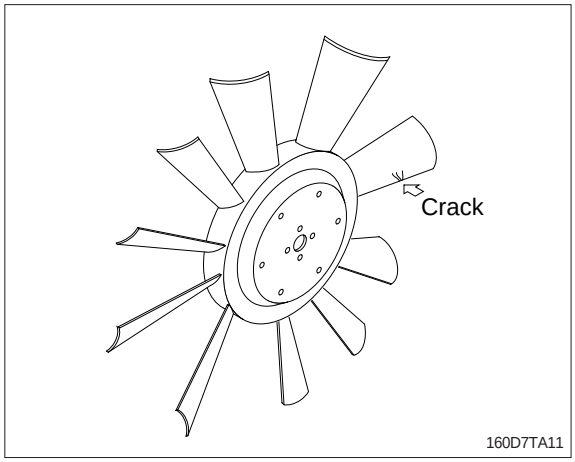
(1) Check that fan belt is not damaged.
(2) Check inside of belt also. If bottom of pulley groove is shining, belt will slip so replace.
(3) Check deflection when fan belt is pushed with a finger pressure at a point midway between fan pulley and alternator pulley.
(4) If fan belt tension is not correct, loosen alternator mounting nut and bolt of adjustment bar. Move alternator to adjust belt tension.

· Fan belt deflection : SEE 8.SPECIFICATION



12) FAN

Move fan backwards and forwards by hand to check for looseness.
Tighten mounting bolt with a spanner.



2. DRIVE SYSTEM

1) GEAR SHIFT LEVER

(1) Neutral starting

Engine can be started only when the shifting lever is in neutral position.

(2) Shifting FWD/REV lever

① Forward

Push the lever forward then forward solenoid valve operates and oil comes to forward clutch thus the truck will run forward.

② Reverse

Pull the lever backward then reverse solenoid valve operates and oil comes to reverse clutch thus the truck will run backward.

2) OIL LEAKAGE

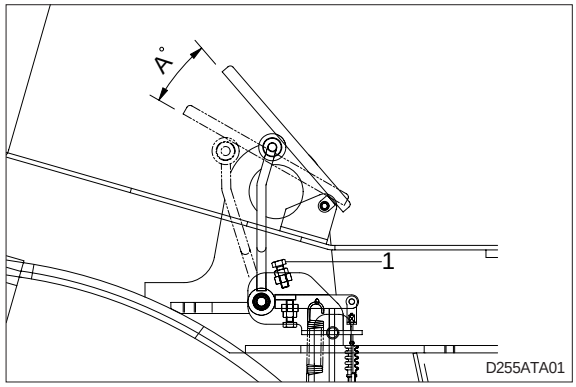
Check that there is no oil leakage from torque converter, transmission or control valve. If oil oozes out and forms drops, replace packing.

3) ADJUSTMENT OF PEDAL

(1) Accelerator pedal

Adjust the stopper bolt(1) so that pedal operation range is "A°".

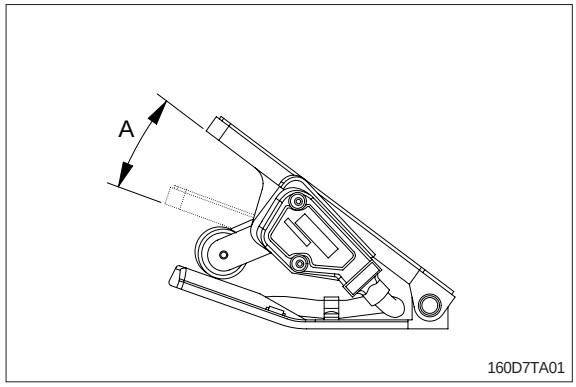
Model	Operation range(A°)
1.5~1.8 ton	19
2.0~3.0 ton	19.6
3.5~4.5 ton	21.6
5.0~7.0 ton	22.7



(2) Electric accelerator pedal (3.5~7.0 TON HMC ENGINE : #1001-)

Pedal operation range is "A°".

Model	Operation range(A°)
3.5~4.5 ton	17.5
5.0~7.0 ton	17.5



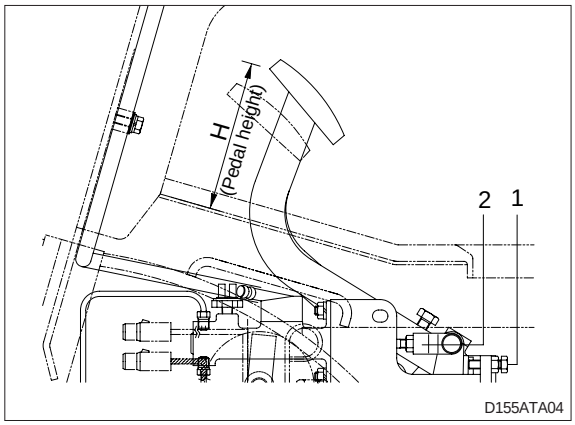
(3) Brake pedal

- Adjust stopper bolt(1) so that pedal height is "H".
- Adjust push rod(2) so that pedal play is idle stroke.

Unit:mm

Model	H	IDLE
1.5~1.8 ton	130~140	10
2.0~3.0 ton	160~170	10~15
3.5~4.5 ton(*)	153~163	13~18
3.5~4.5 ton(**)	130~140	5~8
5.0~7.0 ton	125	4~6.5

* 35DS/40DS/45DS-7, 35D/40D/45D-7(-#1000)
** 35D/40D/45D-7(#1001-, TIER II)



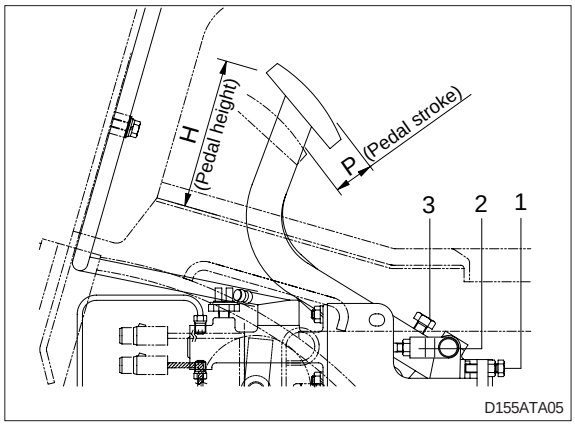
(4) Inching pedal

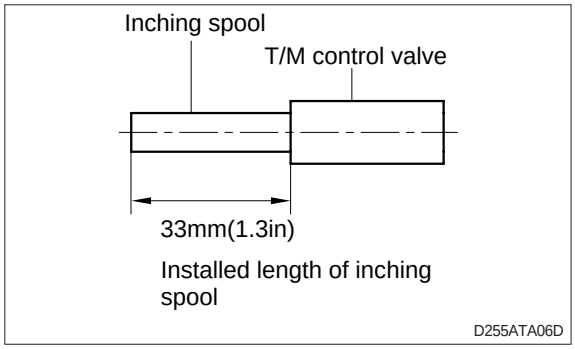
- Adjust stopper bolt(1) so that pedal height is "H".
- Adjust rod(2) so that length of inching spool is 33mm when pedal height is "H".
- Adjust bolt(3) so that brake pedal interconnects with inching pedal at inching pedal stroke "P".

Unit:mm

Model	H	P	IDLE
1.5~1.8 ton	132~142	43	10
2.0~3.0 ton	160~170	20~30	2~4
3.5~4.5 ton(*)	153~163	30~40	13~18
3.5~4.5 ton(**)	130~140	30~34	5~8
5.0~7.0 ton	125	90	4~6.5

* 35DS/40DS/45DS-7, 35D/40D/45D-7(-#1000)
** 35D/40D/45D-7(#1001-, TIER II)





4) CHECK OIL LEVEL

Stop the machine in a flat place and check the oil level with the dipstick.

(1) Brake reservoir

Check the brake reservoir, and add brake fluid, if necessary. The embossed letter facing up.

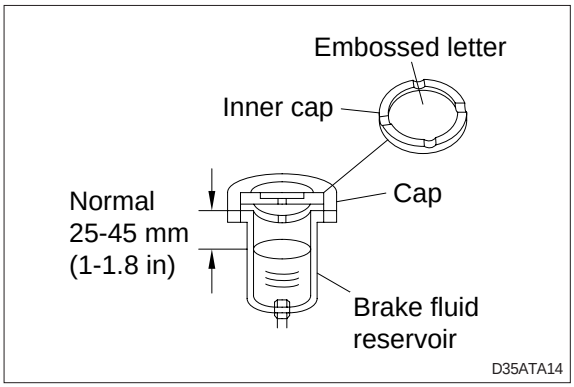
(2) Differential case

Remove the level plug at front face of the differential case. The oil should be leveled with the bottom of the plug hole. If the oil level is too low, add oil through the oil filler plug at the top of the differential case.

(3) TORQFLOW Transmission

Check the oil level with the oil gauge below the floor plate. If the oil level is too low, add oil through the oil filler plug.

※ **Follow the same procedure as for the differential case when checking the oil level or adding oil to the clutch transmission case.**



3. TRAVEL SYSTEM

1) TIRES

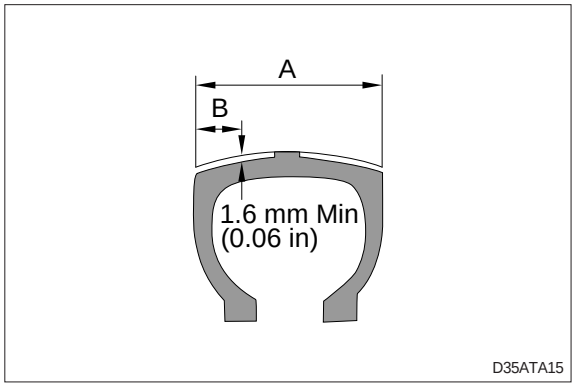
(1) Check tire pressure using tire gauge : SEE 5-3 CHECK BEFORE STARTING ENGINE

(2) Check visually for cracks and damage to tread and side wall. If crack or damage is serious, replace tire.

(3) Wear

Measure tread of pneumatic tires(tires with air). Depth of tread must be at least 1.6mm (0.06in) at point 1/4 across width of tread. A/B≒4.

(4) Check tire visually for uneven wear, stepped wear or any other abnormal wear. Check also for pieces stuck in tire.



2) HUB NUTS

Use wrench to check for loose hub nuts.

Tighten any loose hub nuts to specified tightening torque : SEE 8.SPECIFICATION

3) RIM SIDE RING

Check rim side ring for deformation or cracks. Check visually or use crack detection method.

・Rear rim connecting nut torque : SEE 8.SPECIFICATION

4) STEERING AXLE

(1) Push axle in from one side or measure front to rear clearance with feeler gauge. Check that clearance is within 2mm. If clearance is more than 2mm, insert shim to reduce clearance to within 0.7mm.

・Mounting bolt torque : SEE 8.SPECIFICATION

(2) Measure clearance between center pin and bushing. Check that clearance is within 0.5mm(0.02in) and that there is an oil groove on the bushing.

5) DRIVE AXLE

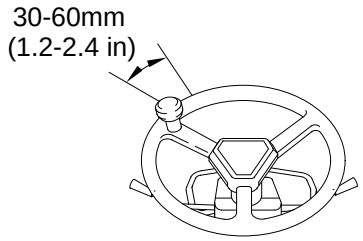
Check that there is no deformation or crack around mounting bolts of front axle and main frame and at welds. Check visually or use crack detection method.

Mounting bolt torque : SEE 8.SPECIFICATION

4. STEERING SYSTEM

1) STEERING WHEEL

Set rear wheels facing straight forward, then turn steering wheel to left and right. Measure range of steering wheel movement before rear wheel starts to move. Range should be 30 - 60㎜ at rim of steering wheel. If play is too large, adjust at gearbox. Test steering wheel play with engine at idling.



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2) KNUCKLE

Check knuckle visually or use crack detection method. If the knuckle is bent, the tire wear is uneven, so check tire wear.

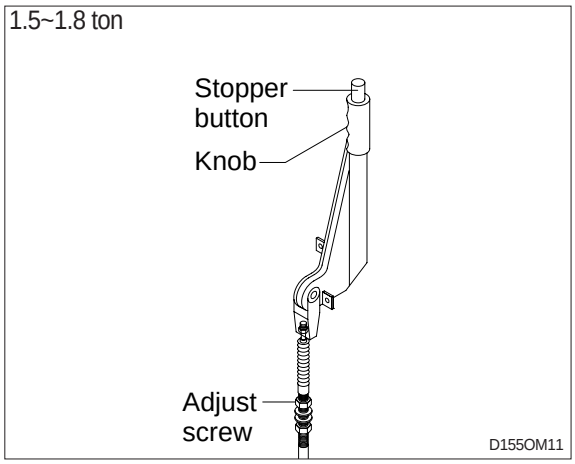
3) STEERING AXLE

(1) Put camber gauge in contact with hub and measure camber. If camber is not within 1±0.5°, rear axle is bent.
(2) Ask assistant to drive machine at minimum turning radius.
(3) Fit bar and a piece of chalk at outside edge of counterweight to mark line of turning radius.
(4) If minimum turning radius is not within±100㎜ (±4in) of specified value, adjust turning angle stopper bolt.

5. ADJUSTMENT OF PARKING BRAKE LEVER

1. RATCHET TYPE PARKING LEVER(1.5~1.8 TON ONLY)

1) Put the lever in the brake released position.
2) Tighten it with a adjust screw to give a force of 20kg to the lever operation.



2. TOGGLE TYPE PARKING LEVER

1) Put the lever in the brake released position.
2) Turn knob in order that the adjuster(2) may be operated.