# 7. PLANNED MAINTENANCE

## 1. INTRODUCTION

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

## 2. LIFT TRUCK MAINTENANCE

Regular maintenance and care of your lift truck is not only important for full and efficient truck life also essential for your safety. The importance of maintaining your lift truck in a safe operating condition by servicing it regularly and, when necessary, repairing it promptly cannot be emphasized too strongly. Experience has shown that powered industrial trucks can cause injury if improperly used or maintained. In the interest of promoting safety, several current industry and government safety standards specify that any powered industrial truck not in safe operating condition be removed from service and that all repairs be made by trained and authorized persons.

To assist you in keeping your lift truck in service and in good operating condition, this section outlines maintenance procedures that should be done at regular intervals. This planned approach is considered essential to the life and safe performance of your truck.

It is your responsibility to be alert for any indication that your truck may need service and have it attended to promptly. You play an important part in maintenance. Only you can make sure that your lift truck regularly receives the care it needs.

△ **Powered industrial truck may become hazardous if maintenance is neglected.**

## 3. PLANNED MAINTENANCE

As outlined in Section 4, **Daily safety inspection** 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 operators daily inspection,** HYUNDAI recommends that the owner set up and follow a periodic planned maintenance (PM) and inspection program. The **PM** identifies needed adjustments, repairs or replacements so they can be made before failure occurs. The specific schedule (frequency) for the PM inspections depends on the particular application and lift truck usage.

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

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

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

## 4. PLANNED MAINTENANCE INTERVALS

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

**1) Normal operation**

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

**2) Harsh operation**

(1) All harsh working environment

(2) Long term heavy load operation

(3) High and low temperature working environment

(4) Sudden change in temperature

(5) Dusty or sandy working environment

(6) Highly corrosive chemical working environment

(7) Damp working environment

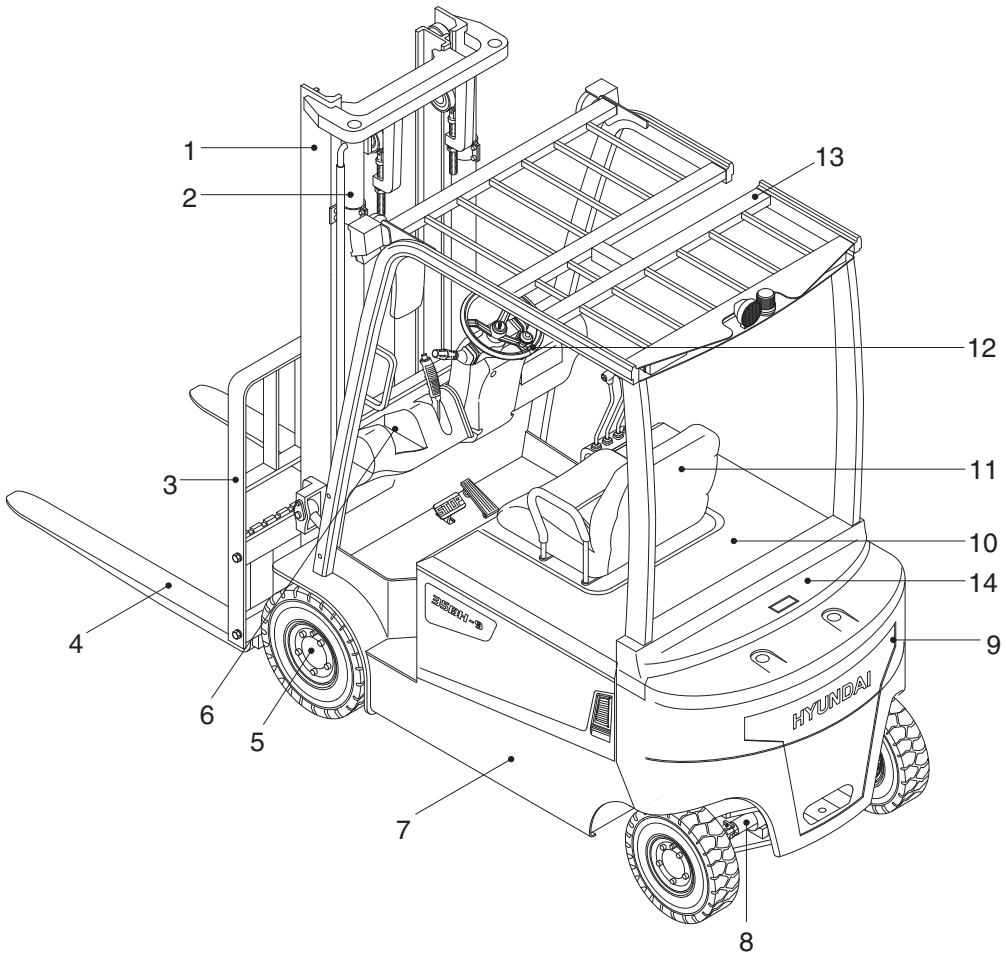
If the lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

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

The maintenance time intervals referred to in this manual relate to truck operating hours as recorded on the hourmeter, and are based on experience which HYUNDAI has found to be convenient and suitable under typical(normal or average) operating conditions.

## 5. MAJOR COMPONENT LOCATIONS

Use the illustration below to locate components included in the PM procedures.

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| | | | | | |
|---|---|---|---|---|---|
| 1 | Mast | 6 | Dash board | 11 | Seat |
| 2 | Lift cylinder | 7 | Frame | 12 | Steering wheel |
| 3 | Carriage and backrest | 8 | Steering axle | 13 | Overhead guard |
| 4 | Forks | 9 | Counterweight | 14 | Rear hood |
| 5 | Drive unit | 10 | Battery cover | | |

## 6. DAILY MAINTENANCE CHECKS

The PM intervals are depend on hour meter records of operation.

| Daily (or every 10 hours) maintenance check list | |
|---|---|
| 1 | Check truck for obvious damages and leaks. |
| 2 | Check clean battery terminals. |
| 3 | Check electrolyte level. |
| 4 | Check capacity, warning plates and decals. |
| 5 | Check condition of tires and wheels. Remove embedded objects. |
| 6 | Check for missing or loose wheel lug nuts. |
| 7 | Check hydraulic sump oil level. |
| 8 | Check display. |
| 9 | Check warning lights and hourmeter. |
| 10 | Check overhead guard condition and bolts. |
| 11 | Check horn operation and other warning devices. |
| 12 | Check steering operation. |
| 13 | Check service brake operation. |
| 14 | Check parking brake operation. |
| 15 | Check directional and speed controls operation. |
| 16 | Check accelerator. |
| 17 | Check lift, tilt and auxiliary operation. |
| 18 | Check mast, lift chains and fasteners. |
| 19 | Check carriage or attachments and forks. |
| 20 | Check seat deck holddown latch for correct locking. |
| 21 | Check optional safety equipment. (Alarms, Lights etc.) |

# 7. PERIODIC MAINTENANCE CHECKS

The PM intervals are depend on hour meter records of operation.

| Service item | | Service interval hours | | | | Initial hours | |
|---|---|---|---|---|---|---|---|
| | | 250 | 500 | 1000 | 2000 | 50i | 250i |
| Tightening | Torque on critical fasteners | | T | | | | T |
| | Drive axle mounting | | T | | | | |
| | Hydraulic hoses, fittings and clamps | | | | T | | |
| Lubrication | Lubricate truck. (see component) | | L | | | | |
| | Steering axle linkage (linkage, kingpin, trunnion) | L | | | | | |
| | Hydraulic pump spline, steerig unit spline | | | | L | | |
| | Tilt cylinder rod ends | L*1 | L*2 | | | | |
| | Mast fittings | | L | | | | L |
| | Lift chains | | L | | | | L |
| | Mast rollers | | L | | | | L |
| Function | Check truck visually and inspect components. | | I | | | | |
| | Truck drive and functional performance | | I | | | | |
| | Battery load test | | M | | | | |
| | Test ground | | | M | | | |
| Periodic replacement parts | Battery cables and truck receptacle | | | C | | | |
| | DC-DC converter | | | C | | | |
| | Check controllers. | | C | | | | |
| | Drive axle air vent | | Clean | | | | |
| | Drive axle fluid | | A | R | | | R |
| | Brake condition and wear | | C | | | | |
| | Hydraulic tank breather | | R*1 | R*2 | | | |
| | Clean hydraulic tank breather. | Clean*1 | Clean*2 | | | | |
| | Hydraulic oil return filter | | | R | | | |
| | Hydraulic tank suction strainer | | | | R | | |
| | Hydraulic oil (conventional) | | | | R | | |
| | Hydraulic oil (HYUNDAI genuine) | | | | 5000 hours | | |
| | Lift chain adjustment and wear. | | C | | | | C |
| | Check contactor. (Replace contactor tips if roughness is remarkable.) | C | | | | | |
| | Brake fluid | | | | R | | |

*1 Harsh condition *2 Normal condition

I : Visual inspection (repair or replace if required)

C : Checking (repair or replacement if required) L : Lubrication

M : Measurement (repair or adjustment if required)

A : Aid (check and aid if required) R : Replacement T : Retightening

## 8. 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, 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 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 fluid or electrolyte levels.

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 blocks under the load-engaging means, inner masts or chassis before working on them.

(4) Disconnect the battery connector before working on the electrical system.

※ Refer to the 1-15 "Jacking and Blocking" section 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.

(2) Make sure parking brake is applied.

(3) Put the directional control lever in NEUTRAL.

(4) 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. Tilt mast forward.
(3) Put the directional control lever in NEUTRAL.
(4) Apply the parking brake.
(5) Turn the key switch to the OFF position.
(6) Put blocks at the wheels if the truck must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, 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) 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.

15) When working on the hydraulic system, be sure the battery is disconnected, mast is in the fully-lowered position and hydraulic pressure is relieved in hoses and tubing.

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

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

17) 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.

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

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

20) 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.

21) 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.

22) 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.

23) 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.

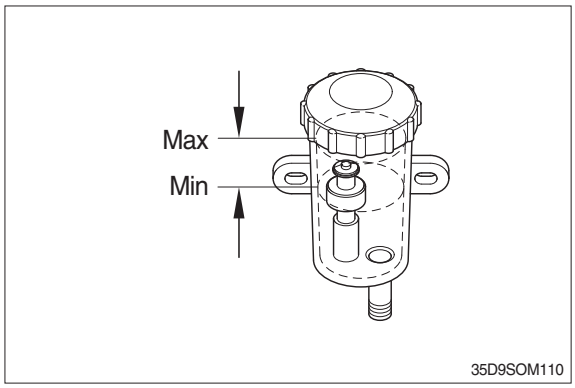
### 1) SUPPLYING BRAKE FLUID

A hydraulically operated brake is employed. Check the level of brake fluid in the reservoir tank. When the level is low, refill.

(1) Do not mix with different kinds of brake fluid.

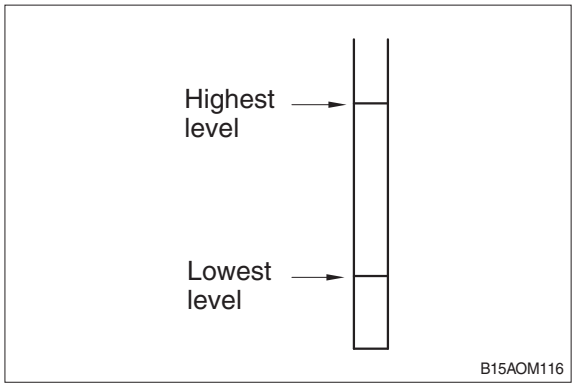
(2) Be careful not to allow external dust to enter through the reservoir cap vent hole and clog it.

(3) Brake fluid change needs a special technique. When the change is necessary, go to the service station and ask for the change.



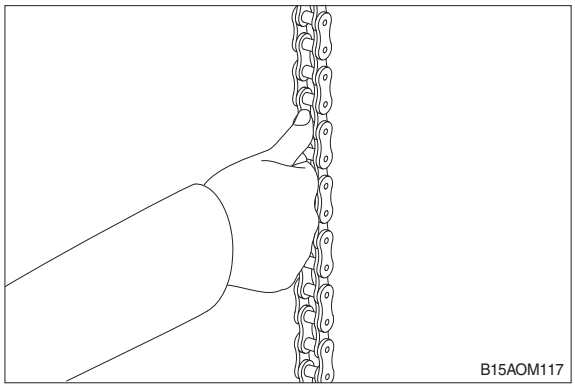

### 2) SUPPLYING HYDRAULIC OIL

Lower the fork in its lowest position on an even ground. Check for the hydraulic oil level with the oil level gauge. When the level is low, refill.




### 3) CHECKING AND ADJUSTMENT OF LIFT CHAIN TENSION

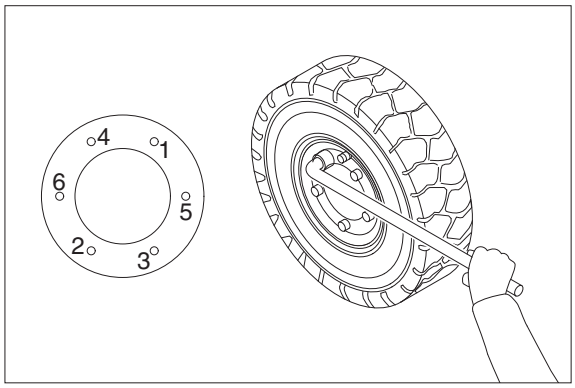
Set the fork in its horizontal position on an even ground. Raise it up to 20~30 ㎝ from the ground and push the chain with both hands. If the tension is too high or too low on one side, adjust it with the chain anchor bolt.



### 4) CHECKING OF HUB NUT TIGHTENING CONDITION

Make sure that the hub nut is firmly tightened.

Tightening and checking should be made in a diagonal order to prevent unbalanced tightening. (see the figure.)

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### 5) GREASING UP

Clean the following fittings with brushes or waste and apply grease to them.

△ **Be careful not to supply too much grease.**

| Fittings | Greasing points |
|---|---|
| Mast support | 2 spots |
| Tilt cylinder pin | 4 spots |
| Steering cylinder link | 4 spots |
| King pin | 4 spots |
| Steering axle mounting | 2 spots |
| Idle wheel bracket | 2 spots |
| Mast roller bearing | 4 spots (V), 8 spots (TF, TS), 12 spots (QF) |

### 6) GREASING OF EACH PARTS

Clean the following parts before greasing.

(1) Lift chain : Clean the chain with a brush greased with SAE 20~30 (brush over the gear oil low viscosity).

(2) Rolling part of mast guide rail roller : Brush over grease.

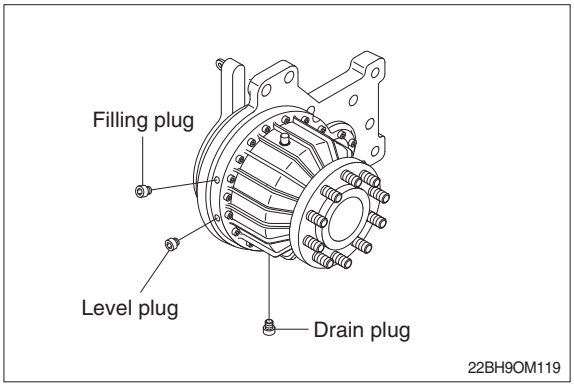
(3) Slide guide and slide rail : Brush over leaked oil.

(4) Sliding parts of inner mast and outer mast : Brush over leaked oil.

(5) Sliding parts of fork and finger bar : Brush over grease.

### 7) CHECK FOR THE OIL LEVEL OF THE DRIVING GEAR CASE

Check for the oil level by taking out the plug provided front side of the gear case.

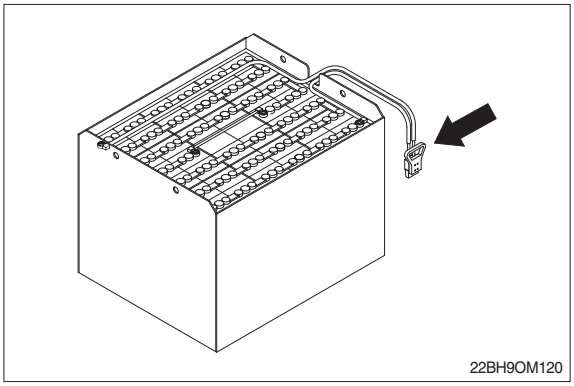



### 8) EXTERNAL APPEARANCE CHECK OF THE VEHICLE

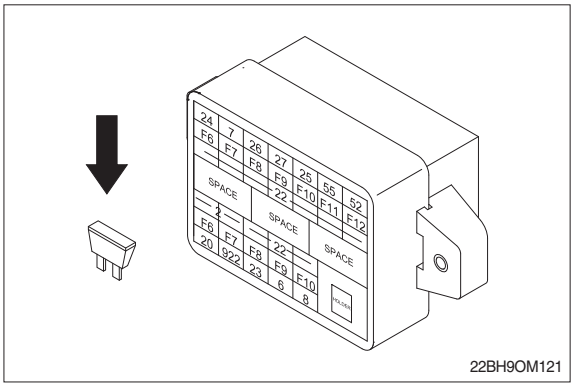
Check for the external appearance of vehicles. If any defect is found immediately contact the service station.

### 9) FUSE REPLACEMENT

(1) Disconnect the battery connector.




(2) Remove the blown fuse and replace with a new one.




※ The blown fuse must be replaced with a fuse of the same capacity. When the fuses are often blown out contact the service station for inspection. Never use a conductor for a fuse.

### 10) 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.**

### 11) LIFT CHAIN INSPECTION AND MEASUREMENT

Inspect and lubricate the lift chains every PM (500 hours). When operating in corrosive environments, inspect the chains at short intervals. During the inspection, check for the following conditions :

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

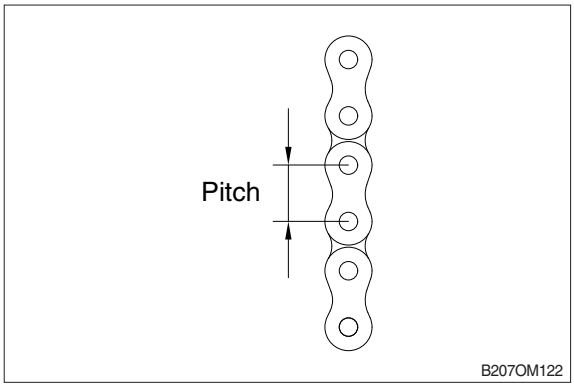
(2) When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

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

### 12) 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 lift 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

### 13) LIFT CHAIN WEAR AND REPLACEMENT CRITERIA




All chains must be replaced if any link has wear of 3% or more, or if any of the damaged conditions noted 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.**

## 10. 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 and maintenance problems. Check for loose fasteners and fittings.
- Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

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

- Inspect the truck for any sign of external leakage: drive axle fluid etc.
- Check for hydraulic oil leaks and loose fittings.

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

- Be sure that the driver's overhead guard, load backrest extension and safety devices are in place, undamaged and attached securely.

Then check all of the critical components that handle or carry the load.

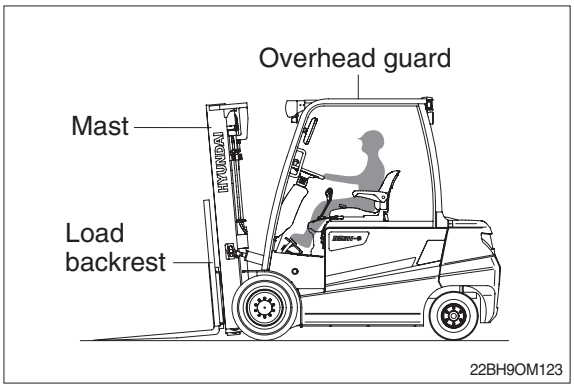
### 1) OVERHEAD GUARD

Check the overhead guard for damage. Be sure that it is properly positioned and all mounting fasteners are in place and tight.

### 2) LOAD BACKREST

Check the load backrest for damage. Inspect the welds on the carriage and load backrest for cracks.

Be sure that the mounting fasteners are all in place and tight.




### 3) MAST ASSEMBLY

Inspect the mast assembly : Rails, carriage rollers, lift chains, lift cylinders 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, any damaged or loose rollers and rail wear (metal flaking). Inspect all lift line hydraulic connections for leaks.

### 4) LIFT CHAIN

Carefully check the lift chains for wear, rust, corrosion, cracked or broken links, stretching, etc.. Check that the lift and carriage chains are adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight.

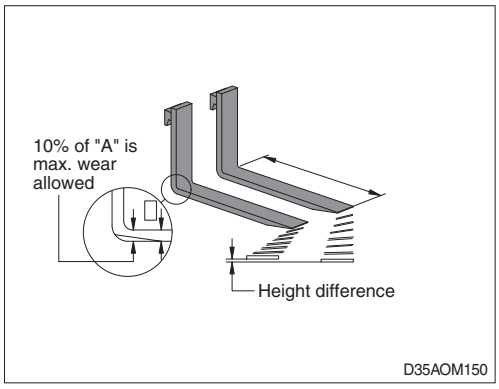
**△ Masts and lift chains require special attention to maintain them in safe operating condition.**

- **Mast can drop suddenly. Look at the mast, but keep hands out.**
- **Lift chain repairs and adjustments should be made by trained service personnel.**

## 5) FORKS

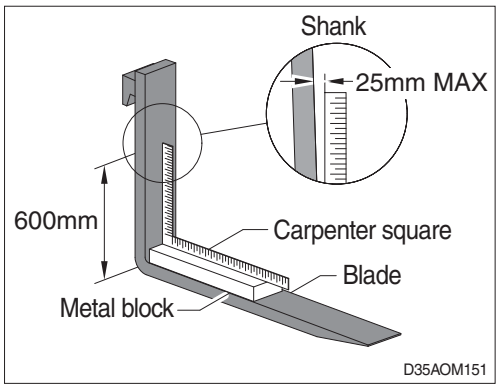
Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

| Model | Fork length (mm) | Height difference (mm) |
|---|---|---|
| All | equal or below 1500 | 3 |
| | above 1500 | 4 |




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

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

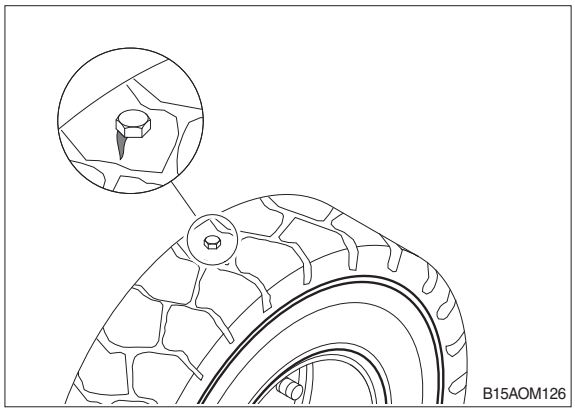



**※ If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.**

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

## 6) WHEELS AND TIRES

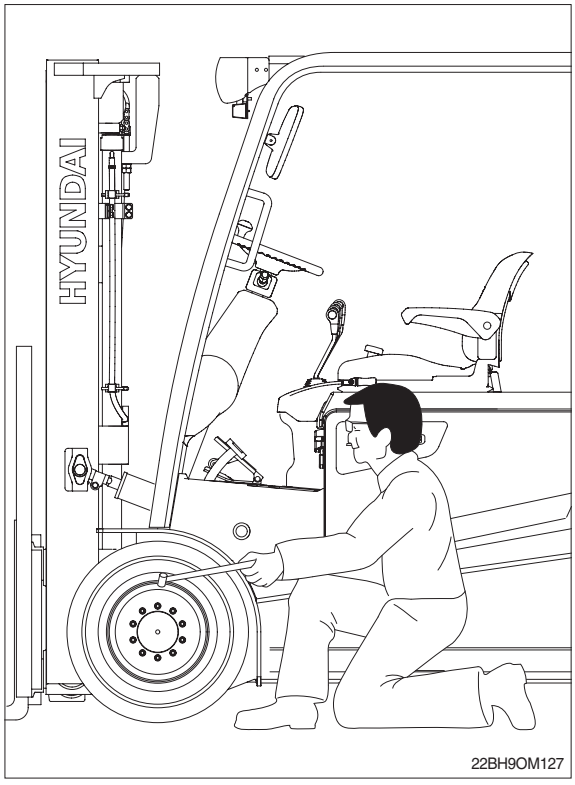
Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or **chunking out**.



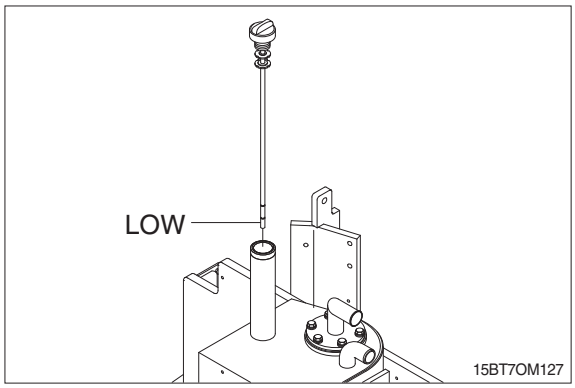

Check all wheel lug nuts or bolts to be sure none of them is loose or missing. Replace missing bolts or lug nuts. Torque loose or replaced items to specifications.

⚠ Check tire pressure from a position facing the tread of the tire, not from 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.

| Description | | Air pressure | | |
|---|---|---|---|---|
| | | bar | kgf/cm$^2$ | psi |
| 22/25/30BH-9 | Front | 9.0 | 9.2 | 131 |
| | Rear | 10 | 10.2 | 145 |
| 35BH-9 | Front | 9.7 | 9.9 | 141 |
| | Rear | 10 | 10.2 | 145 |



## 11. CHECKING THE HYDRAULIC FLUID




Check the hydraulic sump tank fluid level. Correct fluid level is important for proper system operation. Low fluid level can cause pump damage.

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 upright in a vertical position and lower the fork carriage fully down. Pull the dipstick out (under 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.**

※ **When checking hydraulic oil, make sure you use a clean wiper and do not let contaminants get on the dipstick or in the sump.**

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

## 12. CRITICAL FASTENER 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.

Check critical items, including :

- Drive axle mounting
- Drive and steering wheel mounting
- Counterweight mounting
- Load backrest extension
- Overhead guard
- Tilt cylinder mounting & yokes
- Mast mounting & components

Refer to「8. SPECIFICATIONS」for critical tightening torque value.

## 13. AIR CLEANING THE TRUCK

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. A clean condition helps prevent fires and helps the truck run cooler.

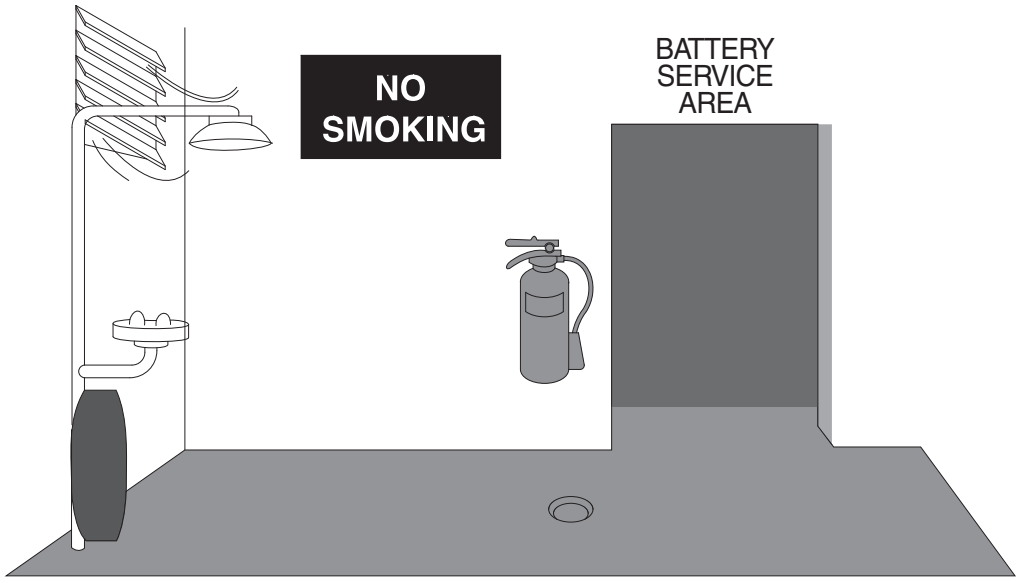
**Lift trucks should be air cleaned at every PM interval and more often if needed.**

Use an air hose with special adapter or extension having a control valve and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 30 psi (207 kPa), maximum. (OSHA requirement.)

**⚠ Wear suitable eye protection and protective clothing.**

Air clean : mast assembly; drive axle; battery; cables; switches and wiring harness; drive and hydraulic motors; and steering axle, steering cylinder and linkage.

## 14. ELECTRIC TRUCK BATTERY MAINTENANCE




B15AOM128

Battery charging installations must be located in areas designated for that purpose. These areas must be kept free of all non-essential combustible materials.

Facilities must be provided for :

- Flushing spilled electrolyte.
- Fire protection.
- Protecting charging apparatus from damage by trucks.
- Adequate ventilation for dispersal of fumes from gassing batteries.

When handling acid concentrates greater than 50 percent acid (above 1,400 specifics gravity), an eye wash fountain must be provided.

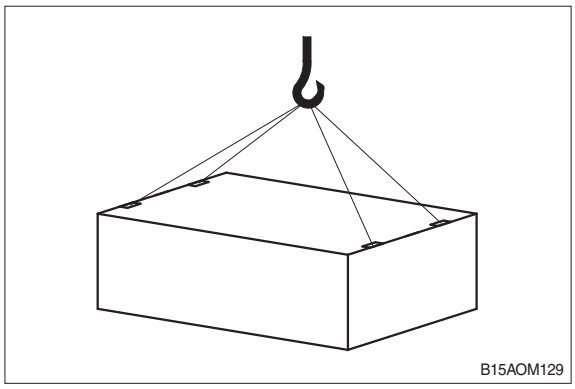
A conveyor, overhead hoist or equivalent material handling equipment must be provided for handling batteries.

**⚠ Electric truck batteries are heavy and awkward to handle. They are filled with a very hazardous chemical solution. On charge, they give off hydrogen and oxygen which, in certain concentrations, are explosive. And they are costly. Before you remove, service or install a truck battery, carefully read the following recommendations and instructions.**

## 15. BATTERY HANDLING

1) Change (remove) or service storage batteries only in an area designated for this purpose.
2) Be sure this area has provisions to flush and neutralize spillage, to ventilate fumes from gassing batteries and for fire protection.
3) This area should be equipped with material-handling tools designed for removing and replacing batteries, including a conveyor or overhead hoist. Use lift hooks that have safety latches.
4) Always use a special lifting device such as an insulated spreader bar to attach the hoist to the battery. The width of the spreader bar hooks must be the same as the lifting eyes of the battery, to prevent damage to the battery. If the spreader bar hooks are movable, carefully adjust the position (width) of the hooks so that the pull is directly upward (vertical) and no side load or force (pressure) is exerted on the battery case. Be sure the lift hooks are the correct size to fit the lifting eyes of the battery.

5) If the battery does not have a cover of its own or has exposed terminals and connectors, cover the top with a non-conductive (insulating) material, e.g., a sheet of plywood or heavy cardboard, prior to attaching the lifting device.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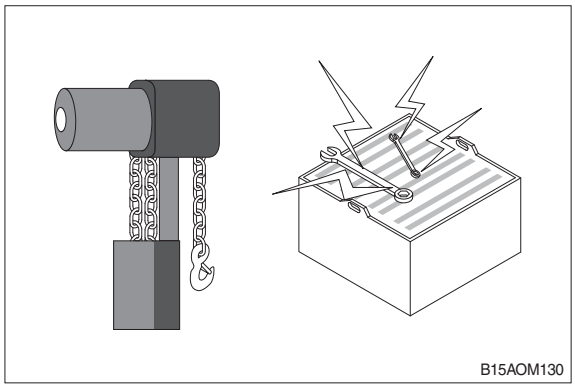
6) Chain hoists or power battery hoists must be equipped with loadchain containers to accumulate the excess lifting chain.
7) Keep all tools and other metallic objects away from the terminals.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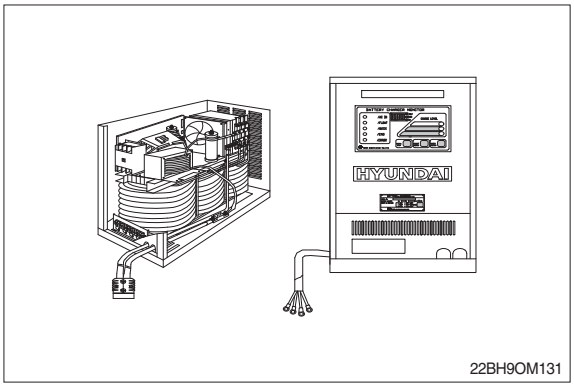
# 16. BATTERY CHARGING

The charger is of the automatic type so that only requirement for charging is to insert the plug, there being no need for maintaining watch .




## 1) INSTRUCTION

(1) When inserting the plug and connecting the battery connector, the input power lamp and the battery connection lamp light on and charge is started after a few seconds.
**The power is automatically cut off after completion of charge.**

**(2) Functions**

The function of indication lamps and switches.

① **Input power lamp** : Only lighting on during charge. Check the plug and input power if the lamp does not light on.

② **Battery connection lamp** : Lighting on when the charger and the battery are connected. Check the connector if the lamp does not light on.

③ **75% charge lamp** : Lighting on from 75% charge to completion.

④ **Full charge lamp** : Lighting on when charging is completed.

⑤ **Input disconnect lamp** : Lighting on when the input supply line is disconnected. At this time, check the input power.

⑥ **Over voltage lamp** : Lighting on when the manual stop button is pushed or charger voltage is above 105. At this time, unplug and disconnect the battery and charger connectors.

⑦ **Over current lamp** : Lighting on when the current is overload. At this time, unplug, open charger door and push the thermal relay button on the electromagnetic switch plug again after about 5 minutes and if this lamp lights on again stop charging and call A/S.

⑧ **Ordinary/Equalizing charge convert switch** : Place the switch to left side for ordinary charge and to right side for equalizing charge.

⑨ **Manual stop button** : During charge, push this button to stop charging.

⑩ **Reversion button** : After stop charging artificially or push the manual stop button, use this button to revert to charging.

⑪ **Voltage/current confirming button** : The indicator always show battery voltage and when push this button, the current is displayed in the indicator.

## 2) INSTALLATION OF THE CHARGER

(1) Place for installation
Install the charger at a place with good ventilation, no excessive temperature, low humidity and little dust.

(2) For the primary of the transformer, use the taps corresponding to the power voltage difference. For example, 218V (measured value)-220V (primary).

(3) Confirm the earth line of charging cable wire and make sure the earth line connects the earth of building.

## 3) ORDINARY CHARGE

(1) The procedure for charging is as follows :
① Remove the key of vehicle.
② Confirm the convert switch at ordinary charge position.
③ Connect the battery connector and the charging connector.
④ Make sure the pilot lamp lights.
(2) The procedure after completion of charging is as follows :
① Ensure that the full charge lamp lights on.
② Disconnect the battery connector from the charge connector.
(3) The procedure for stopping charging halfway is as follows :
① Push the manual stop button.
② Disconnect the battery connector from the charge connector.

## 4) EQUALIZING CHARGE

(1) Continual repetition of ordinary charge will create a certain amount of performance difference among the cells. For this reason, the battery is slightly overcharged from time to time to equalize the performance among the cells, that is, given equalizing charge.
Equalizing charge should be given in the following cases:
① A battery that is subject to daily repetition of charge and discharge. For the battery, equalizing charge should be performed once a month.
② When discharged over the designated capacity.
③ When recharge had been delayed after discharge.
④ When a short-circuit has occurred.
Equalizing charge is performed in the same way as in ordinary charge. However, place the ordinary/equalizing charge convert switch on the equalizing charge position.

△ **Excessive equalizing charge may shorten the life of the battery.**

## 5) SUPPLEMENTARY CHARGE

If one day operation cannot be completed with single charge, rest period should be utilized to charge and it is performed in almost the same way as ordinary charge.

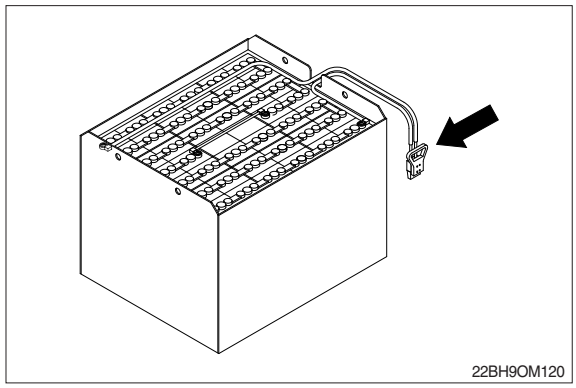
## 6) NOTICES

① When installing the charger confirm the input voltage and use the taps corresponding to the poser voltage in the area.
② Charge the battery immediately after use and once a month even in storage.
③ Take care not to let the battery specific gravity lower in winter time especially.
④ During charging, if electrolyte temperature of the battery in above 55℃ stop charging.
⑤ During charging, as an inflammable gas is generated out of the battery, particular care should taken for fire and ventilation.

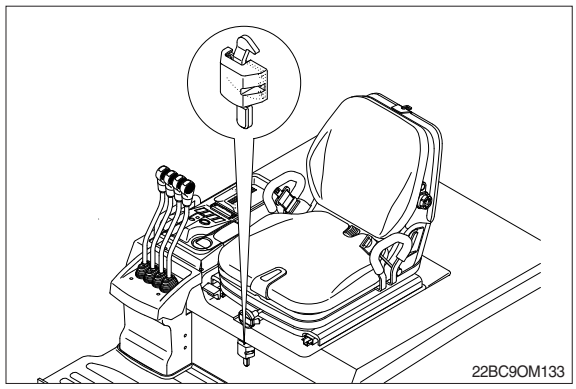
## 17. BATTERY REMOVAL FROM TRUCK

When the spare battery is used for continuous operation or it is required to check the battery, motor, etc., remove the battery through the following procedure:

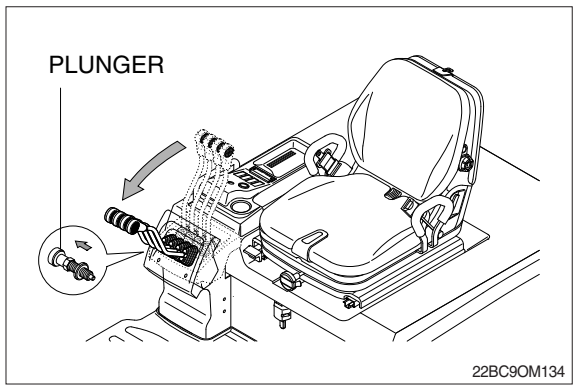
1) Disconnect the battery connector.



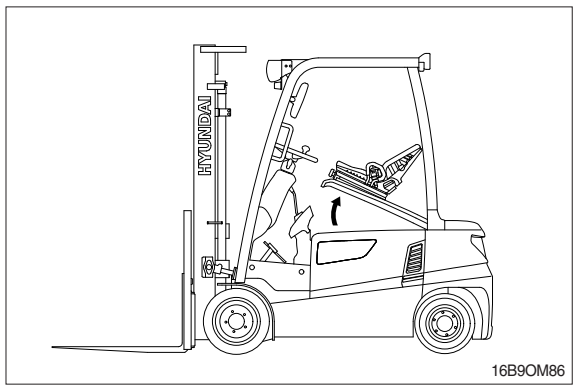

2) Release the battery cover latch.



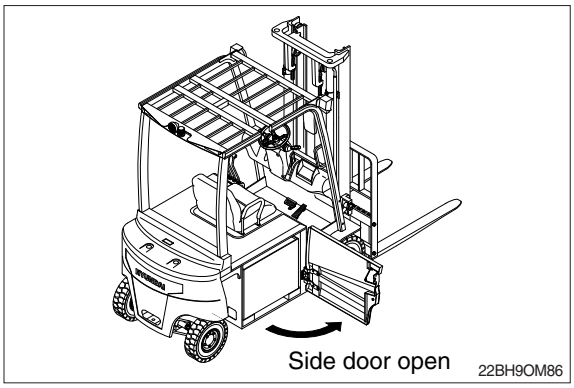

3) Pull the plunger and tilt the levers forward.



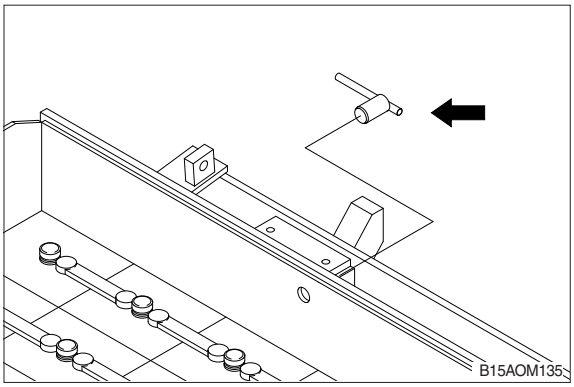

4) Open the battery cover.



4-1) Open the side door. (SBR Type, Option)

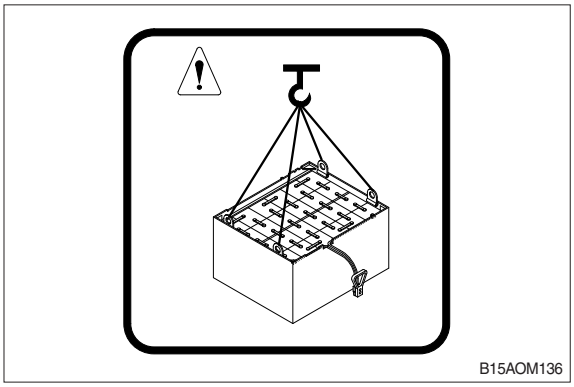



5) Remove the battery stopper.




6) Put down the battery with fork lift or chain block by hang up hook at 4 links which located in right and left of the battery.

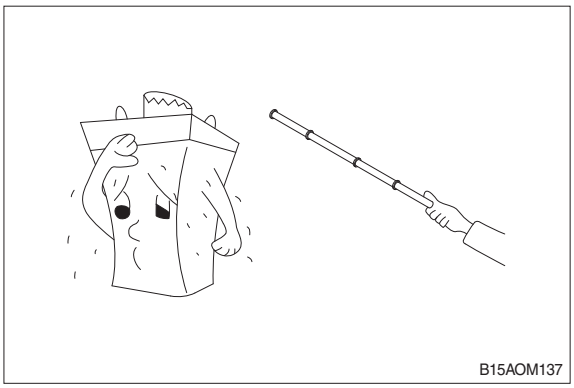
※ **When installing the battery, follow the above steps in reverse order.**



## 18. BATTERY CLEANING AND CARE

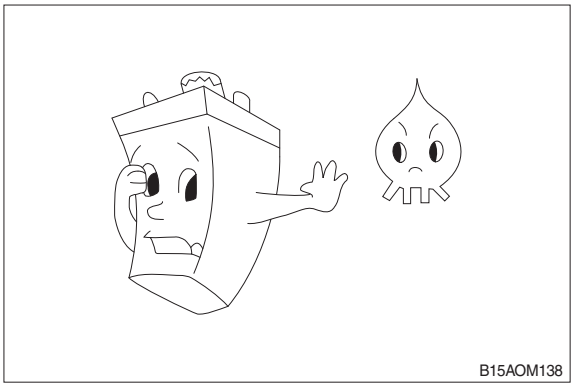
### 1) AVOID OVER-DISCHARGE

If used until the vehicle can no longer run, battery life will be shortened. If the battery capacity indicator's red lamps turns on at on load lift, stop operation and charge the battery without delay.




### 2) INFLAMMABLE

In any case, keep fire away from the battery because it contains an inflammable gas.

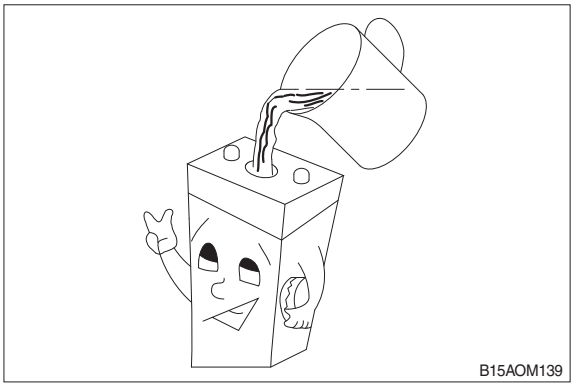



### 3) REFILLING DISTILLED WATER

Refill distilled water to maintain the electrolyte level to the specified height after finished equalizing charge, because electrolyte is lost through decomposition during charge and also through natural evaporation. It is unnecessary to refill dilute sulfuric acid into the battery except the case of losing electrolyte by running over.

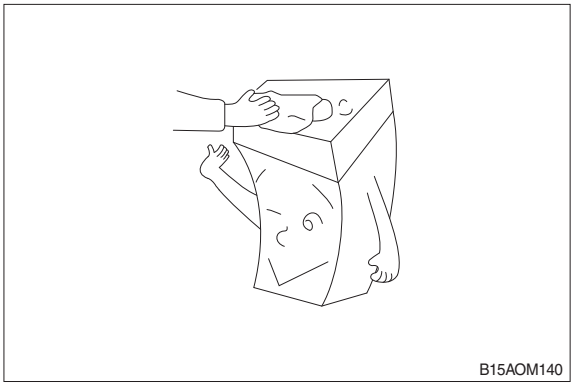
**⚠ Periodically inspect the electrolyte level and replenish it up to normal, if necessary.**

**In case the electrolyte level is above the normal, if can be overflew and cause the battery and machine damage.**




### 4) KEEP THE BATTERY CLEAN

Keep the battery, in particular the upper surface, clean and dry and keep the filler plugs tightly screwed.



## 19. NEW MACHINE OILS

New machine uses following lubricants and oils.

| Description | Specification |
|---|---|
| Gear oil | Mobilfluid 424 |
| Hydraulic oil | ISO VG46/VG68, Hyundai genuine long life hydraulic oil<br>ISO VG15, Conventional hydraulic oil★1 |
| Brake oil | Hydraulic oil ISO VG32 (AZOLLA ZS32) |
| Grease | NLGI No.2 |

- API : American Petroleum Institute
- SAE : Society of Automotive Engineers
- ISO : International Organization for Standardization
- NLGI : National Lubricating Grease Institute

★1 : Cold region
Russia, CIS, Mongolia

## 20. RECOMMENDED LUBRICANTS

| Service point | Kind of fluid | Capacity ℓ (U.S. gal) | Ambient temperature °C (°F) |
|---|---|---|---|
| | | | -50 (-58) / -30 (-22) / -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104) |
| Axle | Gear oil | 2.4 (0.63) | Mobilfluid 424 |
| Hydraulic oil tank | Hydraulic oil | 35 (9.2) | ★ISO VG 15<br>ISO VG 46<br>ISO VG 68 |
| Brake system | Brake oil | 0.5 (0.1) | ★HYDRAULIC OIL ISO VG10 (AZOLLA ZS10)<br>Hydraulic oil ISO VG32 (AZOLLA ZS32) |
| Fitting (Grease nipple) | Grease | 0.1 (0.03) | ★NLGI No.1<br>NLGI No.2 |

★ : Cold region
Russia, CIS, Mongolia