Powered Industrial Truck (Forklift)

Operator Safety Training

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Section 1: Powered Industrial Trucks (Forklift)

Powered industrial trucks, commonly called forklifts or lift trucks, are used in many industries, primarily to move materials. They can be used to move, raise, lower, or remove large objects or a number of smaller objects on pallets or in boxes, crates, or other containers.

The hazards commonly associated with powered industrial trucks vary depending on the vehicle type and the workplace where the truck is used. Each type of truck presents different operating hazards. For example, a sit-down, counterbalanced high lift rider truck is more likely than a motorized hand truck to be involved in a falling load accident, because the sit-down rider truck can lift a load much higher than a hand truck. Workplace conditions also present different hazards. For example, retail establishments often face greater challenges than other worksites in maintaining pedestrian safety.

The best way to protect employees from injury also depends on the type of truck operated and worksite where it is being used. This book specifically provides information on OSHA's Powered Industrial Truck requirements [29 CFR 1910.178] and industry best practices addressing:

- Types & Fundamentals: The differing types and fundamentals of powered trucks
- Operating the forklift: The basic operating rules and safe work practices
- Understanding the Workplace: How workplace conditions can affect safe operation
- Training Assistance: Operator training required by OSHA

It is a violation of Federal law for anyone UNDER 18 years of age to operate a forklift or for anyone OVER 18 years of age who is not properly trained and certified to do so.

Section 2: Types & Fundamentals

This section reviews the classes of commonly-used powered industrial trucks. It also summarizes the major types of power sources used in powered industrial trucks and reviews safe practices for refueling and battery charging/changing operations. Finally, this section reviews the major parts of a powered industrial truck, including some of the potential hazards and possible solutions associated with each part.

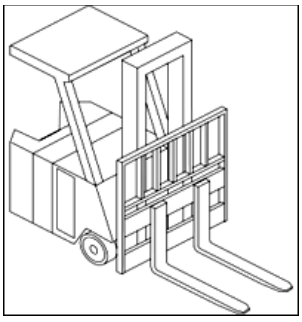
Types/Class

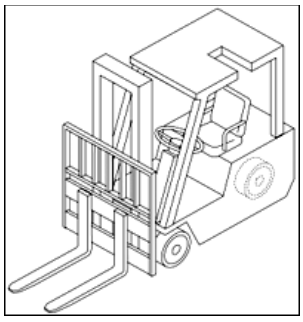
The following are classes of commonly-used powered industrial trucks. This classification does not include all powered industrial trucks covered by the OSHA standard [29 CFR 1910.178(a), 29 CFR 1910.178(b) and 29 CFR 1910.178(c)].

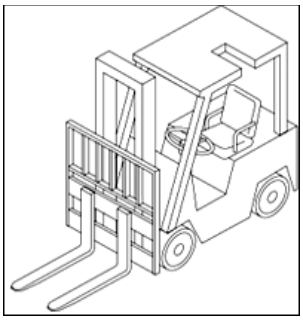
Each operator is required to be aware of the truck specifications on the nameplate and what they mean. If there is a special attachment, it must be listed on the nameplate.

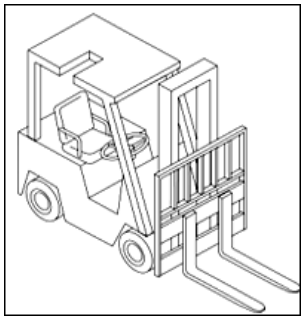
Class I: Electrical Motor Rider Trucks

The following are examples of Class I powered industrial trucks.


Lift Code 1: Counterbalanced Rider Type, Stand Up.

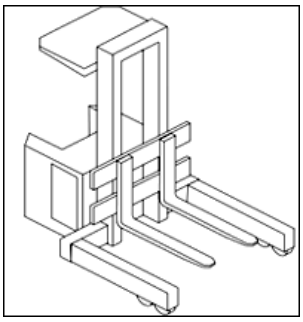

Lift Code 4: Three Wheel Electric Truck, Sit Down.

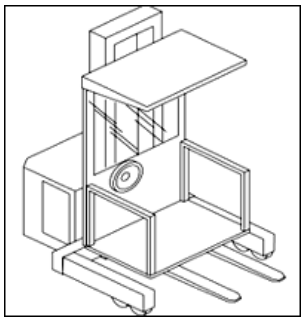

Code 5: Counterbalanced Rider, Cushion Tires, Sit Down

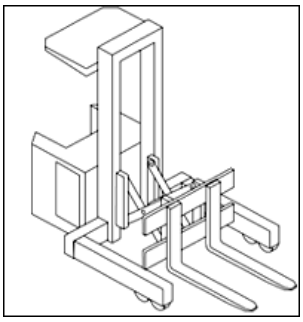

Lift Code 6: Counterbalanced Rider, Pneumatic or Either Type Tire, Sit Down.

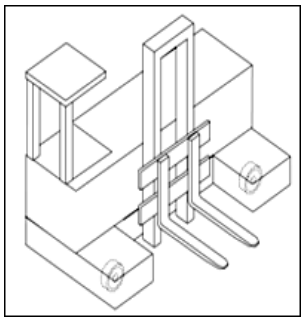
Class II: Electrical Motor Narrow Aisle Trucks

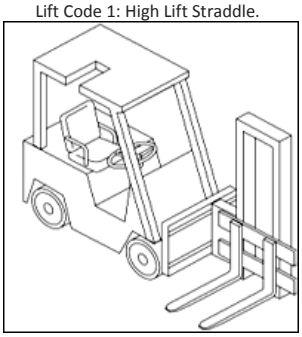
The following are examples of Class II powered industrial trucks.

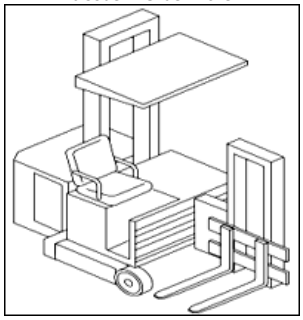

Lift Code 1: High Lift Straddle.

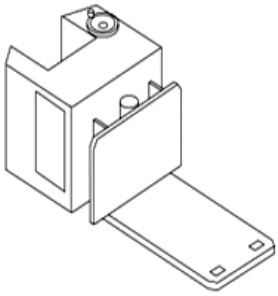

Lift Code 2: Order Picker.

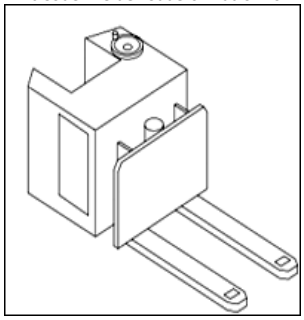

Lift Code 3: Reach Type Outrigger.


Lift Code 4: Side Loaders: Platforms.

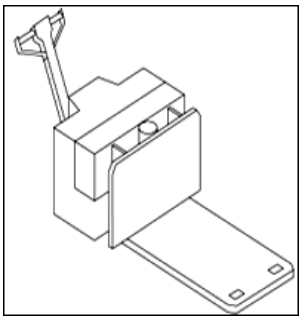

Lift Code 4: Side Loaders: High Lift Pallet.

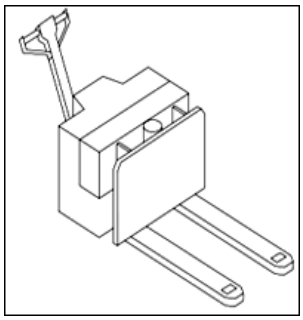

Lift Code 4: Turret Trucks.

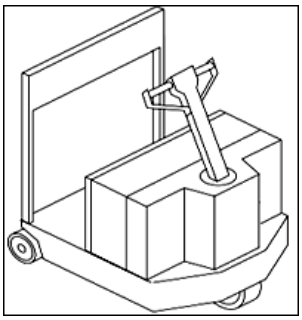

Lift Code 6: Low Lift Platform.

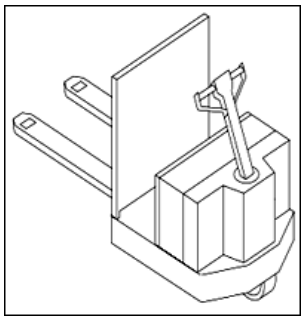

Lift Code 6: Low Lift Pallet.

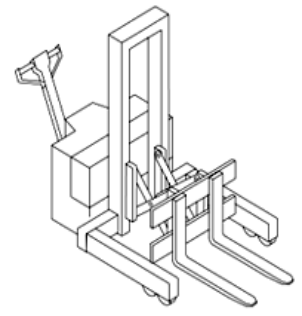
Class III: Electric Motor Hand Trucks or Hand/Rider Trucks

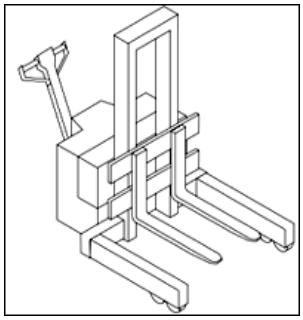

Lift Code 1: Low Lift Platform.

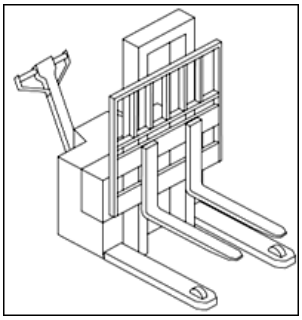

Lift Code 2: Low Lift Walkie Pallet.

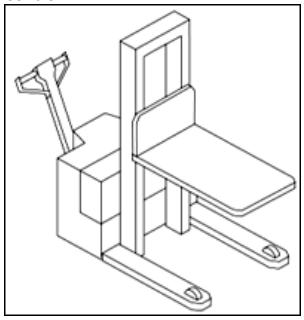

Lift Code 3: Tractors

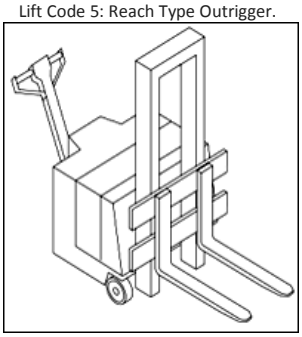

Lift Code 4: Low Lift Walkie/Center Control.

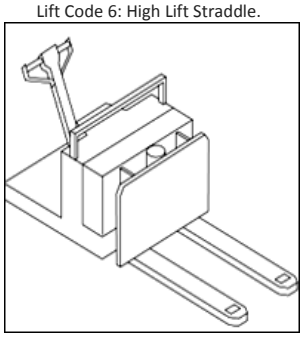

Lift Code 5: Reach Type Outrigger.


Lift Code 6: High Lift Straddle.


Lift Code 6: Single Face Pallet.

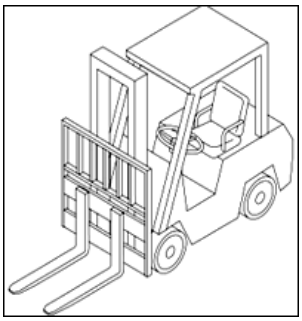

Lift Code 6: High Lift Platform.


Lift Code 7: High Lift Counterbalanced.


Lift Code 8: Low Lift Walkie/Rider Pallet and End Control.

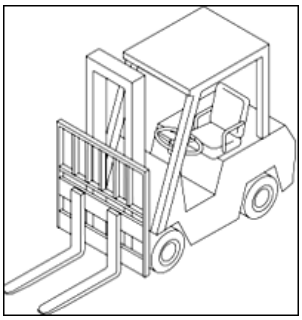
Class IV: Internal Combustion Engine Trucks (Solid/Cushion Tires)

The following are examples of Class IV powered industrial trucks.


Lift Code 3: Fork, Counterbalanced (Cushion Tire).

Class V: Internal Combustion Engine Trucks (Pneumatic Tires)

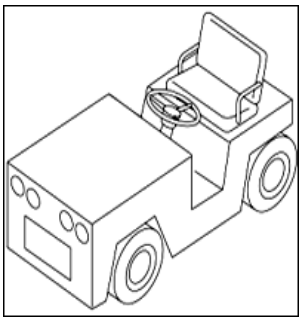
The following are examples of Class V powered industrial trucks.



Lift Code 4: Fork, Counterbalanced
(Pneumatic Tire)

Class VI: Electric and Internal Combustion Engine Tractors

The following are examples of Class VI powered industrial trucks.

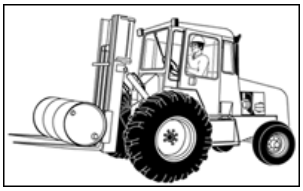


Lift Code 1: Sit-Down Rider
(Draw Bar Pull Over 999 lbs.)

Class VII: Rough Terrain Forklift Trucks

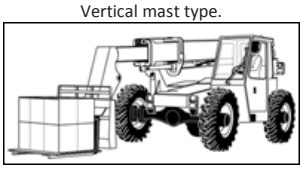
Class VII – Rough terrain forklift is a generic term used to describe forklifts typically intended for use on unimproved natural terrain and disturbed terrain construction sites. However, the term "rough terrain" does not imply that the forklift can be safely operated on every conceivable type of terrain.

There are three basic types of rough terrain forklift:



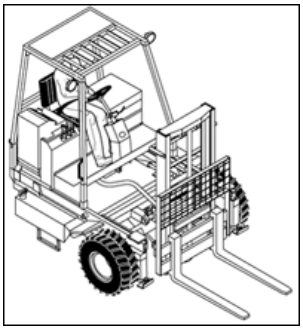
Vertical mast type.

This is an example of a ruggedly constructed forklift and is designed to be used primarily outdoors.



Variable reach type.

This is an example of a vehicle equipped with a telescoping boom, which enables it to pick and place loads at various distances and lift heights in front of the machine. The ability to reach out in front of the forklift allows the operator flexibility in the placement of a load.



Truck/trailer mounted.

This is an example of a portable self-propelled rough terrain forklift that is typically transported to the job site. It is mounted on a carrier to the back of a truck/trailer and is used to unload heavy items from the truck/trailer at the job site. Note that not all truck/trailer mounted forklifts are rough terrain forklifts.

Power Sources

The two main power sources for powered industrial trucks are internal combustion, which uses a traditional engine that runs on liquid petroleum gas (LPG), compressed natural gas (CNG), gasoline, diesel, or other fuel, and electric, which uses an on-board battery. This section provides information on these power sources, including some of the potential hazards and possible solutions associated with their use and with refueling and battery charging/changing operations.

Other power sources that may become more widespread in the future include fuel cells and hybrid systems. Hydrogen fuel cells will have zero emissions and quiet operation plus the ability to be refueled as quickly as gasoline engines. Hybrid systems will use a combination of fuel cells and batteries.

Internal Combustion (IC)

Forklifts powered by internal combustion engines run on a variety of fuels, including gasoline, diesel fuel, liquid petroleum gas (LPG), and compressed natural gas. Forklifts with internal combustion engines can be quickly refueled but require regular maintenance checks for leaks of fuel or oil and worn parts to keep systems working properly. Forklifts powered by internal combustion engines are also used indoors, although this may increase exposure to exhaust and noise.

Figure 1. Internal combustion engine used in a forklift.

The most widely used forklifts have an internal combustion engine powered by fuels that include gas, liquid petroleum, diesel fuel, and compressed natural gas. Forklifts with internal combustion engines can be quickly refueled but require regular maintenance checks for leaks of fuel or oil, worn parts requiring replacement, and to keep systems working properly. Newer forklifts with internal combustion engines have on-board sensors that monitor and adjust emissions and have catalytic converters that help reduce emissions.

Potential Hazards

A fork that shows any of the following defects shall be withdrawn from service and discarded or properly repaired:

- Exposure to engine exhaust containing carbon monoxide. If the engine is not properly combusting fuel, the exhaust may contain high levels of carbon monoxide.
- Exposure to spills and leaks of fuel and oil.

Requirements and Recommended Practices

- Do not operate in a poorly ventilated area where vapors can concentrate.
- Carefully wash away or completely evaporate spillage of oil or fuel.
- As part of the pre-operation inspection, check all fluid levels, including oil, water, and hydraulic.
- Check for leaks from the hydraulic cylinder, the battery, and the fuel system.
- Check the exhaust color for incomplete combustion. For example, black smoke may be an indication of incomplete combustion.
- Check and report unusual noises or excessive vibration.

Figure 2. Operator refueling diesel-powered forklift.

Refueling: Gasoline and Diesel

Liquid petroleum gas (LPG) is a commonly used fuel for forklifts. It is a safe fuel when handled properly. When handled improperly, it can cause serious injury or death.

Potential Hazards

- LPG vapor is heavier than air and will seek the lowest lying area. If not adequately dissipated, it will collect in pockets and possibly ignite when exposed to a heat source.
- LPG is extremely flammable.
- LPG is extremely cold when exposed to the atmosphere. If your skin is exposed to LPG, you can get frostbite.


Figure 3. Operator changing LPG container.

Requirements and Recommended Practices

- Do not refuel LPG-powered trucks in confined areas where LPG vapors could collect if a leak occurs.
- Do not leave LPG-powered trucks near heat sources, stairways, exits, or other egress areas.
- When parking LPG-powered trucks for a long period of time, turn the service valve off.
- Only trained and authorized personnel should replace LPG containers.
- Follow proper procedures for storing and handling liquid petroleum gas. [29 CFR 1910.110]

Electric


Figure 4. Electric forklift.

Electric-powered forklifts are most commonly used indoors in warehouses. Unlike internal combustion forklifts, electric forklifts are quiet and generally non-polluting but present other serious hazards that must be addressed.

Electric Forklifts

Electric forklifts produce zero emissions, virtually eliminate the hazard of carbon monoxide poisoning, and run more quietly than internal combustion forklifts. However, electric forklifts present other serious hazards that must be addressed.

Potential Hazard

- Electric forklifts are powered by large lead-acid batteries, which must be routinely charged. The hazards and recommended practices for charging and changing batteries are reviewed below.

Requirements and Recommended Practices

- Designate an area for the purpose of battery charging.
- Make sure that the forklift is charged before using.
- Recognize that heavy loads drain the battery more quickly.

Figure 5. Large installations should have a plumbed drench shower and an eyewash.

Battery Charging Area

A properly equipped battery charging area will have:

- No smoking.
- Warning signs posted.
- Adequate fire protection.
- Ample and readily available water supply for flushing and neutralizing spilled electrolyte.
- An eyewash able to provide a 15 minute flow. (Figure 5) Note: For large installations, there should be a plumbed drench shower and an eyewash.
- A phone or other means of communication in the event of an emergency.
- Adequate ventilation to avoid the build up of hydrogen gas during battery charging.
- Soda ash or other neutralization materials in the immediate area.
- A dry chemical, CO2 or foam fire extinguisher.
- Means to protect charging apparatus from damage from trucks.

Figure 6. The battery charge gauge indicates over-discharging.

Battery Charging and Changing Procedures

An electric forklift is designed to operate for one shift and then be charged on the next shift or overnight. Some employers routinely change batteries instead of charging them in the vehicle. The discharged battery is removed from the forklift and a charged battery is installed in its place.

Only trained personnel should charge and change batteries in electric forklifts. In addition to training in battery changing and charging procedures, these employees should be trained on emergency procedures in the event of an acid splash, including how to use eyewash and shower facilities.

Potential Hazards

- Batteries are very heavy.
- Batteries contain sulfuric acid that is highly corrosive and could be splashed on personnel servicing or changing batteries.
- Toward the end of the battery charging process, batteries can give off highly explosive hydrogen fumes.
- Contact with battery cells can cause electrical short circuits, which can burn unprotected skin.

Figure 7. Electric forklift properly positioned while changing battery.

Requirements and Recommended Practices

Always follow your facility's specific safety procedures. Follow the recharger manufacturer's recommendations for attaching and removing cables and for proper operation of your equipment.

Figure 8. Battery hoisted from forklift compartment with

- Properly position trucks and apply brakes before attempting to change or charge batteries. (Figure 7) [29 CFR 1910.178(g)(8)]
- Use a lifting beam or equivalent material handling equipment when lifting the battery. (Figure 8) Do not use a chain with two hooks. This may cause distortion and internal damage. [29 CFR 1910.178(g)(4)]
- Charge batteries in the designated battery charging area. (Figure 9) [29 CFR 1910.178(g)(1)]
- Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries. [29 CFR 1910.178(g)(2)]
    - NOTE: OSHA Directive,STD 1-11.4 - 29 CFR 1910.178(g)(2); Battery Charging Stations for Fork Lifts and Other Industrial Trucks, 10/30/1978 states: "**Battery charging**" areas where power industrial truck batteries are charged only--no maintenance is performed, batteries are not removed from the trucks and no electrolyte is present in the area--are not subject to the requirement of [29 CFR 1910.178(g)(2)]. The charging areas shall be in compliance with [29 CFR 1910.178(g)(1), (8), (9), (10), (11) and (12)]. Personal protective equipment shall be used when and where required.

Figure 9. Battery charging area.

- When charging batteries, pour acid into water. Never pour water into acid. [29 CFR 1910.178(g)(7)]
- Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat. [29 CFR 1910.178(g)(9)]
- Prohibit smoking in the charging area. [29 CFR 1910.178(g)(10)]
- Take precautions to prevent open flames, sparks, or electric arcs in battery charging areas. [29 CFR 1910.178(g)(11)]
- Remove all metallic jewelry before recharging. Tools and other metallic objects shall be kept away from the top of uncovered batteries. [29 CFR 1910.178(g)(12)]
- Wear personal protective equipment (face shield, safety goggles, neoprene or rubber gloves and apron). [29 CFR 1910.132]
- Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use. (Figure 10) [29 CFR 1910.151(c)]

Figure 10. Eyewash station.

- Check the electrolyte level before recharging. Record the specific gravity with the hydrometer in the service log. Check the pilot cell.
- Check the water level. Do not add water prior to recharging. Record in service log.
- Check the voltage. If the battery has sealed vents, do not recharge with a current greater than 25 amperes.
- Unplug and turn off the charger before connecting or disconnecting the clamp connections.
- Attach the positive clamp (+, usually colored red) to the positive terminal first and then the negative clamp (-, usually colored black) to the negative terminal, keeping the proper polarity.

- Turn off the charger if the battery becomes hot or the electrolyte fluid comes out of the vents. Restart charging at a lower charging rate.
- Check water level after charging. Add distilled water or de-ionized water if water level is below level indicator. Record in service log.
- Return battery to forklift with lifting beam and secure in place after charging. [29 CFR 1910.178(g)(4) and (g)(5)]
- Check the indicator on the hour meter to see that battery is fully charged.

Figure 11. Discharging a battery beyond the manufacturer's recommended discharge level over works the battery making recharging more difficult and may damage or ruin the

Battery Maintenance

Under normal operating conditions, power industrial truck forklift batteries can be expected to remain in service for 2,000 work shifts or charge/discharge cycles. Implementing a proper battery maintenance program can increase the life of the batteries and help protect employees. Battery failure could lead to mechanical breakdowns and possible accidents involving forklift operators and/or other personnel.

- Do not continue a battery in service merely because it continues to deliver power.
- Do not exceed the service hours in the manufacturer's recommendations.
- Do not over charge or under charge batteries.
- Avoid discharging batteries beyond the manufacturer's discharge level. This can result in permanent battery damage and shorten battery life considerably.
- Warning signs of a low battery include slow starting, dim headlights, and the ammeter indicating discharge at high RPM.
- Recycle or properly dispose of batteries. Spent batteries are a hazardous waste unless they are properly reclaimed at a lead smelter or battery recycler.

Figure 12. Water is added at the end of the charge by operator wearing PPE.

Sulfuric Acid Splash

Battery acid is dilute sulfuric acid. Sulfuric acid is a clear, colorless liquid with an acrid smell. It is corrosive and can cause severe burns.

Potential Hazards

- Acid splash, especially to the eyes.
- Acid spill.
- Corrosive burns.

Requirements and Recommended Practice

- Wear personal protective equipment:
  - Wear chemical splash goggles or full face shield with safety glasses equipped with side shields.
  - Wear acid-proof gloves made of rubber or neoprene.
  - Wear acid-resistant clothing or rubber or neoprene apron.
  - Wear acid-resistant safety shoes or boots.

- Employees who wear contact lenses should wear chemical splash goggles during battery charging. In the event of an acid splash to the eyes, the contact lens could hold the acid to the eye, making it more difficult to flush the acid away and causing more serious damage to the eye.

Emergency Procedure in the Event of an Acid Splash

These are sample procedures. Your facility may have its own safety procedure, requiring employees to contact their supervisors or medical personnel either on-site or off-site. Consult the Safety Data Sheet for additional information.

Figure 13. Acid splash.

If the acid splash is to the eyes:

1. Remove safety glasses and flush eyes with clean water in eyewash for 15 minutes.
2. Seek medical attention immediately.
3. Report the incident to your supervisor.

If the acid splash is to the skin:

1. Remove acid soaked clothing immediately.
2. Flush acid contacted skin with clean water for 15 minutes.
3. Seek medical attention immediately if redness or burns occur.
4. Report the incident to your supervisor.

If the acid is swallowed and the victim is conscious:

1. Remove victim from battery area and provide fresh air.
2. Wash out mouth with large amounts of water.
3. Give victim milk to drink.
4. Do not try to induce vomiting.
5. Monitor victim's breathing and condition. Start CPR if victim stops breathing.
6. Use NIOSH approved acid mist respirator, if OSHA PEL (1.0 mg/m3) is exceeded or if respiratory irritation occurs.
7. Seek immediate medical attention.
8. Report the incident to your supervisor.

If the acid is swallowed and the victim is unconscious:

1. Remove victim immediately from battery area and provide fresh air.
2. Start CPR if victim stops breathing.
3. Provide oxygen, if properly trained personnel are available.
4. Seek immediate medical attention.
5. Report the incident to your supervisor.

Sulfuric Acid Spill (In the event of battery breakage)

1. Neutralize the spill with soda ash or baking soda. Use 1 pound of baking soda to 1 gallon of water.
2. The acid reaction is complete when it stops fizzing. Make certain that the acid is neutralized by checking the pH is neutral between 6 and 8.

Figure 14. Sulfuric acid spill.

3. Absorb neutralized material onto clay or other absorbent material, if necessary. If the spill is very large, contain the spill with earth or clay dikes.
4. Brush under the battery connectors and remove all grime. Rinse the residue from the battery with clean water with a hose.
5. Report the incident to your supervisor.
6. Determine proper disposal by contacting local environmental authorities.

Hydrogen Gas

Flammable hydrogen gas is always present during battery recharging. Hydrogen gas is potentially explosive if allowed to accumulate in a closed area.

Potential Hazard

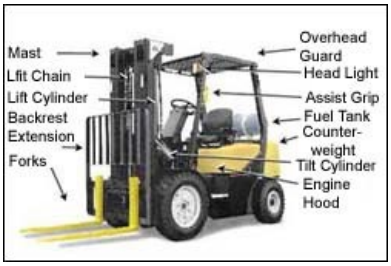
- Ignition/explosion of accumulated hydrogen gas.

Requirements and Recommended Practice

- Post no smoking signs.
- Use non-sparking tools.
- Prevent open flames, sparks, or electrical arcs in the battery charging area to minimize the danger of explosion.
- Provide adequate ventilation.
- Open the battery cover when charging, so that the hydrogen gas can vent better. This is especially important in confined areas where the danger of accumulation is greatest.

Parts

The following are the major parts of a forklift. This discussion focuses on the most common types of forklifts. Be sure to read the operator's manual for your forklift and follow the manufacturer's recommendations.



Mast and Carriage

The mast is the vertical assembly that does the work of raising, lowering, and tilting the load. The mast supports the carriage that allows its vertical movement with the hydraulic lift. The carriage is made of flat metal plates that move along the mast by chains or are directly attached to the hydraulic cylinder. The hydraulic lift cylinder supplies the power to lift the load.

Figure 15. Reach truck with mast extended.

Mast Types

There are a number of mast types:

1. **SIMPLEX:**

   The features of a simplex mast are:

   - Single stage mast.

- Limited Free Lift (4-6") Free lift is the distance the forks go up before the mast is extended.
- **Recommended Use**: In loading and unloading trucks and in areas where overhead clearance is a problem.

2. **DUPLEX:**

The features of a duplex mast are:

- Two stage mast.
- Has greater Free Lift (50-60") than the simplex mast.
- Can load and unload higher-tiered stacks than simplex.

3. **TRIPLEX:**

The features of a triplex mast are:

- Three stage mast.
- Has same Free Lift (50-60") as duplex mast but extends further.
- Can load and unload higher-tiered stacks than simplex or duplex.

Figure 16. Triplex mast in narrow aisle rider reach truck. Note that the forklift is removing stock from a rack. Foot and truck traffic in the opposite aisle way should be controlled to prevent injury from falling materials.

4. **QUAD:**

The features of a quad mast are:

- Four stage mast.
- Has same Free Lift (50-60") as duplex or triplex mast but extends further.
- Can load and unload higher-tiered stocks than the duplex or triplex, but requires precautions at its highest lifting heights.

Note: The lifting capacity of the forklift decreases as its load is raised. For more information, see Load Handling and Narrow Aisles.

Visibility

Mast configuration can affect the operator's visibility. Newer mast designs, such as those that use two side cylinders, can provide substantially improved visibility compared with some older mast designs that have a single central cylinder. (Figures 17 and 18)

The operator should travel with the load trailing and/or use a spotter whenever necessary to achieve adequate visibility.

Figure 17. Mast with central cylinder

Figure 18. High visibility mast with

Forks

Figure 19. Forks.

The forks (also known as tines or blades) carry the load. They have a heel where they curve upward and an upright shank where they are attached to the carriage.

Potential Hazards

A fork that shows any of the following defects shall be withdrawn from service and discarded or properly repaired:

- Surface cracks.
- Blade or shank are not straight.
- Fork angle from blade to shank is not straight.
- Difference in height of fork tips.
- Positioning lock not in working order.
- Fork blade or shank wear.
- Fork hooks wear.
- Fork marking not legible.

Figure 20. Damaged fork.

Requirements and Recommended Practices

- Do not operate the forklift if the forks show any of the defects listed above.
- Always inspect forks during the pre-operation inspection. Repair or replace the forks if they are not in good working order. Replacement parts shall be equivalent as to safety with those used in the original design. [29 CFR 1910.178(q)(5)]
- Do not operate a forklift from which the positioning lock has been removed or is inoperable. As the forklift travels, the positioning lock holds the forks in position and prevents sliding of the forks and loss of the load.

Additional Information

- Fork inspection requirements for powered industrial trucks. OSHA Standard Interpretation, (October 22, 1999).

Figure 21. Carton clamp carrying cotton bales.

Attachments

Powered industrial trucks often use various attachments in place of traditional forks. These attachments increase the versatility of the truck, but can present important safety considerations, including stability, capacity, and visibility.

Some common attachments are:

- Slipsheet attachments which avoid the use of pallets. (Figure 22)
- Sideshifters shift the forks right and left. (Figure 23)
- Container handlers designed to lift shipping containers.
- Carton clamps equipped with a pressure valve to squeeze the load.
- Cotton or pulp bale clamps that grab and hold bales.
- Paper roll handlers.
- Barrel clamps. (Figure 24)
- Rotators that grab and rotate the load.
- Extending or telescoping forks such as in reach and turret trucks. (Figure 25)
- Personnel platforms specially designed for lifting personnel.

Figure 22. Slipsheet attachment eliminates need for pallets.

Figure 23. Side-shifter controls enable the forks to be moved right and left.

Operators must be trained in the proper use of attachments because they alter the performance of the forklift. Attachments affect the truck's performance by changing its center of gravity, visibility, and capacity.

Potential Hazards

- Overloading. The weight of the attachment reduces the lifting capacity of the truck.

- Tipover and falling loads. The attachment increases the load center by moving the load further away from the balance or fulcrum point.

Figure 24. Forklift equipped with a barrel clamp attachment.

Requirements

- Train operators in the fork and attachment adaptation, operation, and use limitations. [29 CFR 1910.178(l)(3)(i)(G)]
- Retrain an operator if a new attachment is added to the forklift. Consult the operator's manual for instructions on how to use the new equipment.
- Do not exceed the rated capacity of the forklift/attachment combination.
- Know the mechanical limitations of your forklift.
- Change capacity, operation, and maintenance instruction plates, tags,

Figure 25. Reach stacker used in marine terminals and longshoring.

or decals when a forklift truck is equipped with an attachment.

- Treat an unloaded forklift with an attachment as partially loaded. [29 CFR 1910.178(o)(4)]
- Include attachments in a scheduled maintenance and inspection program. Tailor inspection steps to the attachment.
    - Examine load-bearing components for deformation.
    - Examine load-bearing welds for cracks.
    - Inspect mechanical and hydraulic components and maintain in accordance with the manufacturer's instructions.

- If the truck is equipped with front-end attachments other than factory installed attachments, request the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered. [29 CFR 1910.178(a)(5)]

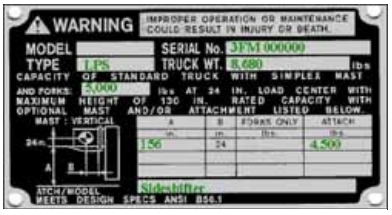


Figure 26. Data plate for an attachment (sideshifter).

- Modifications or additions that affect capacity or safe operation shall not be performed without prior written approval from the forklift truck manufacturer. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. [29 CFR 1910.178(a)(4)]
    - If no response or a negative response is received from the manufacturer, written approval of the modification/addition from a qualified registered professional engineer is acceptable. A qualified registered professional engineer must perform a safety analysis and address any safety or structural issues contained in the manufacturer's negative response before granting approval. The forklift nameplates must be changed accordingly.
    - See Forklifts: Free Rigging Requires Manufacturer's Approval, OSHA Standard Interpretation, (October 22, 1999). Free rigging is the direct attachment to or placement of rigging equipment (slings, shackles, rings, etc.) onto the forks of a powered industrial truck for a below-the-forks lift. This type of lift does not use an approved lifting attachment. Although free rigging is a common practice, it could affect the capacity and safe operation of a powered industrial truck.

Nameplate

Each operator is required to be aware of the truck specifications on the nameplate and what they mean. If there is a special attachment, it must be listed on the nameplate.

The nameplate (also called the data plate) provides important information for the forklift operator, including the fuel type, forklift weight, and capacity. Operators should read the nameplate to know the forklift's capabilities and limitations.

Figure 27. This data label indicates that this forklift has a 156" upright mast height in column A and a 24" load center in column B. Its stated capacity is 5,000 lbs with just its forks. With the sideshifter attachment, its stated capacity is 4,500 pounds. The truck weighs 8,600 pounds.

Requirements and Recommended Practices

OSHA requirements state:

"Approved trucks shall bear a label or some other identifying mark indicating approval by the testing laboratory. See paragraph (a)(7) of this section and paragraph 405 of "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", which is incorporated by reference in paragraph (a)(2) of this section and which

provides that if the powered industrial truck is accepted by a nationally recognized testing laboratory, it should be so marked." [29 CFR 1910.178(a)(3)]

- Train employees to properly read and understand the nameplate and to know what the information means.
- Ensure every truck has its durable, corrosion-resistant nameplate legibly inscribed with the following information:
  - Truck model and serial number
  - Truck weight
  - Designation of compliance with the mandatory requirements of ASME B56.1, "Safety Standard for Low and High Lift Trucks," applicable to the manufacturer
  - Type designation to show conformance with the requirements, such as those prescribed by Underwriters Laboratories, Inc., and Factory Mutual Research Corporation
  - Capacity
- Do not operate a truck with an illegible or missing nameplate.

Additional Information

ANSI/ITSDF B56.1 calls for additional information on nameplates on high-lift trucks, electric trucks, and trucks intended for use in hazardous locations. [See ANSI/ITSDF B56.1, "Safety Standard for Low and High Lift Trucks," Section 7.5, "Nameplates and Markings"]

Capacity

The capacity is the manufacturer's guideline for how much weight a forklift can safety lift. Exceeding the capacity of a forklift presents serious hazards, including tipover.

The nameplate in Figure 28 indicates that the forklift is an LPS type, which is a liquid petroleum gas powered unit provided with additional safeguards to operate in certain hazardous locations. The truck weight is 8,680 pounds and its capacity is 5,000 pounds at a 24 inch load center to a maximum height of 130 inches. The nameplate indicates that the capacity of the forklift with the sideshifter attachment is 4,500 pounds to a maximum height of 156 inches.

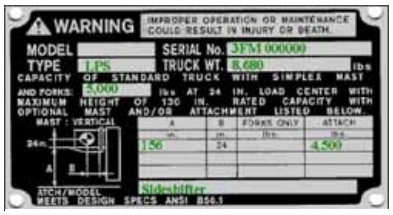


Figure 28. The nameplate indicates that the capacity of the truck is 4,500 pounds with the sideshifter attachment.

If the load has a different load center or it is irregular, such as a series of boxes of varying weights, then the capacity must be recalculated. [**See Load Composition**].

Requirements and Recommended Practices

- Train employees to properly read the nameplate and to understand what the information means.
- Check the nameplate for maximum capacity and maximum height.
- Do not exceed the capacity of the truck.
- Understand that the addition of an attachment generally lowers the capacity of a forklift.
- Understand that the size, position and weight distribution of the load also affects the capacity. Capacity assumes the center of gravity of the load is at the load center shown on the label. If this is not the case, the load may exceed the forklift's capacity.

Danger, Warning and Caution Labels

In addition to the nameplate, forklifts may have other warning labels or decals that provide safety information to operators. Safety labels should be clearly visible to the operator and must be replaced if missing, damaged, or illegible.

Under one classification system, there are three types of warning labels or decals:

- **DANGER** means if the danger is not avoided, it will cause death or serious injury.
- **WARNING** means if the warning is not heeded, it can cause death or serious injury.
- **CAUTION** means if the precaution is not taken, it may cause minor or moderate injury.

Figures 29 and 30 show examples of warning labels.

Figure 29. Safety decal on forklift.

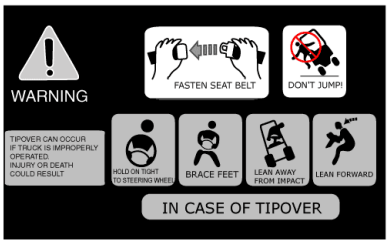


Figure 30. The steps to take in a tipover of a sit-down counterbalanced forklift: Fasten seat belt, don't jump, hold on tight to steering wheel, brace feet, lean away from impact and lean forward. Note that the seat belt should already be fastened.

Controls

Before operating a forklift, read and study the operator's manual discussion on controls. Locate each control and understand how to use each one.

Figure 31. Operator depressing inching pedal.

- **Forward/Reverse Directional Controls**
  The directional control allows the operator to move the forklift forwards or backwards. Directional controls can be column mounted (mounted on the steering column) or foot operated (controlled by shifting the accelerator pedal side to side).
- **Hydraulic Lift Controls**
  Forklifts have hydraulic lift controls to raise and lower the forks and to tilt the forks. Visually inspect the hydraulic controls before each use and test that they are working properly. See **Load Handling** for more information on lifting loads.
- **Pedals**
  Forklifts have accelerator and brake pedals that operate similarly to these pedals in other vehicles. Some forklifts also have a clutch, which allows shifting into higher forward gears. The inching pedal gives the operator more control of the forklift in tight places. See **Steering, Turning and Changing Direction** for more information on using inch pedals.

- **Parking Brake**
  Forklifts are equipped with a parking brake. Be sure to set the parking brake when leaving a forklift and block the wheels if the forklift is parked on an incline. See Parking for more information on parking a forklift.

Figure 32. Dashboard showing gauges on a forklift.

Instruments

Forklifts have a variety of instruments on the dashboard. Read your operator's manual and become familiar with each of the warning lights and gauges on the dashboard. Never operate a forklift if a warning light or gauge signals an unsafe condition.

Instrument Panel

Read your operator's manual and become familiar with each of the warning lights and gauges on the dashboard. Know what each one indicates.

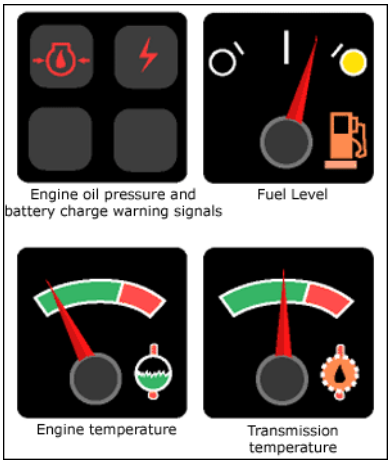


Figure 33. These common forklift gauges show normal operating

Potential Hazards

- Mechanical breakdown
- Forklift malfunction

Requirements and Recommended Practices

- Turn on the forklift and check all the warning indicators on your dashboard.
- Never operate a forklift with a warning light or gauge signaling an unsafe condition.
- Do not attempt a repair unless authorized to do so.
- Report any abnormality to your supervisor.

Figure 34. Typical warning gauges.

Oil Pressure Gauge

The **oil pressure gauge** indicates the oil pressure inside the engine. An oil pressure warning light may also be present.

Requirements and Recommended Practices

- Do not operate the forklift if the light comes on or the gauge indicates oil pressure problems.
- Check for leaks. Clean up any spills or mark the hazard area until it can be cleaned.
- Notify your supervisor or maintenance personnel.
- Only trained and authorized personnel may service a forklift.

Figure 34. Electronic engine oil gauge, warning indicators.

Temperature Gauge/Light

The **engine temperature gauge** is similar to the engine temperature gauge found on a car or truck.

- Engine temperature may be indicated by "C" for cold or green indicating safe operating temperature, while a hot, overheating engine may be indicated by an "H" for hot or red.
- Refer to your owner's manual for the appearance and significance of your engine temperature gauge.

Figure 35. Engine temperature gauge in the normal zone.

Requirements and Recommended Practices

- Do not operate a forklift if the light comes on or the gauge indicates an overheated engine.
- Check for leaks. Clean up any spills or mark the hazard area until it can be cleaned.
- Notify your supervisor or maintenance personnel.
- Allow an overheated forklift to cool down before removing the radiator cap. When removing the cap, wear leather gloves and eye protection and open the cap slightly to check for stored pressure before completely removing the cap. Only trained and authorized personnel may service a forklift.

Transmission Temperature

The transmission temperature warning light or gauge indicates when the transmission temperature is too high.

Figure 36. Transmission temperature in normal range.

Requirements and Recommended Practices

- Do not operate a forklift if the light comes on or the gauge indicates an overheated transmission.
- Check for leaks. Clean up any spills or mark the hazard area until it can be cleaned.
- Notify your supervisor or maintenance personnel.
- Transmission fluid may need to be added. Only trained and authorized personnel may service a forklift.

Fuel Gauge

The **fuel gauge** shows the amount of fuel remaining.

Figure 37. Fuel gauge.

Requirements and Recommended Practices

- Do not operate while extremely low on fuel.
- Check the fuel level during your daily inspections.
- Refuel only in designated areas. Clean up any spills or mark the hazard area until it can be cleaned.

Hour Meter

The **hour meter** records the number of hours that a truck has been used. It should be recorded in your Daily Inspection Log. Maintenance is often scheduled by hours of truck use, so it is an important indicator.

Figure 38. Hour meter indicating the total time the forklift has been in service.

Requirements and Recommended Practices

- Log the hours of use daily.

- Do not exceed manufacturer's recommended hours in service.
- Properly maintain vehicles according to manufacturer's recommended maintenance schedule. Only trained and authorized personnel may service a forklift.

Battery Discharge Indicator

Electric forklifts have a battery discharge indicator that shows when a battery charge is low. Some ways that battery gauges on the instrument panel indicate the battery is discharged are:

Figure 38. Battery low.

- the warning light indicator is on.
- the gauge needle is in the warning zone.
- a percentage indicator shows the battery charge level.

Requirements and Recommended Practices

- Return to the battery recharging area if the battery gauge is low.
- Recharge the battery only if you are trained and authorized to do so.

For the procedures, see Battery Charging and Changing Procedures.

Battery


Figure 39. Recharging battery.

This section reviews the parts of batteries used in electric forklifts. For information on battery use, maintenance, recharging, and changing, see **Power Sources: Electrical**.

Electric forklift service personnel need to know the parts of an industrial battery in order to properly and safely handle it at the end of every shift. The parts of an industrial battery include:


Figure 40. This is a cutaway of an industrial battery showing the rugged plates, extra heavy grids and impact-resistant case.

- **Cell**: The interior of the battery is divided into **cells**, with each cell containing a set of alternately spaced positive and negative plates. A negative plate is contained at each end of the cell to maintain proper electrical balance. The battery's voltage is determined by the number of cells.
- **Separator**: Separators are located between the plates for insulation.
- **Battery tray**: The cells are in a steel container called the battery tray.
- **Electrolyte**: The cell elements are fully submerged in a sulfuric acid solution called the **electrolyte**.
- **Element**: A **positive and negative terminal** is visible at the top of each cell. This assembly is known as the **element**. It is placed in the **jar**, the acid-proof, high-impact resistant container. A high-impact cover seals to the jar.
    - **Positive terminal**. All the positive plates are connected to the positive terminal.
    - **Negative terminal**. All the negative plates are connected to the negative terminal.

Potential Hazards:

- Electrical shock.
- Explosion.

Requirements and Recommended Practices:

- Never accidentally create an electrical current by connecting the positive to the negative terminal through any part of your body or through any other conductor.
- Never wear metal jewelry which will conduct electricity when working around batteries.
- Never put metal articles or tools on top of the batteries or place conductive articles across the battery posts.
- Always shut the charger off when connecting or disconnecting the battery. An arc or spark could cause an explosion.
- Use only non-sparking, non-conductive tools.
- Keep the vent plugs in place at all times except when adding water to the cells or taking hydrometer readings.
- Check the battery cables and cable connectors regularly. If the insulation is worn or connector contacts are pitted, the truck should be removed from service and repairs made immediately.
- Follow proper lockout/tagout procedures [29 CFR 1910.147] when working on a battery in a forklift.

For more information, see **Battery Charging and Changing Procedures**.

Additional Information:

- Electrical. OSHA Safety and Health Topics Page.
- Control of Hazardous Energy (Lockout/Tagout). OSHA Safety and Health Topics Page.

Overhead Guard

An overhead guard is designed to protect the operator from falling objects.

Requirements and Recommended Practices


Figure 41. Overhead guard.

- Use an overhead guard as protection against falling objects such as small packages, boxes, bagged material, etc., but not to withstand the impact of a falling capacity load. [29 CFR 1910.178(m)(9)]
- Wear a hard hat when appropriate for additional protection.
- Keep hands and feet within the forklift to avoid danger of falling loads.
- Use a load backrest extension behind the forks whenever necessary to minimize the possibility of the load or part of it from falling rearward. [29 CFR 1910.178(m)(10)]
- Equip all high-lift rider trucks, order-picker trucks and rough-terrain forklift trucks with an overhead guard manufactured in accordance with ANSI B56.1-1969, "Safety Standard for Low and High Lift Trucks," unless operating conditions do not permit. [29 CFR 1910.178(e)(1)]
- As part of the daily inspection of the forklift, check the overhead guard for broken welds, missing bolts, or other damage.

Tires


Figure 42. Forklift tire.

There are several different types of forklift tires, depending on how the forklift is used. Common types of forklift tires include pneumatic, solid, and polyurethane. As part of the daily inspection of the forklift, check tire condition, including cuts and gouges, and check pressure for air-filled tires.

Other Safety and Warning Devices

Forklifts can incorporate many warning and safety devices to help protect operators, pedestrians, other forklift operators and others.

Figure 43. Forklift operator using a seat belt.

Powered industrial trucks may be equipped by the manufacturer with the following safety devices:

- Seat belts and similar restraints
- Horns
- Backup alarms that sound when forklift reverses
- Fire extinguisher
- Warning lights that flash
- Directional signals and brake lights
- Mirrors

Figure 44. Fire extinguisher.

Requirements and Recommended Practices

- Equip every power-propelled truck with an operator-controlled horn, whistle, gong, or other sound-producing device. ANSI B56.1-1969 Incorporated by reference [29 CFR 1910.178(a)(2)]
- Equip every truck with an operator-controlled horn, whistle, gong, or other sound-producing device. ANSI/ITSDF B56.1-2011.
- Where appropriate to the worksite, equip trucks with additional sound-producing or visual (such as lights or blinkers) devices. ANSI/ITSDF B56.1-2011.

Figure 45. Safety mirror with pedestrian in view.

Additional Information

- OSHA Instruction CPL 02-01-028 (CPL 2-1.28A) - Compliance Assistance for the Powered Industrial Truck Operator Training Standards (Nov. 30, 2000). Section 1910.178 does not currently contain requirements for the use of operator restraint systems. However, Section 5(a)(1) of the OSH Act requires employers to protect employees from serious and recognized hazards.
- OSHA's Seat Belt Policy: OSHA's enforcement policy on the use of seat belts on powered industrial trucks in general industry is that employers are obligated to require operators of powered industrial trucks that are equipped with operator restraint devices, including seat belts, to use the devices. ANSI/ITSDF B56.1-2011 - Safety Standard for Rough Terrain Forklift Trucks (Reaffirmation of ANSI/ITSDF B56.6-2005).

Figure 46. Warning strobe light flashes as operator backs up.

Section 3: Operating the Forklift

Mastering customer service goes beyond implementing the right tools and technologies; it requires cultivating a customer-centric mindset within your organization. In this chapter, we will explore the importance of developing a customer service mindset, including fostering a customer-centric culture, practicing empathy and understanding, and honing the skill of active listening.

Pre-Operation

A vehicle that is in need of repair, defective or in any way unsafe should be removed from service. The problem should be recorded on a log and reported to a supervisor immediately. This section discusses pre-operation and operational inspections that operators should perform to ensure that forklifts will operate safely. Only operators who have been trained and evaluated in accordance with 29 CFR 1910.178(l) can operate forklifts.

Note: For a brief overview of measurements that forklift operators should know to determine whether the forklift can do a task safely in the available space, see **Critical Forklift Measurements**.

Figure 47. Employee performing pre-operation inspection.

Pre-Operation Inspection

Requirements and Recommended Practices:

OSHA requires that all forklifts be examined at least daily before being placed in service. Forklifts used on a round-the-clock basis must be examined after each shift. [29 CFR 1910.178(q)(7)]

Figure 48. Operator checking fluid levels.

The operator should conduct a pre-start visual check with the key off and then perform an operational check with the engine running. The forklift should not be placed in service if the examinations show that the vehicle may not be safe to operate.

Figure 49. Operator checking condition of tires.

Remember! A vehicle in need of repair, defective or in any way unsafe, should not be driven and should be taken out of service immediately. Any problems should be recorded on the appropriate documents and reported to a supervisor.

- Before starting your vehicle, conduct a pre-operation (or pre-start) inspection that checks a variety of items, including but not limited to:
    - Fluid levels -- oil, water, and hydraulic fluid.
    - Leaks, cracks or any other visible defect including hydraulic hoses and mast chains. **NOTE:** Operators should not place their hands inside the mast. Use a stick or other device to check chain tension.
    - Tire condition and pressure including cuts and gouges.
    - Condition of the forks, including the top clip retaining pin and heel.
    - Load backrest extension.
    - Finger guards.
    - Safety decals and nameplates. Ensure all warning decals and plates are in place and legible. Check that information on the nameplate matches the model and serial numbers and attachments.
    - Operator manual on truck and legible.
    - Operator compartment. Check for grease and debris.
    - All safety devices are working properly including the seat belt.

Figure 50. Operator checking condition of the forks.

Figure 51. Operator inspecting the top clip retaining pin for the forks.

- In addition to this general inspection, additional items should be checked depending on the forklift type (electric or internal combustion, including liquid propane). These include but are not limited to:

Additional Information

- **Electric Forklifts**
    - Cables and connectors for frayed or exposed wires
    - Battery restraints
    - Electrolyte levels
    - Hood latch

Note: Always use personal protective equipment such as a face shield, rubber apron, and rubber gloves when checking electrolyte.

Figure 52. Operator ensuring that warning decals are in place and legible.

- **Internal Combustion Forklifts**
    - Engine oil
    - Brake reservoir
    - Engine coolant
    - Air filter
    - Belts and hoses
    - Radiator
    - Hood latch

Figure 53. Operator checking the seat belt as part of the pre-operation inspection.

- **Liquid Propane Forklifts**
    - Properly mounted tank
    - Pressure relief valve pointing up
    - Hose and connectors
    - Tank restraint brackets
    - Tank for dents and cracks
    - Tank fits within profile of truck
    - Leaks

Note: Always use personal protective equipment such as a face shield, long sleeves, and gauntlet gloves when checking liquid propane tanks and fittings.

Figure 54. Operator inspecting the load backrest as part of the pre-operation inspection.

Additional Information

- Sample Daily Checklists for Powered Industrial Trucks. **Note:** Checklists are provided as a guide only and are not a substitute for complying with OSHA standards.
    - Appendix A: Checklists for internal combustion and electric trucks
    - Appendix B: Checklists for various truck types and sample generic checklist

Figure 55. Operator ensuring that the operator manual is on board the forklift and legible.

Operational Inspection

Figure 56. Operational check of hoist and lowering control.

After completing the pre-operation inspection, operators should conduct an operational inspection with the engine running. This inspection includes:

- Accelerator linkage
- Inch control (if equipped)
- Brakes
- Steering
- Drive control: forward and reverse
- Tilt control: forward and back
- Hoist and lowering control
- Attachment control
- Horn
- Lights
- Back-up alarm (if equipped)
- Hour meter

Figure 57. Operator performing operational inspection of working lights.

NOTE: Unusual noises or vibrations should be reported immediately.

Additional Information

- Sample Daily Checklists for Powered Industrial Trucks. **Note:** Checklists are provided as a guide only and are not a substitute for complying with OSHA standards.
    - Appendix A: Checklists for internal combustion and electric trucks
    - Appendix B: Checklists for various truck types and sample generic checklist

Figure 58. Operator conducting operational inspection with engine running.

Removal From Service

Potential Hazards

While driving, be aware of these potential hazards:

- Mechanical breakdown
- Fire
- Overheating
- Leakage

Requirements and Recommended Practices

The OSHA powered industrial truck standard [29 CFR 1910.178] lists a number of conditions under which a forklift must be removed from service. If the operator notes these conditions while driving, the operator must stop, park the vehicle and get assistance.

- Any powered industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel. [29 CFR 1910.178(q)(1)]
- Defects when found must be immediately reported and corrected. [29 CFR 1910.178(q)(7)]

- Any vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated. [29 CFR 1910.178(q)(8)]
- When the temperature of any part of any truck is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated. [29 CFR 1910.178(q)(9)]
- No truck shall be operated with a leak in the fuel system until the leak has been corrected. [29 CFR 1910.178(p)(4)]

Maintenance

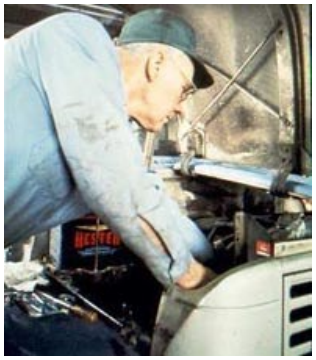


Figure 59. Trained and authorized mechanic performing regularly scheduled maintenance.

Scheduled maintenance is critically important to the safe operation of your vehicle. Never operate a forklift requiring maintenance, and always report repair problems to your supervisor. Follow your company's procedures.

Potential Hazards:

- Forklift skidding or sliding due to grease, leakage, spills.
- Mechanical breakdown due to poor maintenance.
- Accidents and injuries due to improperly working equipment.

Requirements and Recommended Practices:

Figure 60. Preventive maintenance being performed on a forklift.

- Never operate a vehicle that requires maintenance or is in any way unsafe. [29 CFR 1910.178(p)(1)]
- Remove from service any powered industrial truck not in safe operating condition. All repairs must be made by authorized personnel. Do not attempt to fix it yourself unless you are trained and authorized to do so. [29 CFR 1910.178(q)(1)]
- Perform preventive maintenance according to manufacturer's scheduled recommendations.
- Keep industrial truck in clean condition, free of lint, excess oil, and grease. [29 CFR 1910.178(q)(10)]
- Use non-combustible agents for cleaning trucks.
- High flash point (at or above 100° F) solvents may be used. Do not use low flash point (below 100° F) solvents.
- Take recommended precautions regarding toxicity, ventilation and fire hazards.

For more information on battery maintenance, see the **Battery Maintenance** section of the **Power Sources: Electric** page.

Traveling & Maneuvering

Forklift operators must follow safe operating rules at all times. Operators must always maintain control of the forklift, keep a proper lookout, and operate the forklift at speeds safe for the particular operation and worksite conditions.

Figure 61. Employee traveling and maneuvering a forklift.

Mounting and Dismounting

Figure 62. Operator grasping hand grips when mounting the vehicle.

Potential Hazards

- Hitting head on overhead cage.
- Slips, trips and falls, especially feet slipping off step.

Requirements and Recommended Practices

- Be sure that your hands are clean and dry to prevent slipping when grabbing handhold.
- Check your shoes for grease before entering the vehicle.
- Grasp handhold and get a good grip. Never grab the steering wheel because it could cause you to lose balance if it moves.
- Always be careful with your footing when mounting and dismounting vehicle.
- Pull or lower your body carefully into or out of cab. Dismounting is the opposite of mounting -- do not jump.
- Wear appropriate footwear to prevent skids.

Figure 63. Operator dismounting a forklift.

Starting/Stopping

Starting

Before starting a forklift, be sure to conduct a pre-operation inspection. In addition, conduct an operational check after starting the engine.

Figure 64. Stop signs posted to regulate traffic flows.

- Ensure that your way is clear. Sound your horn in warning or use a spotter if your view is obstructed.
- Proceed cautiously down the travel path watching for dangerous blind spots.

Stopping

- Select an area to park. Do not park in an unauthorized area. Do not block an aisle or exits. Follow your company's parking procedures.
- Apply brake slowly and stop.
- Neutralize the controls.
- Set the parking brake.
- Turn off the ignition.
- If the truck is parked on an incline, block the wheels.

Figure 65. Operator slows down and sounds the horn at cross aisles where vision is obstructed.

For more information, see **Parking**.

Operating at Speed

Potential Hazards

While traveling avoid these potential hazards:

- Tipover caused by driving too fast.

- Collision with pedestrians and obstacles caused by inattention and not being able to stop in time.

Requirements and Recommended Practices

Figure 66. Observe all posted speed limits and warning

Be aware of the travel conditions along your planned route:

- Under all travel conditions the truck must operate at a speed that will permit it to be brought to a stop in a safe manner. [29 CFR 1910.178(n)(8)]
- The driver must slow down for wet and slippery floors. [29 CFR 1910.178(n)(10)]
- The driver must look in the direction of, and keep a clear view of, the path of travel. [29 CFR 1910.178(n)(6)]
- The driver must slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing. [29 CFR 1910.178(n)(4)]
- While negotiating turns, speed shall be reduced to a safe level by turning the steering wheel in a smooth, sweeping motion. [29 CFR 1910.178(n)(15)].
- Grades shall be ascended or descended slowly. [29 CFR 1910.178(n)(7)].
- When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the Running over loose objects on the roadway surface shall be avoided. [29 CFR 1910.178(n)(14)].


Figure 67. Forklifts are less stable on turns and grades and can tipover.

Steering, Turning and Changing Directions


Figure 68. Operator is releasing the inching pedal, setting the direction control to forward and pressing the accelerator. (The brake is the middle pedal.)

Changing Direction

Potential Hazards

While changing directions, be aware of these potential hazards:

- Tipover.
- Collision with a pedestrian, another vehicle or an object.

Requirements and Recommended Practices

- Come to a complete stop before changing directions.
- Use a horn or warning light to warn pedestrians when reversing.

Reversing

Reversing can increase the chances of injury and accident. Use extreme caution when backing up.


Figure 69. Warning strobe light flashing as operator backs up.

Potential Hazards

While backing up or reversing, be aware of these potential hazards:

- Pedestrians being struck by or crushed by the forklift.
- Collision with another forklift or racking.

Requirements and Recommended Practices

- Keep a clear view. [29 CFR 1910.178(n)(6)]
- Look in the direction of travel. When reversing, look behind. [29 CFR 1910.178(n)(6)]
- Be aware of limited visibility, and use extreme caution when driving in reverse.
- Consider the use of ground guides, rear-view mirrors, spotters, or other aids to increase visibility.
- Consider the noise level in your workplace. Do not assume pedestrians or bystanders are able to hear a back-up alarm.
- Allow plenty of room for pedestrians. You cannot anticipate what people will do. Many have no idea how quickly forklifts accelerate and how sharply they turn.
- Never assume pedestrians or bystanders are aware of the presence of heavy equipment and the intended direction of travel.
- Do not grab the overhead guard when traveling in reverse. This could expose the operator's finger to serious injury.

Figure 70. Using pedal to shift from reverse to forward.

Turning and Steering

Potential Hazards

While steering, be aware of these potential hazards:

- Collision with pedestrians or objects due to the forklift's tail swinging to the side opposite the direction of the turn.
- Falling load following collision.
- Tipover caused by turning too sharply.


Figure 71. An exaggerated tail swing is caused by rear wheel steering; the operator is turning left and the rear is swinging toward the right.

Requirements and Recommended Practices

- When turning, reduce speed to a safe level. [29 CFR 1910.178(n)(15)]
- Proceed with caution when making turns, especially when working in confined areas or narrow aisles. When the lift truck turns a corner, the rear of the lift truck swings in the opposite direction of the turn.
- Anticipate the rear-end swing and start the turn as close to the inside corner as possible. Plan your route and anticipate turns.
- Never turn with forks elevated.
- Never turn on a grade. The forklift may tipover laterally on even a very small grade.

Traveling on Inclines

Potential Hazards

While traveling on a grade or incline, be aware of these potential hazards:

- Tipover
- Falling load


Figure 72. Drive loaded trucks forward going up a ramp.

Requirements and Recommended Practices

- Drive loaded trucks forward going up a ramp with the load upgrade and drive in reverse going down a ramp with the load upgrade.

- Always drive unloaded trucks with the forks downgrade.
- Never drive with the load downgrade.
- Never turn a forklift on a grade.

For more information, see the **Workplace: Ramps and Grades** section.

Parking

An unattended vehicle is a danger to the operator and others unless it is properly secured.

Potential Hazards

While parking and leaving an unattended vehicle, be aware of these potential hazards:

- Danger of an improperly parked truck being struck by personnel or objects.
- Danger of unintended movement of the truck.

Requirements and Recommended Practices

A powered industrial truck is considered "unattended":

- When the operator is 25 ft. or more away from the vehicle even if it remains in his view, or whenever the operator leaves the vehicle and it is not in his view. [29 CFR 1910.178(m)(5)(ii)]

When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set. Wheels shall be blocked if the truck is parked on an incline. [29 CFR 1910.178(m)(5)(i)]

- Select a hard, level surface.
- Do not park on a grade, unless wheels are blocked.
- Park in authorized areas only, unless the forklift is disabled. Park a safe distance from fire aisles, stairways or fire equipment. Do not block traffic. [29 CFR 1910.178(m)(14)]
- Fully engage the parking brake.
- Lower the load engaging means (lifting mechanism) fully.
- Neutralize the controls:
    - Set the direction lever in neutral, and lock the mechanism (if available). Tilt the mast forward slightly and lower the forks to the floor until the fork tips touch the floor.
- If the forklift is disabled, and the forks cannot be lowered to the floor, follow proper lockout/tagout procedures. [29 CFR 1910.147] Do not allow anyone to stand or pass under the forks. [29 CFR 1910.178(m)(2)]
- Turn the key to OFF, and stop the engine. Remove the key.
- Get off the forklift without jumping.

Note: When the operator of an industrial truck is dismounted and within 25 ft. of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement. It is not required that the power be shut off. [29 CFR 1910.178(m)(5)(iii)]

Figure 73. Operator looking in the direction of travel and keeping arms in the confines of the vehicle.

Safety Travel Practices

Complying with safe travel practices and OSHA regulations will improve safety in your workplace.

Potential Hazards

While traveling, be aware of these potential hazards:

- Overturning forklift
- Falling load
- Being struck or crushed by forklift
- Collisions

Requirements and Recommended Practices

Figure 74. Operator traveling with load lowered.

- Always look in all directions before proceeding.
- Always look in the direction of travel. If the load blocks your view, travel in reverse. Keep a clear view.
- Observe all traffic regulations, including authorized plant speed limits. Maintain a safe distance, approximately three truck lengths from the truck ahead, and keep the truck under control at all times. [29 CFR 1910.178(n)(1)]
- Yield the right of way to ambulances, fire trucks, or other vehicles in emergency situations. [29 CFR 1910.178(n)(2)]
- Do not pass other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations. [29 CFR 1910.178(n)(3)]

Figure 75. Do not travel with the load elevated.

- Cross railroad tracks diagonally wherever possible. Do not park closer than 8 feet from the center of railroad tracks. [29 CFR 1910.178(n)(5)]
- Operate at a speed that will permit the truck to be brought to a stop in a safe manner under all travel conditions. [29 CFR 1910.178(n)(8)]
- Do not engage in stunt driving and horseplay. [29 CFR 1910.178(n)(9)]
- Slow down for wet and slippery floors. [29 CFR 1910.178(n)(10)]
- Properly secure the dockboard or bridgeplates before driving over them. Drive over them carefully and slowly and never exceed their stated capacity. [29 CFR 1910.178(n)(11)]
- Approach elevators slowly and enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off the power, and set the brakes. [29 CFR 1910.178(n)(12)]
- Separate forklift and pedestrian traffic as much as possible. Use established pedestrian walkways with guard rails and strictly enforce their use.
- Never carry passengers. [29 CFR 1910.178(m)(3)]
- Keep arms or legs inside the confines of your vehicle. [29 CFR 1910.178(m)(4)]
- Watch for surface obstructions; even a small bump can cause a load to fall off elevated forks.
- Never drive up to anyone who is in front of a bench or any other fixed object. [29 CFR 1910.178(m)(1)]
- Do not travel into a position that, if the forklift jumped forward, the brakes failed, or the wrong lever was pushed, a coworker could be pinned between the forklift and another object.

Visibility

Blocked visibility, including partially blocked visibility, increases the chances of accidents. Operators should take measures to minimize the risks.

Figure 76. Operator keeping a clear view.

Potential Hazards

When visibility is impaired, be aware of these potential hazards:

- Collision
- Falling load
- Falling off loading dock
- Worker struck or crushed by forklift

Requirements and Recommended Practices

Figure 77. Operator's clear view of working aisle.

- Keep a clear view. [29 CFR 1910.178(n)(6)]
- Look in the direction of travel. When reversing, look behind. [29 CFR 1910.178(n)(6)]
- Use spotters, rear view mirrors, or other aids to increase visibility.
- Where available, use concave mirrors when entering buildings or aisles.
- Equip forklifts with headlights where general lighting is less than two lumens per square foot. [29 CFR 1910.178(h)(2)] In general, forklifts should have headlights if working at night, outdoors, or in any area where additional lighting would improve quality.
- Drive slowly into and out of warehouses or other buildings. Going from bright daylight into a darkened warehouse may blind drivers just long enough to hit another worker, vehicle or object.
- Be especially careful on loading docks; stay away from the edge.
- Add physical barriers such as ramps, raised concrete staging areas and heavy-gauge safety chains in front of dock openings. Use protective guard rails.
- Add a "warning track" of yellow paint on the floor near dock openings.
- Slow down and sound the horn at cross aisles and other locations where vision is obstructed. [29 CFR 1910.178(n)(4)]

Tipover

There are two basic type of tipovers in a forklift: 1) a forward tip or longitudinal tip, and 2) a lateral or side tip. The procedure to follow in the event of tipover varies depending on the type of tipover and the class of forklifts that you may use in your facility.

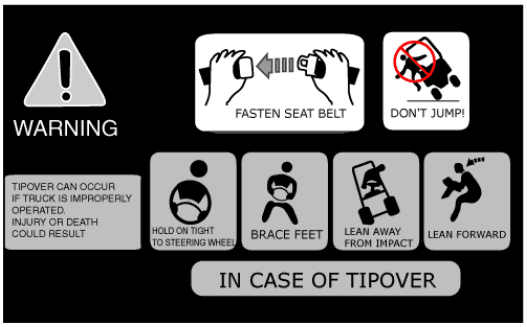


Figure 78. Example of warning label on a powered industrial truck showing actions to take in the event of a tipover of a sit-down counterbalanced truck.

IN CASE OF A TIPOVER:

For tipovers on sit-down counterbalanced trucks:

- Don't jump. Stay in the forklift.
- Hold tight to the steering wheel.
- Brace feet.
- Lean AWAY from the impact.
- Lean forward.

Note: Tipover procedures for other types of forklifts may vary. For example operators of stand-up forklifts with rear-entry access should step backwards off the forklift if a tipover occurs.

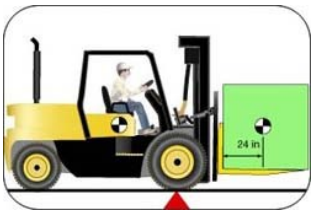


Figure 79. The load center is the distance from the face of the forks to the load's center of gravity. Many forklifts are rated using a 24-inch load center, which means that the load's center of gravity must be 24 inches or less from the face of the forks. (In this illustration, the red arrow represents the fulcrum and the black and white circle under the operator's seat represents the vehicle's center of gravity.)

Load Handling

Forklifts are used for picking up, transporting, stacking and unstacking loads. The following are safe operating rules for each step of safe load handling. For more on evaluating the load, see **Load Composition**.

Safe Handling Preparation

Potential Hazards

Before handling loads, be aware of the following:

- Off-center loads which may cause tipover or falling loads.
- Overloading which may cause tipover or falling loads.
- Damaged or loose loads.

Figure 80. A damaged carton is an unsafe load to carry.

Requirements and Recommended Practices

- Secure the load so it is safely arranged and stable. [29 CFR 1910.178(o)(1)] Do not carry damaged merchandise unless it has been secured by wrapping or banding. (Figure 80)
- Center the load as nearly as possible. [29 CFR 1910.178(o)(1)] Use caution when handling off-center loads that cannot be centered. [29 CFR 1910.178(o)(1)] Distribute the heaviest part of the load nearest the front wheels of the forklift.
- Do not overload. Know the stated capacity of your forklift and do not exceed it. [29 CFR 1910.178(o)(2)] Only by keeping within the weight limit can you operate the forklift safely.
- A forklift's capacity is rated for a specified load center. If the load is off-center, improperly distributed, or oversized, it may exceed capacity and unbalance the forklift. (Figure 81)
- Use the load extension backrest.

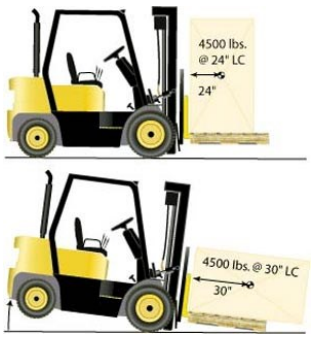


Figure 81. Improperly distributed loads may tip the forklift because the center of gravity has shifted.

Approaching

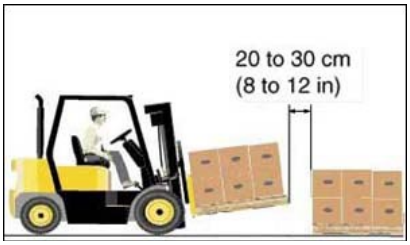


Figure 82. Operator stops slowly in front of the load platform.

Potential Hazards

While approaching a load, be aware of the following:

- Accidents may occur when:
- Approaching too fast.
- Turning too rapidly.

Requirements and Recommended Practices

1. Approach the load slowly and carefully.
    - Stop 20 to 30 cm (8 to 12 inches) in front of the load. (Figure 82)
    - Be certain that the truck is placed squarely in front of the load and that the forks are at the correct height.
    - Set the direction control to neutral
2. Do not raise or lower the forks unless the forklift is stopped and the brake is set.
3. Prior to raising the load, ensure there is adequate overhead clearance. Vision is obstructed after the load is elevated.
4. Use the inching pedal to creep the load to the stack.

Figure 83. Operator lifts load with the mast vertical.

Mast Position

Potential Hazard

While moving the mast, be aware of the following:

- Tipovers and dropped loads while moving the mast.

Requirements and Recommended Practices

- Use extreme care when tilting loads. Do not tilt forward with forks elevated except when picking up or depositing a load. When stacking or tiering, tilt backward only enough to stabilize the load. [29 CFR 1910.178(o)(6)]
- Use extra caution when handling loads that approach the truck's maximum rated capacity:
- Tilt the mast back and position the heaviest part of the load against the carriage. (Figure 84)
- Travel with the mast tilted back to keep the load stable.
- Tilt the mast forward cautiously when positioning the load onto the stack. [29 CFR 1910.178 App A]
- Never travel with the load tilted forward. Tilting the load forward increases the load distance and makes the load less stable (Figure 85).

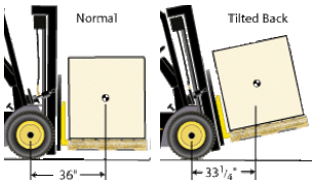


Figure 84. Tilting the mast back reduces the load distance and makes the load safer to carry.

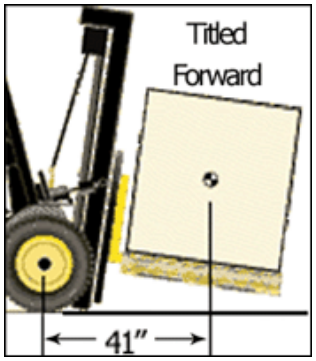


Figure 85. Tilting the mast forward increases the load distance and makes the load less stable.

Fork Position

Figure 86. Operator slides the forks into the pallet until they are fully under the load.

Potential Hazards

While moving the forks into position, be aware of the following:

- Tipover
- Dropped load
- Collision

Requirements and Recommended Practices

- Level the forks before inserting them into the pallet.
- The forks must be placed under the load as far as possible. [29 CFR 1910.178(o)(5)]
- Slide the forks into the pallet until they are fully under the load. The forks should be at least two-thirds the length of the load
- Be careful that the forks do not go through to the other side where pallets are closely stacked.
- Center the weight of the load between the forks. Adjust the forks to distribute the weight evenly. Note that forks are adjustable either manually or with a fork positioner.
- Tilt the mast back carefully to stabilize the load. [29 CFR 1910.178(o)(5)]
- Pick up an off-center load carefully. There is a greater danger of a tipover.

Lifting the Load

Figure 87. Operator is lifting the load.

Potential Hazards

While lifting the load, be aware of the following:

- Insufficient clearance
- Falling loads
- Stuck loads

Requirements and Recommended Practices

1. Check that there is adequate overhead clearance before raising the load. This is especially true when high tiering or in a confined space like a truck trailer. There must be sufficient headroom under overhead installations, lights, pipes, sprinkler systems, etc. [29 CFR 1910.178(m)(8)]
2. Carefully lift the load up above the lower stack about 10 cm (4 inches). (Figure 87)
3. Lift the load clear and then tilt the mast back slightly to rest the load against the load backrest extension.
4. Ensure that the load does not catch on any obstructions.
5. Slowly return the lift control lever to the neutral position.

Lowering the Load

Potential Hazards

While lowering the load, be aware of the following:

- Falling loads.
- Striking objects.

Requirements and Recommended Practices

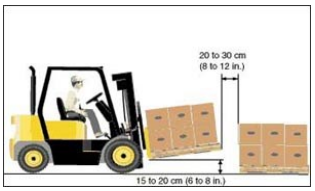


Figure 88. Tilt the mast backward to stabilize the load.

The mast must be carefully tilted backward to stabilize the load.

1. Ensure the load is secured before moving.
2. Carefully tilt the mast backward to stabilize the load. [29 CFR 1910.178(o)(5)]
3. Slowly move the truck to 20 to 30 cm (8 to 12 inches) away from the stack.
4. Stop the truck.
5. Return the mast to the vertical position before lowering the load.
6. Lower the load so that its lowest point is 15 to 20 cm (6 to 8 inches) from the floor.
7. While traveling, keep the load at a safe travel height. See **Traveling & Maneuvering**.


Figure 89. Reach trucks maximize maneuverability in narrow aisle.

High Tiering

Reach trucks are often used for high tiering, which involves storing material in multiple tiers high off the ground.

Potential Hazards

- Overloading
- Tipover


Figure 90. Triple reach extends 23 feet high. The lightest loads are placed on the top tiers.

Requirements and Recommended Practices

- Set the heaviest loads on the bottom tier.
- Set the lightest loads on the top tier.
- Reduce the load below the capacity of the reach truck as the mast is fully extended.
- Slowly and carefully extend the reach mechanism forward when depositing the load on the top tier.
- Use extreme care when tilting a load forward or backward, particularly when high tiering. [29 CFR 1910.178(o)(6)]


Figure 91. Reach mechanism extends forward to deposit load on top tier.

Truck Trailers and Railcars

Potential Hazards

While entering and leaving truck trailers or railroad cars, be aware of the following:


Figure 92. Wheels are chocked prior to boarding.

- Falling off loading dock.
- Moving trucks or railroad cars during loading and unloading.
- Slipping or inadequate dockboards.

Requirements and Recommended Practices

The OSHA Powered Industrial Trucks standard [29 CFR 1910.178] lists a number of situations in which special procedures must be followed before starting entry:

- The brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks. [29 CFR 1910.178(k)(1)]
- See Chocking requirements for trailers docked to buildings with downward approaches, OSHA Standard Interpretation, (2005, November 8). The Federal Motor Carrier Safety Administration's braking regulations preempt OSHA from enforcing the requirements in 29 CFR 1910.178(k)(1) and 29 CFR 1910.178(m)(7) for commercial motor vehicles (CMVs).
- Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations. [29 CFR 1910.178(k)(2)]
- Fixed jacks may be necessary to support a semitrailer and prevent upending during the loading or unloading when the trailer is not coupled to a tractor. [29 CFR 1910.178(k)(3)]
- Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position. [29 CFR 1910.178(k)(4)]

Figure 93. Use positive protection to prevent railroad cars from being moved.

Figure 94. Operator using warning light and looking in the direction of travel when exiting a truck trailer.

The OSHA Walking-Working Surfaces standard [29 CFR 1910.30(a)] contains requirements for dockboards (bridge plates).

- Portable and powered dockboards shall be strong enough to carry the load imposed on them. [29 CFR 1910.30(a)(1)]
- Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping. [29 CFR 1910.30(a)(2)]
- Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) "Industrial Lifts and Hinged Loading Ramps" published by the U.S. Department of Commerce, which is incorporated by reference as specified in Sec. 1910.6. [29 CFR 1910.30(a)(3)]
- Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling. [29 CFR 1910.30(a)(4)]
- Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position. [29 CFR 1910.30(a)(5)]

Figure 95. Entering a truck trailer with adequate overhead clearance.

Additional Trailer Loading and Unloading Procedures

- Inspect the floor of the trailer to be sure that it will support the forklift and load.
- Ensure that the height of the entry door is adequate to clear the height of your vehicle, taking into consideration the height of the loading platform.
- Drive straight across the bridge plates when entering or exiting the truck trailer or railroad car.
- Use dock lights and headlights when working in a dark trailer.
- Sound the horn when entering or exiting the trailer.
- In determining the capacity of the trailer floor to support a forklift, consider various factors, including floor thickness and cross-member spacing or unsupported floor area. In general, the

larger the unsupported area, the lower the forklift capacity the trailer will have for the same floor thickness.

- Never use the forklift to open railroad car doors unless:
- It has a device designed for that purpose.
- The operator is trained in the use of the device.
- All other employees stand clear.
- 29 CFR 1910.178(m)(6) Powered Industrial Trucks; Truck Operations. OSHA Directive STD 01-11-003 (STD 1-11.3), (October 30, 1978).

Section 4: Understanding the Workplace

Figure 96. Do not drive over oil and grease spots. Use a dock board or plate to bridge the gap between the dock and the truck being loaded or unloaded.

Safely operating a forklift requires awareness of the conditions at your workplace. This section will identify potential hazards and possible solutions for the following aspects of the workplace:

- **Physical Conditions**
- **Pedestrian Traffic**
- **Ramps and Grades**
- **Loading Docks**
- **Narrow Aisles**
- **Elevators**
- **Enclosed and Hazardous Areas**

NOTE: For information on battery charging areas, see the **Electric** page in the **Types and Fundamentals** section.

Physical Conditions

Surface or ground conditions are an important part of safe lift truck operation. Operating surfaces must be strong enough to support the forklift, its load and its operator. They must also be free of holes, grease, oil or obstructions that could cause the lift truck to skid or bounce, and possibly tipover.

Slippery conditions

Potential Hazards

- Danger of skidding when traveling on oil, grease, water or other spills.
- Danger of tipover when traveling on ice, snow, mud, gravel and uneven areas.

Requirements and Recommended Practices

- Avoid the hazardous surface when feasible.
- Spread absorbent material on slick areas that you cannot avoid.
- Cross the slippery area slowly and cautiously.
- Report the area to prevent others from slipping.
- Post a sign or warning cones until the area can be cleaned.
- Drive slowly! (Figure 97)
- Maintain contact with the ground by crossing uneven areas at an angle. (Figure 98)

Figure 97. Slow down to a speed at which you can maintain control.

- Clean up the oil or grease spill before proceeding. Driving over an oil or grease spot will enlarge the hazardous area.

Figure 98. Maintain contact with ground by crossing uneven areas at an angle.

Obstructions and uneven surfaces

Potential Hazards

- Danger of tipover when traveling over obstructions.
- Danger of tipover in holes and bumps.

Requirements and Recommended Practices

Figure 99. Get off the forklift and remove the obstruction.

- Keep all aisles clear.
- Watch out for overhead obstructions.
- Avoid the obstruction or get off the forklift and remove the obstruction. See **Parking**.
- Never drive straight across speed bumps or railroad tracks. Cross slowly at a 45 degree angle.
- Maintain steering control by keeping contact with the ground at all times.
- If an area is cluttered, walk the route first to spot problems.

For additional information, see **Operating a Forklift - Traveling & Maneuvering**.

Floor loading limits

Potential Hazard

- Danger of collapsing floor.

Figure 100. Forklift weight exceeded the load limit of the flooring.

Requirements and Recommended Practices

- Observe posted floor loading limits.
- Inspect the condition of the floor. Look for holes or weakened flooring, loose objects or obstructions, protruding nails or boards.
- Inform supervisor immediately if flooring is defective.
- Do not travel over surface that cannot support the weight of the lift truck, its load and its operator.
- ***Do not enter a box car or semi-van without inspecting its floor and knowing its load limits.***

For additional information, see **Load Handling: Operating the Forklift**.

Overhead clearance

Potential Hazards

Figure 101. Ensure adequate overhead clearance.

- Damage to lights, stacks, doors, sprinklers, pipes.
- Damage to load.
- Danger of tipover.

Requirements and Recommended Practices

- Be aware of the height of fixtures.
- Do not travel with loads elevated.

Pedestrian Traffic

Figure 102. Operator cautioning pedestrian to stop.

Many pedestrians or bystanders are injured in forklift-related accidents. These injuries can occur when forklifts strike pedestrians or when pedestrians are struck by falling loads.

Additional Resources:

- NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts. DHHS (NIOSH) Publication No. 2001-109, (2001, June). Forklift overturns are the leading cause of fatalities involving forklifts; they represent about 25 percent of all forklift-related deaths.

Pedestrian traffic

Figure 103. Yield right of way to pedestrians.

Forklift operators should always be aware of conditions in their workplace, including pedestrian traffic. Forklift traffic should be separated from other workers and pedestrians where possible.

Potential Hazard

- Danger of striking pedestrians and objects

Figure 104. Slow down, stop and sound horn at intersections and wherever your vision is obstructed.

Requirements and Recommended Practices

- Yield right of way to pedestrians.
- When a person or group of people walks across your planned route:
- Stop.
- Wait until the pedestrians pass by.
- Proceed cautiously through any congested area.
- If an area is cluttered, walk the route first to spot problems.
- Check for situations that require a spotter and use one when traveling.
- Warn pedestrians, by asking them to move, if there is not sufficient safe clearance.
- Sound the horn at blind corners, doorways and aisles.
- Sound the horn or other alarm when you back up.

Figure 105. Sign posted in area with high pedestrian traffic.

Reminders for the Driver

- Slow down, stop and sound horn at intersections, corners, and wherever your vision is obstructed.
- When provided, use flashing warning light or backup alarms when traveling in reverse.
- Do not move the truck if you do not have a clear view of travel.
- Use a spotter for blind spots.
- Always look in the direction of travel.
- Keep a clear view.
- Start, stop, travel, steer and brake smoothly.
- Signal to pedestrians to stand clear.

- Do not allow anyone to stand or pass under the load or lifting mechanism.
- When possible, make eye contact with pedestrians or other forklift operators.

Reminders for the Pedestrians

- Be aware that lift trucks cannot stop suddenly. They are designed to stop slowly to minimize load damage and maintain stability.
- Stand clear of lift trucks in operation.
- Avoid a run-in. The driver's visibility may be limited due to blind spots.
- Be aware of the wide rear swing radius.
- Use pedestrian walkways, or stay to one side of the equipment aisle.
- Never ride on a forklift, unless authorized and the forklift is designed for riders.
- Never pass under an elevated load.

Reminders for Plant Safety Managers

- OSHA requires that permanent aisles and passageways be free from obstructions and appropriately marked where mechanical handling equipment is used. [29 CFR 1910.176(a)]
- Consider separating pedestrians from lift trucks by providing:
- Pedestrian walkways,
- Permanent railings or other protective barriers,
- Adequate walking space at least on one side, if pedestrians must use equipment aisles,
- Pedestrian walkway striping on the floor, if barriers cannot be used.
- Install convex mirrors at blind aisle intersections.
- Post traffic control signs.
- Post plant speed limits.

Figure 106. Do not carry passengers.

Moving personnel

Passengers should not be allowed on forklifts unless the forklift is specifically designed to accommodate passengers.

Potential Hazard

- Danger of falling

Figure 107. Specialized platform for lifting coworker. Note: There is a guard on the back of the platform to keep the person in the platform and protect the worker's arms and hands.

Requirements and Recommended Practices

- The OSHA standard [29 CFR 1910.178(m)(3)] states that unauthorized personnel are prohibited from riding on a forklift. If riders are authorized, a safe place must be provided.
- Unless authorized, never carry passengers -- NO RIDERS.
- Use only specialized equipment designed to raise personnel.
- Never transport employees on a platform. Employees can only be hoisted up and down.
- Never transport employees on the forks.

Figure 108. Operator signaling to coworker to stand back.

Maintain distance

Forklift operators should keep a safe distance from workers on foot and other pedestrians.

Potential Hazard

- Danger of striking pedestrians

Requirements and Recommended Practices

- Warn pedestrians of your approach by horn, hand signal, or warning light.
- Maintain a safe clearance from coworkers.
- Employees should stay out of the potential path where a load can fall.

Ramps and Grades

Figure 109. Drive loaded trucks forward going up a ramp.

Forklift operators should follow certain general rules of the road when traveling on ramps and other inclines.

- Traveling on ramps and grades
- Traveling with a load (forks upgrade)
- Traveling empty (forks downgrade)

For more on maneuvering and handling loads, please see the **Operating the Forklift** section.

Traveling on ramps and grades

Figure 110. Traveling down ramp without load.

Potential Hazard

- There is a danger of tipover when traveling on ramps and grades.

Requirements and Recommended Practices

- Always look in the direction of travel.
- Never turn on a ramp or incline. Turn prior to the ramp or incline to place forks in proper direction.
- Keep a safe distance from the edge of a ramp.
- Do not travel on ramps with slopes or other conditions that exceed the manufacturer's recommendation.

Traveling with a load (forks upgrade)

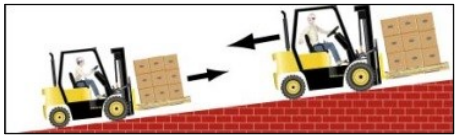


Figure 111. Traveling with a load. Note that ramps should have railings or bull rails.

Forklift operators should be aware of procedures to follow when traveling on ramps and other inclines with a load.

Potential Hazards

- Danger of tipover.
- Danger of losing load.

Figure 112. Traveling up ramp with load.

Requirements and Recommended Practices

- When traveling with a load, the load should point up the incline, regardless of direction of travel.
- Going up the incline:
  - Drive forward.
  - Forks pointed upgrade.
  - Use a spotter if load blocks the driver's view.
- Going down the incline:
  - Drive in reverse.
  - Turn head and face downgrade.
  - Forks pointed up the grade.

NOTE: When walking with a pallet truck with or without a load, the forks should be pointed downgrade, regardless of direction of travel.

Figure 113. Traveling down ramp with a load.

Traveling empty (forks downgrade)

Forklift operators should follow certain procedures when traveling on ramps and grades without a load.

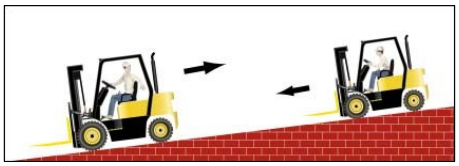


Figure 114. Traveling without a load. Note that ramps should have railings or bull rails.

Potential Hazard

- Danger of tipover.

Requirements and Recommended Practices

- When traveling without a load, the forks should point downgrade, regardless of direction of travel.
- Going up the incline:
- Drive in reverse.
- Turn head and face upgrade.
- Forks pointed downgrade.
- Going down the incline:
- Drive forward.
- Forks pointed downgrade.

Figure 115. Traveling down ramp without load.

Loading Docks

Loading docks can be dangerous places for forklifts. Falls from a loading dock in a forklift can be fatal.

- Loading docks

For information on entering truck trailers and railroad cars, see **Truck Trailers and Railroad Cars**.

Figure 116. Always look in the direction of travel. Be careful at the edges of the loading docks.

Loading Docks

When operating a forklift on a loading dock, slow down, watch out for others, and be aware of the edge of the dock.

Potential Hazards

- Falling off the edge of the dock.
- Skidding or slipping due to wet or icy conditions.

Requirements and Recommended Practices

- Maintain a safe distance from the edge of loading dock.
- Watch out for tail swing.
- Keep working surfaces clear and clean.
- Paint the edges of the loading dock to improve visibility.

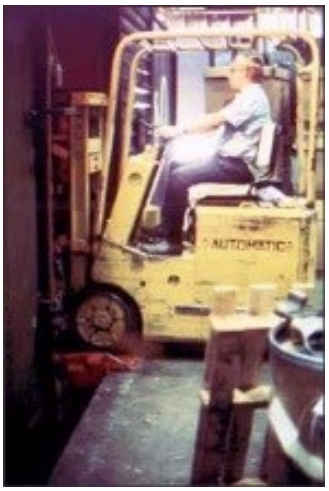


Figure 117. Use curbed ramps and dockboards to keep lift trucks from sliding.

Figure 118. Paint the edges of loading docks to improve visibility. Check for pedestrians, over vehicles, and other obstacles when exiting trailers.

Figure 119. Painted edges of loading docks to improve

Narrow Aisles

Conventional rack storage systems were designed for the counterbalanced lift truck which requires about a 12 ft (144 in) aisle width. Narrow aisle storage systems provide more storage space, but require reach trucks and order pickers to operate in much narrower aisle widths.

Figure 120. Reach truck.

Reach trucks

Reach trucks are a type of Class II electric motor narrow aisle truck. These trucks are used for high tiering, which involves storing material in multiple tiers high off the ground.

Potential Hazards

- Danger of overloading, especially on high lift.
- Danger of tipover.

Requirements and Recommended Practices

- Check pallet weight before lifting.
- Place heaviest loads on the bottom racks, and lighter loads on the top.
- Do not exceed the load capacity of the lift truck with attachments such as a pantograph attachment. **(Figure 121)**
- Do not lift the heaviest load to the maximum lift or stacking height. There may be a loss of stability.

Figure 121. Reach truck with pantograph attachment that scissors forward from the mast to retrieve the pallet.

Order picker

Order picker trucks are another type of Class II electric motor narrow aisle truck. These trucks are designed to lift the operator to retrieve items.

Potential Hazards

- Falling

Requirements and Recommended Practices

- Wear appropriate fall protection equipment that is properly fitted and adjusted. Ensure that employees are trained in the proper use of the fall protection equipment.

Figure 122. Order picker operator using full body harness.

Additional Information:

- OSHA strongly encourages the use of body harnesses on elevated platforms of powered industrial trucks. **OSHA Standard Interpretation: Fall protection requirements for elevated platforms of powered industrial trucks; body belts versus harnesses.** (June 28, 2004)

Safe stacking rules

Potential Hazards

- Falling loads
- Tipover

Requirements and Recommended Practices

OSHA's Powered Industrial Truck Standard includes a series of rules for safe stacking:

Figure 123. Stored material stacked safely.

- Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered. [29 CFR 1910.178(o)(1)]
- Only loads within the rated capacity of the truck shall be handled. [29 CFR 1910.178(o)(2)]
- The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted. [29 CFR 1910.178(o)(3)]
- Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load. [29 CFR 1910.178(o)(4)]
- A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load. [29 CFR 1910.178(o)(5)]

- Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used. [29 CFR 1910.178(o)(6)]

In addition, the following are recommended:

- Move forks as far apart as the load will permit. Be sure the load is centered and the forks are completely under the load before lifting.
- When stacking use only enough backward tilt to stabilize the load.

Elevators

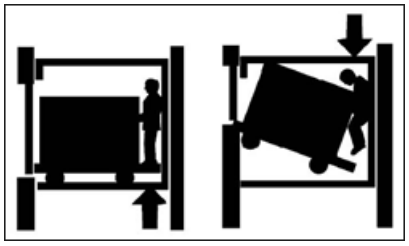


Figure 124. Dangerous loading of a

Potential Hazards

- Overloading. Know the combined weight of the load and the truck.
- Damage to floor.
- Insufficient overhead clearance and space in elevator.

Requirements and Recommended Practices

- Ensure the elevator has a rated capacity to safely lift the combined weight of the load and the truck.
- Approach elevators slowly and enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off the power, and set the brakes. [29 CFR 1910.178(n)(12)]
- Ensure adequate overhead clearance for truck and space in elevator for the truck and operator.

Enclosed and Hazardous Areas

Only designated types of forklifts can be used in certain hazardous locations in the workplace.

Figure 125. Danger of carbon monoxide poisoning in confined spaces.

Designated locations

Be familiar with OSHA's truck designations and hazardous location classifications. Only use powered industrial trucks that have the correct designation for the location's classification. Post signs in hazardous areas. [29 CFR 1910.178(c)]

OSHA Powered Industrial Truck Designations

Figure 126. Posted chemical hazard area.

The OSHA standard specifies 11 designations of powered industrial trucks [29 CFR 1910.178(b)]:

1. **D.** Diesel powered units with minimal acceptable safeguards against inherent fire hazards.
2. **DS.** Diesel powered units with additional safeguards to the exhaust, fuel, and electrical systems.
3. **DY.** Diesel powered units that have all the safeguards of DS units, plus do not have any electrical equipment including the ignition. They have temperature limitation features.
4. **E.** Electrically powered units with minimal acceptable safeguards against inherent fire hazards.

5. **ES.** Electrically powered units with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures.
6. **EE.** Electrically powered units that have all the safeguards of the E and ES units, plus the electric motor and all other electrical equipment are completely enclosed.
7. **EX.** Electrically powered units with electrical fittings and equipment designed, constructed, and assembled so that the units can be used in certain atmospheres containing flammable vapors or dusts.
8. **G.** Gasoline powered units with minimal acceptable safeguards against inherent fire hazards.
9. **GS.** Gasoline powered units with additional safeguards to the exhaust, fuel, and electrical systems.
10. **LP.** Liquefied petroleum gas units with minimal acceptable safeguards against inherent fire hazards.
11. **LPS.** Liquefied petroleum gas units with additional safeguards to the exhaust, fuel, and electrical systems.

Designated Locations

The OSHA standard [29 CFR 1910.178(c)], see Table N-1] provides a listing of classified locations where trucks with each type of designation can operate.

Indoor air quality

When used indoors, forklifts powered with internal combustion engines can present indoor air quality hazards. Cold weather, with the closing of doors and windows, may increase the risk.

Potential Hazard

- Concentration of fumes.

Requirements and Recommended Practices

- Do not operate a gasoline/propane/diesel engine for long periods of time in a confined area, such as a truck trailer
- Shut the engine off when staying inside a small confined area like a trailer.
- Do not operate a combustion engine within a warehouse, plant or onboard ship without adequate ventilation.
- Be careful in cold weather. Doors and windows which are normally open may be closed and exhaust and other gases may concentrate.
- Be careful in small rooms or blocked off areas where gases may accumulate.
- Drive sensibly. Avoid racing the engine or idling for long periods of time.
- Properly maintain engines and do not operate an engine requiring servicing. [29 CFR 1910.178(p)(1)]
- Consider switching to battery-powered forklifts, if much of the work is in poorly ventilated spaces or operators may be over-exposed to exhaust byproducts.
- Consider upgrading the ventilation system.
- Install CO monitors to detect levels.

Figure 127. Powered industrial truck engaged in roll-on roll-off (Ro-Ro) operations and subject to 29 CFR 1915.12

Note: Special Precautions Onboard Ship

If the space to be entered contains an oxygen deficient atmosphere, the space shall be labeled "Not Safe for Workers" or, if oxygen-enriched, "Not Safe for Workers - Not Safe for Hot Work." If an oxygen-deficient or oxygen-enriched atmosphere is found, ventilation shall be provided at volumes and flow rates sufficient to ensure that the oxygen content is

maintained at or above 19.5 percent and below 22.0 percent by volume. The warning label may be removed when the oxygen content is equal to or greater than 19.5 and less than 22.0 percent by volume. [29 CFR 1915.12(a)(2)]

For additional information, see the **Materials Handling: Hoisting and Hauling Equipment section of the Shipyard Employment** on the OSHA website.

Carbon monoxide

Forklifts powered with internal combustion engines can cause high levels of carbon monoxide in enclosed work areas.

Figure 128. Danger of carbon monoxide poisoning in confined spaces.

Potential Hazards:

- Unconsciousness and death may result from carbon monoxide overexposure as the concentration in the bloodstream rises.

Requirements and Recommended Practices:

- Train employees to recognize the warning signs of excessive exposure.
- Learn to recognize the symptoms and signs of carbon monoxide overexposure.
- Be especially aware of the dangers onboard ship. [29 CFR 1915.12]

Section 5: Training Assistance

Only trained and competent operators shall be permitted to operate a powered industrial truck. All powered industrial truck operators must be trained and certified by their organizations. [29 CFR 1910.178(l)]

Figure 129. Employees being trained.

Training Requirements

What does the OSHA standard require?

The standard requires employers to develop and implement a training program based on the general principles of safe truck operation, the types of vehicle(s) being used in the workplace, the hazards of the workplace created by the use of the vehicle(s), and the general safety requirements of the OSHA standard. Trained operators must know how to do the job properly and do it safely as demonstrated by workplace evaluation. Formal (lecture, video, etc.) and practical (demonstration and practical exercises) training must be provided. Employers must also certify that each operator has received the training and evaluate each operator at least once every three years. Prior to operating the truck in the workplace, the employer must evaluate the operator's performance and determine the operator to be competent to operate a powered industrial truck safely. Refresher training is needed whenever an operator demonstrates a deficiency in the safe operation of the truck. Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance in the workplace. [29 CFR 1910.178(l)(2)(ii)]

Training Program Content

Powered industrial truck operators shall receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation of the truck in the employer's workplace. [29 CFR 1910.178(l)(3)]

Truck-related Topics [29 CFR 1910.178(l)(3)(i)]

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Differences between the truck and the automobile.
- Truck controls and instrumentation: where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Vehicle capacity.
- Vehicle stability.
- Any vehicle inspection and maintenance that the operator will be required to perform.
- Refueling and/or charging and recharging of batteries.
- Operating limitations.

Workplace-related Topics [29 CFR 1910.178(l)(3)(ii)]

- Surface conditions where the vehicle will be operated.
- Composition of loads to be carried and load stability.
- Load manipulation, stacking, and unstacking.
- Pedestrian traffic in areas where the vehicle will be operated.
- Narrow aisles and other restricted places where the vehicle will be operated.
- Hazardous (classified) locations where the vehicle will be operated.
- Ramps and other sloped surfaces that could affect the vehicle's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

If an operator was previously trained in one of these topics, and the training is appropriate to the truck and working conditions encountered, additional training on that topic is not required if the operator has been evaluated and found competent to operate the truck safely.

Trainees may operate a powered industrial truck only:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence.
- Where such operation does not endanger the trainee or other employees.

Refresher Training

Refresher training and evaluation: [29 CFR 1910.178(l)(4)]

Refresher training, including an evaluation of the effectiveness of that training, shall be conducted to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely. Refresher training in relevant topics shall be provided to the operator when:

- The operator has been observed to operate the vehicle in an unsafe manner.
- The operator has been involved in an accident or near-miss incident.
- The operator has received an evaluation that reveals that the operator is not operating the truck safely.
- The operator is assigned to drive a different type of truck.
- A condition in the workplace changes in a manner that could affect safe operation of the truck.

Each operator's performance must be evaluated at least once every three years.

Certification

Employers must certify that each operator has been trained and evaluated in accordance with the OSHA standard. [29 CFR 1910.178(l)(6)]

The certification must include:

- Operator name.
- Training date.
- Evaluation date.
- Name of person(s) performing the training or evaluation.

Bonus: Developing Your Own Training Program

Figure 130. Operator being trained on working on a loading dock.

Before developing your operator training program, you should become familiar with the OSHA standard for powered industrial trucks and any operator's manuals for the equipment in your workplace.

- Identify the types of powered industrial trucks in your workplace and those employees who will be required to operate the vehicles.
- Identify your training methods.
- Develop the content for your training program.
- Provide for employee evaluation.
- Include refresher training.

It is important to recognize that training, although essential, will not be enough to eliminate accidents. To be most effective, operator training should be part of a larger comprehensive powered industrial truck safety program that includes the following elements:

- Hazard identification and possible solutions.
- Training (of both truck operators and those personnel working near lift trucks) and evaluation of operator competence.
- Supervision (site survey, ongoing hazard assessment).
- Operating procedures (company policies, recordkeeping, safety practices).
- Maintenance and repair procedures.
- Facility design.
- Lift truck selection criteria (equipment survey of truck types, attachments and modifications).

Additional Information:

- OSHA Instruction CPL 02-01-028 (CPL 2-1.28A) - Compliance Assistance for the Powered Industrial Truck Operator Training Standards (November 30, 2000).
- Training and Reference Materials – Powered Industrial Trucks provides additional operator training resources.
- Powered Industrial Trucks OSHA Safety & Health Topics page includes links to other Safety and Health sites related to powered industrial trucks.

Appendix A – Checklist for Internal Combustion and Electric Trucks

Operator's Daily Checklist - Internal Combustion Engine Industrial Truck - Gas/LPG/Diesel					
Record of Fuel Added					
Date		**Operator**		**Fuel**	
Truck #		**Model#**		**Engine Oil**	
Department		**Serial#**		**Radiator Coolant**	
Shift		**Hour Meter**		**Hydraulic Oil**	

Engine Off Checks	**OK**	**Maintenance**
Leaks – Fuel, Hydraulic Oil, Engine Oil or Radiator Coolant		
Tires – Condition and Pressure		
Forks, Top Clip Retaining Pin and Heel – Check Condition		
Load Backrest – Securely Attached		
Hydraulic Hoses, Mast Chains, Cables and Stops – Check Visually		
Overhead Guard – Attached		
Finger Guards – Attached		
Propane Tank (LP Gas Truck) – Rust Corrosion, Damage		
Safety Warnings – Attached (Refer to Parts Manual for Location)		
Battery – Check Water/Electrolyte Level and Charge		
All Engine Belts – Check Visually		
Hydraulic Fluid Level – Check Level		
Engine Oil Level – Dipstick		
Transmission Fluid Level – Dipstick		
Engine Air Cleaner – Squeeze Rubber Dirt Trap or Check the Restriction Alarm (if equipped)		
Fuel Sedimentor (Diesel)		
Radiator Coolant – Check Level		
Operator's Manual – In Container		
Nameplate – Attached and Information Matches Model, Serial Number and Attachments		
Seat Belt – Functioning Smoothly		
Hood Latch – Adjusted and Securely Fastened		
Brake Fluid – Check Level		
Engine On Checks – Unusual Noises Must Be Investigated Immediately	**OK**	**Maintenance**
Accelerator or Direction Control Pedal – Functioning Smoothly		
Service Brake – Functioning Smoothly		
Parking Brake – Functioning Smoothly		
Steering Operation – Functioning Smoothly		
Drive Control – Forward/Reverse – Functioning Smoothly		
Tilt Control – Forward and Back – Functioning Smoothly		
Hoist and Lowering Control – Functioning Smoothly		
Attachment Control – Operation		
Horn and Lights – Functioning		
Cab (if equipped) – Heater, Defroster, Wipers – Functioning		
Gauges: Ammeter, Engine Oil Pressure, Hour Meter, Fuel Level, Temperature, Instrument Monitors – Functioning		

Operator's Daily Checklist – Electric Industrial Truck

Record of Fluid Added

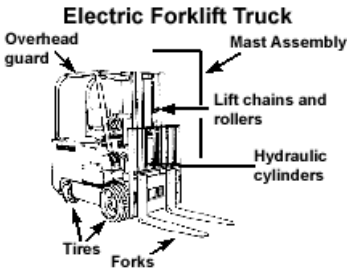
Date		**Operator**		**Battery Water**	
Truck #		**Model#**		**Hydraulic Oil**	
Department		**Serial#**			
Shift		**Drive Hour Meter Reading**		**Hoist Hour Meter Reading**	

Motor Off Checks	**OK**	**Maintenance**
Leaks – Hydraulic Oil, Battery		
Tires – Condition and Pressure		
Forks, Top Clip Retaining Pin and Heel – Check Condition		
Load Backrest Extension – Attached		
Hydraulic Hoses, Mast Chains, Cables & Stops – Check Visually		
Finger Guards – Attached		
Overhead Guard – Attached		
Safety Warnings – Attached (Refer to Parts Manual for Location)		
Battery – Check Water/Electrolyte Level and Charge		
Hydraulic Fluid Level – Dipstick		
Transmission Fluid Level – Dipstick		
Operator's Manual in Container		
Capacity Plate Attached – Information Matches Model, Serial Number and Attachments		
Battery Restraint System – Adjust and Fasten		
Operator Protection Sitdown Truck - Seat Belt – Functioning Smoothly Man-up Truck – Fall protection/Restraining means - Functioning		
Brake Fluid – Check level		
Operator's Manual – In Container		
Nameplate – Attached and Information Matches Model, Serial Number and Attachments		
Seat Belt – Functioning Smoothly		
Motor On Checks – Unusual Noises Must Be Investigated Immediately	**OK**	**Maintenance**
Accelerator Linkage – Functioning Smoothly		
Parking Brake – Functioning Smoothly		
Service Brake – Functioning Smoothly		
Steering Operation – Functioning Smoothly		
Drive Control – Forward/Reverse – Functioning Smoothly		
Tilt Control – Forward and Back – Functioning Smoothly		
Hoist and Lowering Control – Functioning Smoothly		
Attachment Control – Operation		
Horn – Functioning		
Lights & Alarms (where present) – Functioning		
Hour Meter – Functioning		
Battery Discharge Indicator – Functioning		
Instrument Monitors – Functioning		

Appendix B – Checklist for Various Truck Types and Sample Generic Checklist

Daily Inspection Checklist: Electric Forklift Truck

KEY OFF Procedures



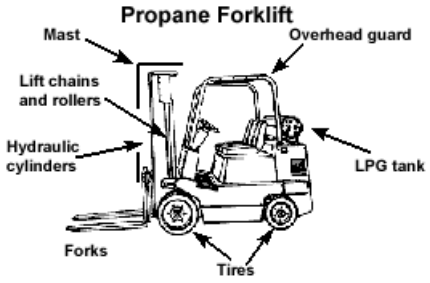
- The vehicle inspection
    - Overhead guard
    - Hydraulic cylinders
    - Mast assembly
    - Lift chains and rollers
    - Forks
    - Tires
- Examine the battery
- Check the hydraulic fluid level

KEY ON Procedures

- Check the gauges
    - Hour meter
    - Battery discharge indicator
- Test the standard equipment
    - Steering
    - Brakes
    - Front, tail, and brake lights
    - Horn
    - Safety seat (if equipped)
- Check the operation of load-handling attachments

Daily Inspection Checklist: Propane Forklift Truck

KEY OFF Procedures



- The vehicle inspection
  - Overhead guard
  - Hydraulic cylinders
  - Mast assembly
  - Lift chains and rollers
  - Forks
  - Tires
  - LPG tank and locator pin
  - LPG tank hose
  - Gas gauge
- Check the engine oil level
- Examine the battery
- Check the hydraulic fluid level
- Check the engine coolant level

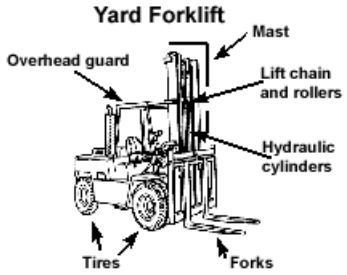
KEY ON Procedures

- Test the front, tail, and brake lights

ENGINE RUNNING Procedures

- Check the gauges
  - Oil pressure indicator lamp
  - Ammeter indicator lamp
  - Hour meter
  - Water temperature gauge
- Test the standard equipment
  - Steering
  - Brakes
  - Horn
  - Safety seat (if equipped)
- Check the operation of load-handling attachments
- Check the transmission fluid level

Daily Inspection Checklist: Yard Forklift Truck



KEY OFF Procedures

- The vehicle inspection
  - Overhead guard
  - Hydraulic cylinders
  - Mast assembly
  - Lift chains and rollers
  - Forks
  - Tires
  - LPG tank and locator pin
  - LPG tank hose
  - Gas gauge
- Check the engine oil level
- Examine the battery
- Inspect the hydraulic fluid level
- Check the engine coolant level

KEY ON Procedures

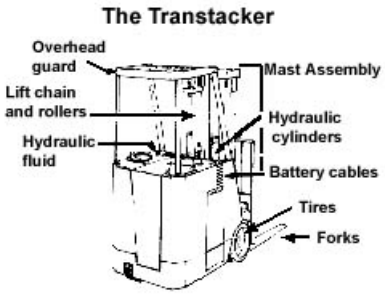
- Test the standard equipment
  - Front, tail, and brake lights
  - Fuel gauge (if diesel)
  - Windshield wiper
  - Heater

ENGINE RUNNING Procedures

- Check the gauges
  - Oil pressure indicator lamp
  - Ammeter indicator lamp
  - Ammeter
  - Hour Meter
  - Water Temperature Gauge
- Test the standard equipment
  - Steering
  - Brakes
  - Horn
  - Safety seat (if equipped)
- Check the operation of load-handling attachments
- Check the transmission fluid level

Daily Inspection Checklist: Electric Transtacker

KEY OFF Procedures

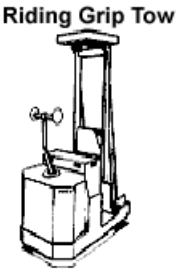


- The vehicle inspection
    - Overhead guard
    - Hydraulic cylinders
    - Mast assembly
    - Lift chains and rollers
    - Forks
    - Tires
    - Battery cables

KEY ON Procedures

- Check the gauges
    - Battery discharge indicator
    - Hour meter
- Test the standard equipment
    - Steering Brakes
    - Lights
    - Horn
- Test the control lever
- Check the operation of load-handling attachments

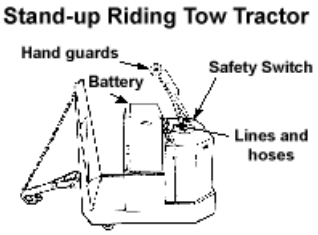
Daily Inspection Checklist: Riding Grip Tow



- The vehicle inspection
    - Lines and hoses
    - Battery
    - Safety switch
    - Hand guards
- The operations inspection
    - Test the brakes
    - Check the drive operations
    - Test the horn
    - Check the grip coupling

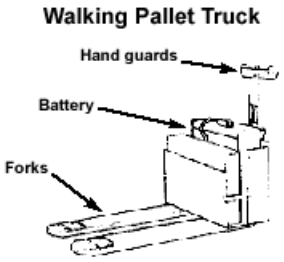
Daily Inspection Checklist: Stand-up Riding Tow Tractor

- The vehicle inspection
    - Lines and hoses
    - Battery
    - Safety switch
    - Hand guards
- The operations inspection
    - Test the brakes
    - Check the drive operations
    - Test the horn
    - Check the tow hook and safety catch



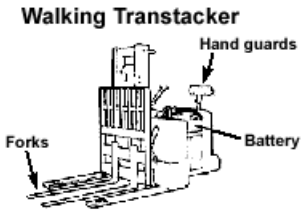
Daily Inspection Checklist: Walking Pallet Truck

- The vehicle inspection
    - Forks
    - Battery
    - Hand guards
- The operations inspection
    - Check the drive operations
    - Test the brakes
    - Check the horn
    - Inspect the load-handling attachment operations

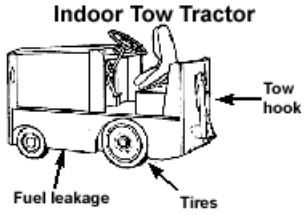


Daily Inspection Checklist: Walking Transtacker

- The vehicle inspection
    - Forks
    - Battery
    - Hand guards
- The operations inspection
    - Check the drive operations
    - Test the brakes
    - Check the horn
    - Inspect the load-handling attachment operations



Daily Inspection Checklist: Indoor Propane Tow Tractor



KEY OFF Procedures

- The vehicle inspection
    - Fluid leakage
    - Tires
    - Tow hook
    - Windshield (if equipped)
    - Overhead guard (if equipped)
    - LPG tank and locator pin
    - LPG tank hose
    - Gas gauge
- Check the engine oil level
- Check the engine coolant level
- Examine the battery

KEY ON Procedures

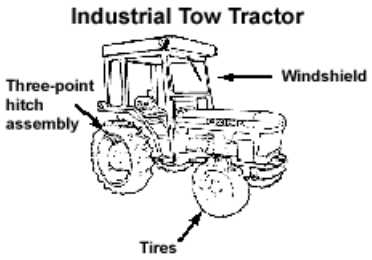
- Test the front, tail, and brake lights
- Check the gauges
    - Oil pressure gauge
    - Ammeter
    - Water temperature gauge
    - Hour meter

ENGINE RUNNING Procedures

- Inspect the standard equipment
    - Steering
    - Brakes
    - Horn
    - Safety seat (if equipped)
- Check the transmission fluid level

Daily Inspection Checklist: Industrial Tractors

KEY OFF Procedures



- The vehicle inspection
    - Windshield
    - Tires
    - Three-point hitch assembly
- Engine oil
- Engine coolant

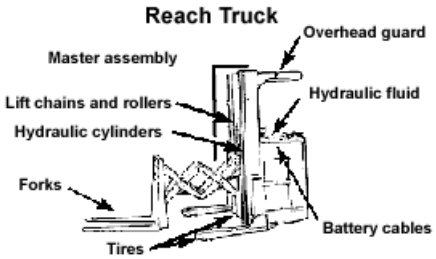
KEY ON Procedures

- Check gauges
    - Oil and battery lights
    - Temperature
    - Hour meter
- Standard equipment
    - Steering
    - Front, tail, and brake lights
    - Horn

ENGINE RUNNING Procedures

- Standard equipment
    - Windshield wiper
    - Brakes
    - Hoist operation

Daily Inspection Checklist: Reach Truck



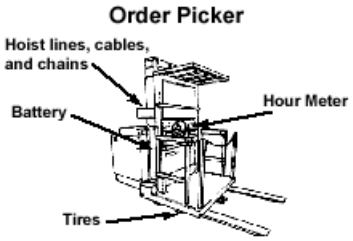
KEY OFF Procedures

- The vehicle inspection
    - Overhead guard
    - Hydraulic cylinders
    - Mast assembly
    - Lift chains and rollers
    - Forks
    - Tires
    - Battery cables
    - Hydraulic fluid

KEY ON Procedures

- Check the gauges
    - Battery discharge indicator
    - Hour meter
- Test the standard equipment
    - Steering
    - Brakes
    - Lights
    - Horn
- Test the control lever
- Check the operation of load-handling attachments

Daily Inspection Checklist: Order Picker



KEY OFF Procedures

- The vehicle inspection
    - Hoist lines, cables, and chains
    - Hour meter
    - Tires
    - Battery cables
    - Limiting device

KEY ON Procedures

- Check the battery discharge indicator
- Test the standard equipment
    - Safety interlock
    - Steering
    - Brakes
    - Lights
    - Horn
- Check the accessories
    - Gripper jaws
    - Work platform

Sample Generic Operator's Daily Checklist

Date		**Operator**	
Truck #		**Model#**	
Department		**Serial#**	
Shift		**Hour Meter Reading**	

	Overhead Guard- Are there broken welds, missing bolts, or damaged areas?		
	Hydraulic Cylinders- Is there leakage or damage on the lift, tilt, and attachment functions of the cylinders?		
	Mast Assembly- Are there broken welds, cracked or bent areas, and worn or missing stops?		
	Lift Chains and rollers		
		Is there wear or damage or kinks, signs of rust, or any sign that lubrication is required?	
		Is there squeaking?	
	Forks		
		Are they cracked or bent , worn, or mismatched?	
		Is there excessive oil or water on the forks?	
	Tires- What do the tires look like?		
		Are there large cuts that go around the circumference of the tire?	
		Are there large pieces of rubber missing or separated from the rim?	
		Are there missing lugs?	
		Is there bond separation that may cause slippage?	
	Battery Check		
		Are the cell caps and terminal covers in place?	
		Are the cables missing insulation?	
	Hydraulic Fluid- Check level?		
	Gauges- Are they all properly working?		
	Steering		
		Is there excessive free play?	
		If power steering, is the pump working?	
	Brakes		
		If pedal goes all the way to the floor when you apply the service brake, that is the first indicator that the brakes are bad. Brakes should work in reverse, also.	
		Does the parking brake work? The truck should not be capable of movement when the parking brake is engaged.	
	Lights- If equipped with lights, are they working properly?		
	Horn- Does the horn work?		
	Safety seat- if the truck is equipped with a safety seat is it working?		
	Load Handling Attachments		
		Is there hesitation when hoisting or lowering the forks, when using the forward or backward tilt, or the lateral travel on the side shift?	
		Is there excessive oil on the cylinders?	
	Propane Tank- Is the tank guard bracket properly positioned and locked down?		
	Propane Hose		
		Is it damaged? It should not be frayed, pinched, kinked, or bound in any way.	
		Is the connector threaded on squarely and tightly?	
	Propane Odor- If you detect the presence of propane gas odor, turn off the tank valve and report the problem.		
	Engine Oil- Check levels.		
	Engine Coolant- Visually check the level. Note: Never remove the radiator cap to check the coolant level when the engine is running or while the engine is hot. Stand to the side and turn your face away. Always use a glove or rag to protect your hand.		
	Transmission Fluid- Check levels?		
	Windshield Wipers- Do they work properly?		
	Seat Belts- Do they work?		
	Safety Switch- (found on stand up riding tow tractors) Is it working?		
	Hand guards- (found on stand up riding tow tractors, walking pallet trucks, walking transtackers) Are they in place?		
	Tow Hook		
		Does it engage and release smoothly?	
		Does the safety catch work properly?	
	Control Lever- Does the lever operate properly?		
	Safety Interlock- (found on order pickers) If the gate is open, does the vehicle run?		
	Gripper Jaws- (found on order pickers) Do the jaws open and close quickly and smoothly?		
	Work Platform- (found on order pickers) Does the platform raise and lower smoothly?		