

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.
- (10) Check the hydraulic 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.**

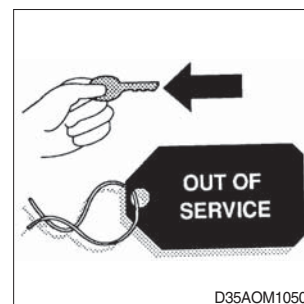
- (1) Test warning devices, horn, light, and other safety equipment and accessories.
- (2) Start the engine and be sure all controls and systems operate freely and return to neutral properly. Check the :
 - ① Gauges, meters, and indicator lights
 - ② Service brakes, inching pedal, and parking brakes
 - ③ Hydraulic controls: lift, tilt, and auxiliary (If installed)
 - ④ Accelerator pedal
 - ⑤ Forward-reverse lever
 - 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. REFUELING LPG TANK

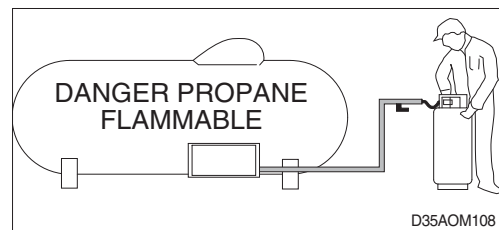
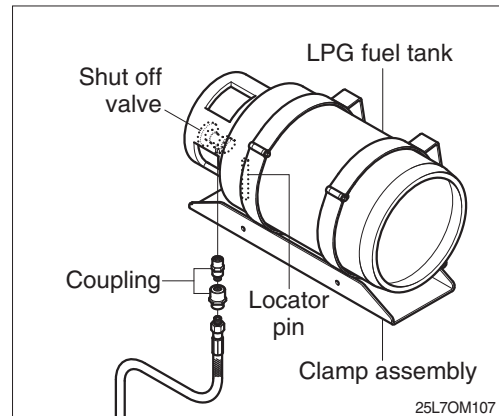
1) When changing LPG (liquefied petroleum gas) tank, follow these basic rules;

- ① Change only in well ventilated areas.
- ② Never allow open flames.
- ③ Turn the start switch to the OFF position.
- ④ Check for leaks.
- ⑤ Check condition of the O-ring.
- ⑥ Make sure tank is on locating pin.
- ⑦ Make sure tank latches are securely fastened.
- ⑧ Store tanks according to local fire codes.

⚠ Before disconnecting or connecting fuel line, make sure the shut off valve is closed.

2) If you refill LPG tank ;

- ① Make sure you know and understand the proper procedure for filling the LPG tank.
- ② If you have any questions on refilling LPG tank, please ask your supervisor.



⚠ LPG IS HEAVIER THAN AIR.

It settles on your clothes and the ground around you, displacing oxygen vital for breathing. Open flame can cause flash fires.

⚠ Check all connections for damage or leaks. If the truck will not start after you change tank, get a qualified mechanic to check the truck.

⚠ Stop the engine when refueling.

All lights and flames shall be kept at a safe distance while refueling.

3. RECOMMENDED SAFETY MAINTENANCE PROCEDURES FOR LPG-FUELED LIFT TRUCKS

▲ LPG is a combustible fuel that is heavier than air. Escaping gas may accumulate in low areas. The fuel cylinder should be mounted so that it does not extend outside the truck and should also be properly positioned by using the locating pin or key way.

- 1) The fuel valve should be turned off when the truck is not in service.
 - 2) Cast fittings should not be used in the LPG system.
 - 3) Use only Underwriters Laboratories or Factory Mutual listed LPG hose assemblies where pressure fuel lines are required.
 - 4) All pipe threaded fittings should be installed using an approved sealing compound.
 - 5) Fuel lines should be supported by clamps to minimize chafing and wear.
 - 6) The LPG solenoid valve should be wired to an automatic shut off switch (oil pressure or vacuum) to prevent leakage of gas in the event of the ignition is on without the engine running.
 - 7) Check the LPG solenoid or vacuum shutoff valve for leakage as follows.
 - (1) Turn fuel tank valve OFF, start and run engine until it stops.
 - (2) Install a 0 to 30 psi pressure gauge per instruction **A** or **B** :
 - A.** To primary test port of single units consisting of primary and secondary regulators.
 - B.** Between the primary and secondary stage regulators when the LPG system consists of two regulators.
 - (3) Turn the tank fuel valve ON. The pressure gauge should maintain a zero reading. If it does not, the solenoid valve or vacuum shutoff valve must be repaired or replaced. An odor is added to LPG to help indicate leaks. If you detect gas odor, you should turn OFF the fuel tank supply valve and engine. Remove all sources of ignition, and ventilate the area. Make all of the necessary repairs before you turn the fuel supply on. The complete LPG system should be inspected periodically. Check all hoses for wear, connections for leaks, and all parts for damage.
- ▲ Fuel hoses have a limited life expectancy. They should be checked for cracking and drying due to age. Hoses with visible signs of age should be replaced. Use only Underwriters Laboratories or Factory Mutual listed LPG parts for replacements.**
- ▲ Service work should be performed by qualified personnel only.**

4. ENGINE OIL SERVICE INTERVAL AND MANAGEMENT

It is the operator's responsibility to check its condition and be sure it is safe to operate. Please check engine oil condition periodically.

▲ Daily check

- Engine oil should be checked once a day before operation.

▲ Periodic check

- Service should be done whichever comes first from operating hours or usage period.
- Be sure to use prescribed engine oil.

Service item	Action	Service interval	
Engine oil and oil filter	Replace	General condition	Harsh condition
		Every 500 hours or 1 year	Every 250 hours or 6 months


※ This oil service interval can be different by engine models.

Harsh condition is as follows.

1. Repeated short operation (repeated cold operation)
2. Frequent driving in sandy or dusty places
3. When using excessive engine idle
4. Frequent driving on uphill and downhill roads
5. Frequent driving with rapid acceleration/deceleration or continuous high-load
6. When operating in salt, corrosion or low temperature conditions

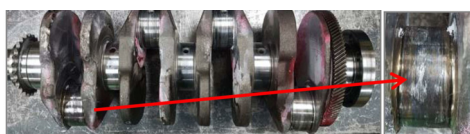
※ Problems with poor engine oil management

▲ Excessive or little engine oil filling

Engine oil quantity (lower)	① Damage on E/G moving parts with poor lubrication due to premature E/G oil deterioration  Crankshaft, camshaft, conrod bearing, piston scuffing, etc. ② Damage on moving parts due to aeration in E/G oil, etc	Oil level gauge unchecked after filling E/G oil
Engine oil quantity (over)	① Damage on after-treatment unit due to excessive blow-by gas ② Dieseling due to excessive blow-by gas ③ Damage (melting) on piston due to E/G oil flow into combustion chamber ④ Injector tip burnout and E/G hesitation due to abnormal combustion by E/G oil in combustion chamber	

※ This service interval is for R-engine model.

< Problem pictures >



< Crankshaft pin seizure >



< Connecting rod bearing seizure >



< Engine oil in combustion chamber >

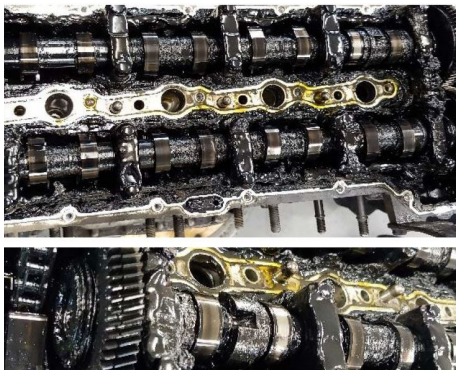


< Connecting rod broken >

⚠ Engine oil contamination (neglecting daily and periodic check)

Gelled	<ul style="list-style-type: none"> ① Excessive wear and seizure of turbocharger shaft bearings due to delayed oil supply to turbocharger ② Excessive wear and seizure of crankshaft main bearing ③ Excessive oil consumption due to piston scuffing and cylinder block bore scratches 	Checking and replacement not performed
Viscosity (high)	<ul style="list-style-type: none"> ④ Excessive wear and seizure of connecting rod bearings ⑤ Excessive wear and seizure of cam shaft bearings ⑥ Engine power reduction and hesitation due to poor autolash ⑦ Excessive chain noise due to poor timing chain tensioner ⑧ Wear and burnout due to lack of lubrication of timing chain lever, guide 	Water inflow etc

< Problem pictures >



< Contaminated and gelled engine oil >



< Excessive wear of moving parts >