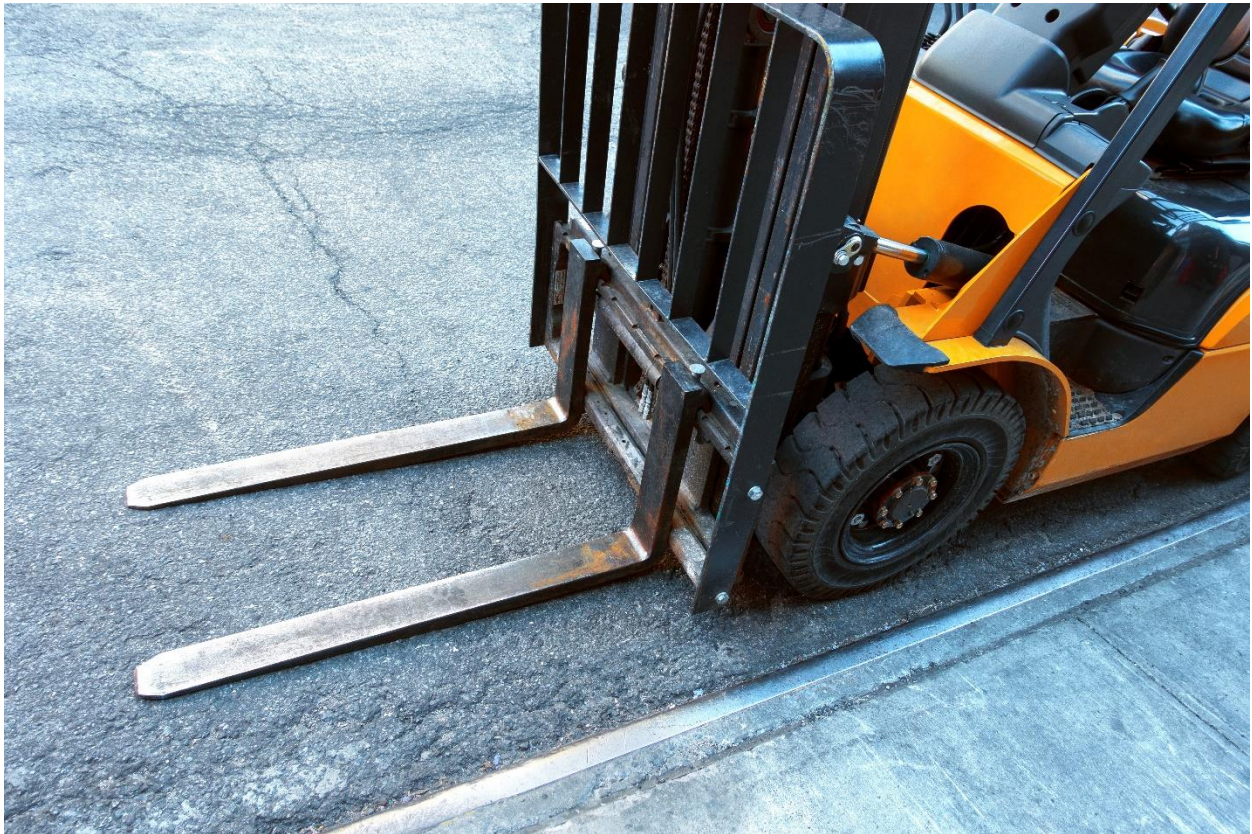


# Powered Industrial Truck “Forklift” Best Practices



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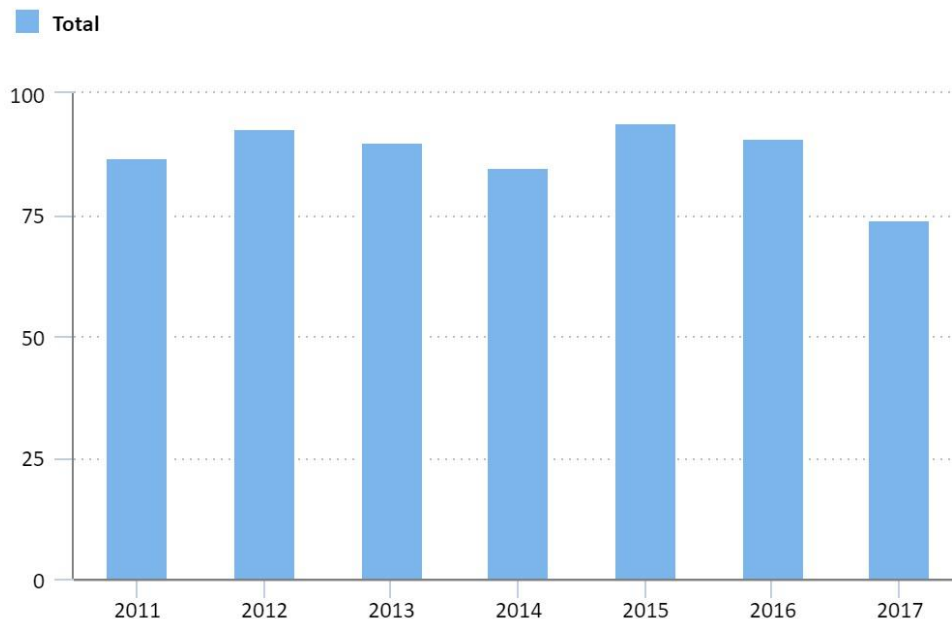
## The Hazards of Powered Industrial Trucks

Powered industrial trucks, **PITs**, such as fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines present serious hazards to employees, the public, and to property. Although these vehicles are usually operated in a limited manner by municipal entities, a comprehensive safety program for them is necessary to avoid the serious injury, liability, and property loss exposures associated with their operation.

Each year in the U.S., over 100 employees are killed and 36,000 are seriously injured in accidents involving these trucks. This is the second leading cause of occupational fatalities in “industrial” type workplaces. In public entities, powered industrial trucks are found in transfer/recycle facilities, public works operations, wastewater and water treatment facilities, civic center/sports complexes and airports.

From 2011 to 2017, 614 workers lost their lives in forklift related incidents and more than 7,000 nonfatal injuries with days away from work occurred every year.

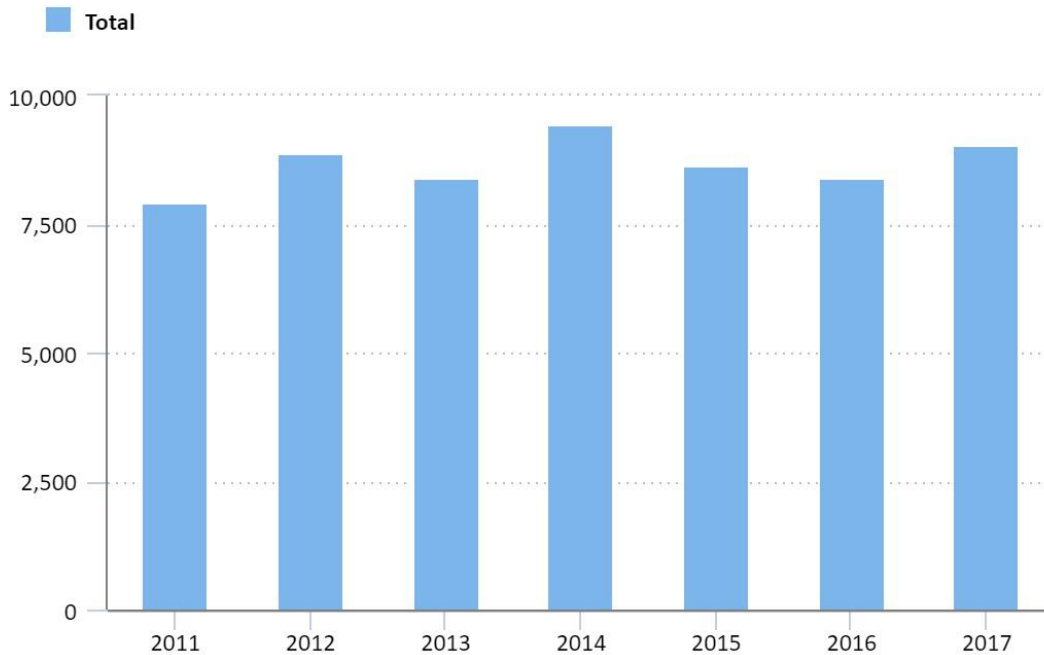
### Fatal occupational injuries involving forklifts, 2011-17



Click legend items to change data display. Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.



## Nonfatal occupational injuries and illnesses involving forklifts, 2011-17



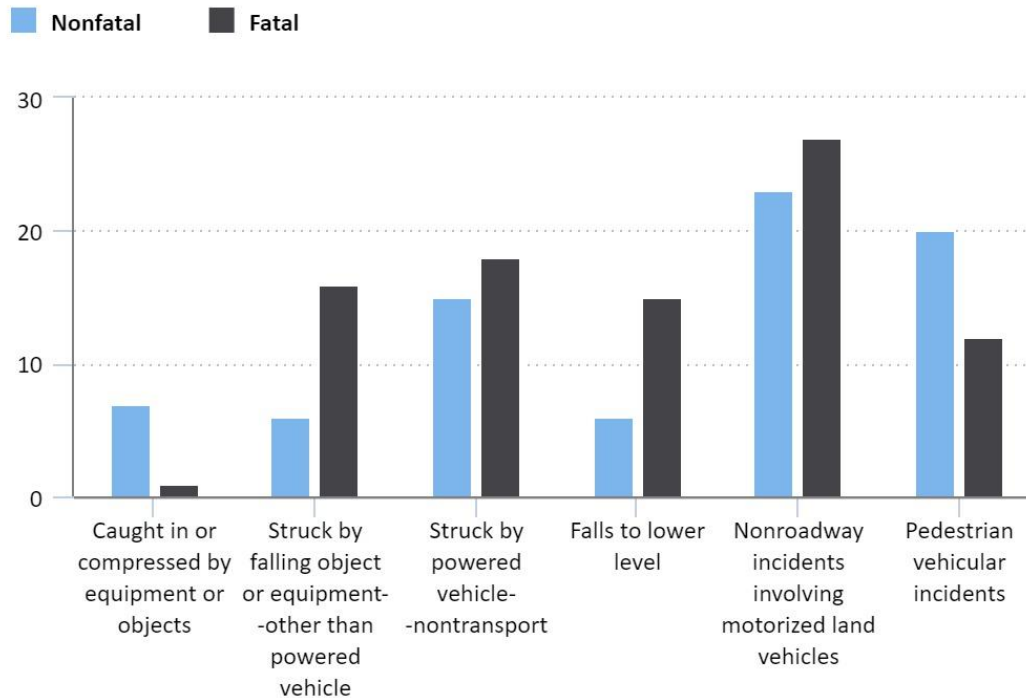
Click legend items to change data display. Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.



Of the 74 fatal work injuries involving PITs in 2017, the events that led to the most workplace deaths were non-roadway incidents (20), struck by powered vehicle, non-transport cases (13), struck by falling object cases (12), falls to lower level (11), and pedestrian vehicular incidents (9).

PITs were involved in 9,050 nonfatal workplace injuries or illnesses with days away from work in 2017. These cases resulted in workers taking a median of 13 days away from work, higher than the median of 8 days for all cases. Of these cases, 2,050 involved non-roadway accidents with the PIT, and 1,850 more cases involved pedestrians while the PIT was in transportation use. PIT related occupational injuries to pedestrians resulted in the highest median days away from work (20 days) compared to other PIT related events.

## Percentage of fatal injuries and nonfatal injuries and illnesses involving forklifts by selected events, 2017



Click legend items to change data display. Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.



As dangerous as they are, these industrial vehicles usually do not get the respect due to them by managers, operators, and employees working where PITs are being operated. They simply don't "look" all that dangerous. The truth is, however, that the average forklift weighs as much as a mid-size car. PITs have no "crush zones" to absorb energy in a collision, no padded dash or safety glass windshield in front of the operator to reduce injury in a collision, and by the very nature of the job that they do, they can easily tip over.

The most common PIT mishaps, resulting in fatal injuries are, in descending order of frequency:

- Tip-overs
- Pedestrians struck by trucks
- Bystanders and operators struck by falling loads
- Falls from the seat, forks or improper make-shift personnel lifts
- Pinned by the mast or a roll away truck
- Collisions with fixed objects
- Driving off loading docks
- Maintenance mishaps including fuel and battery accidents

Serious liability exposures exist when PITs operate near the public or on/around privately owned vehicles or railcars. "Roll-away" trucks, due to improper maintenance or parking practices are not uncommon and can endanger people and property near where a PIT is parked.



PITs that are inadequately maintained and not cleaned frequently enough often catch fire. Mishandling of LP gas fuel or batteries can also create the potential to have a serious fire or explosion. Inadequate engine tuning can also result in unsafe indoor carbon monoxide levels.

For this reason, this guide has been provided to help you develop and fully implement a comprehensive PIT safety program that includes: truck selection, inspection and maintenance, operator training, and rules for safe operation.

## Applicable Standards

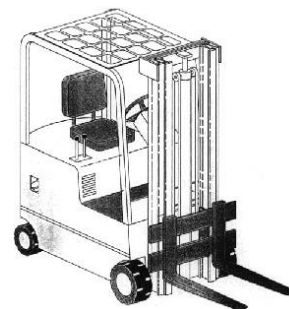
**ME 1910.178 “Powered Industrial Trucks”** is the OSHA Standard for operation of forklifts and PIT vehicles, that has been adopted by the Maine Department of Labor to protect public sector employees. It provides *minimum* safety standards for the selection and operation of PITs. In 1998, the standard was amended to require more extensive training and supervision of forklift operators.

**Part II, ANSI B56.1-1969 “Powered Industrial Trucks”** This recommended standard, published by the American National Standards Institute, includes a current industry “consensus” of what safety features a PIT/forklift should have and how one should be operated safely.

## Types of Powered Industrial Trucks

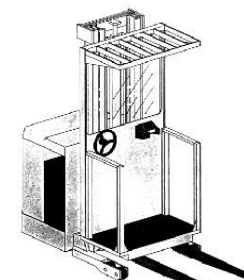
PITs can be described by their load handling configuration (forklift, clamp truck, high lift, low lift, powered hand truck, walkie pallet jack, order picker, etc.) and by their power types—diesel, gasoline, LP, or electric.

The most common type in municipal service is the basic electric or LP gas powered, sit down, counterweight forklift.



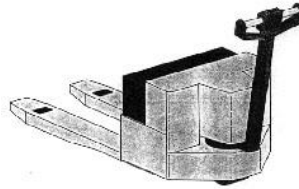
However, the safety standards also apply to several other types of equipment. These include:

### Stand-up forklifts and order pickers

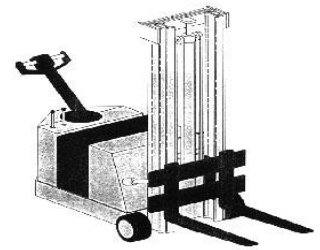


Order Picker

**“Walkie type forklifts, pallet jacks and powered carts.**



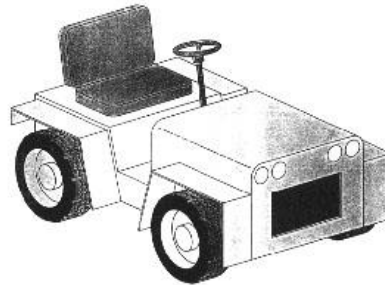
**Low Lift  
Walkie Pallet**



**High Lift  
Counterbalanced**

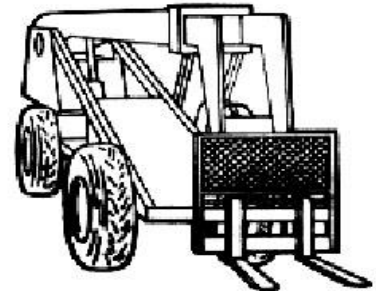
**Tow tractors and Tugs.**

(Usually found at municipal airports.)



**Outdoor, rough terrain forklifts.**

(This category includes skid steer, Lulls and pay loaders if equipped with forks or lifting platforms)



**Intermodal rail tractors, lifts and straddle carriers.**



## Selecting Powered Industrial Trucks

Many PITs currently in municipal service are surplus units from industry and the military. This is fine as long as they are being used within their design limitations, on the surfaces that they were designed for, and are being maintained in accordance with the manufacturer's recommendations. However, many serious PIT accidents are the result of the wrong truck being used for the job at hand. Whether you are specifying a new PIT, shopping for a used PIT, or considering a "gift" from the private sector or another governmental entity, there are several factors that need to be considered:

- 1. Indoor Operation** - Generally, only electric and some specially designed LP or diesel trucks are suitable for indoor use. Gasoline powered trucks should never be used indoors. Considerations include maintenance of the engine and exhaust systems and ventilation of the building.
- 2. Load Rating** - Before selecting a PIT, you should survey the loads that it will handle and the reach required for each task. Don't forget that the paper and cardboard bales commonly handled in municipal recycling can easily weigh twice as much when wet. Each PIT is factory load rated at different mast extension heights. The higher the mast is extended, the less that the PIT can safely handle. As a rule, you should never acquire a PIT that cannot handle the likely heaviest load without exceeding 80% of load rating. As a PIT approaches 100% of its rated capacity, small errors in load handling, steering, or braking can result in tip-overs.
- 3. Load Handling Equipment** - The PIT should be acquired with the proper fork lengths, load backrest extensions and any special attachments needed for its assigned work. Remember, you cannot modify load handling equipment or counterweights without written approval from the manufacturer. If a manufacturer approves an alteration to your PIT capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.
- 4. Tires/Work Surface Design** - Be sure that you select a PIT designed to operate on the surfaces that it will be run on. Most hard tired forklifts are designed to operate on level concrete and are dangerous on loose gravel, snow, or ice. Hard tires are also a bad choice if the PIT will be run for extended periods over floor joints and different floor surfaces. The small "bumps" can cause cumulative trauma back problems for operators over time. Pneumatic or "Solid pneumatic", or "Airless pneumatic" tires made of flexible plastic are available in designs for outdoor use, but must be well maintained for safety. Never operate a PIT with worn-out tires.
- 5. Incline and Clearance** - Each type of PIT has a maximum ramp slope and approach (front) and departure (rear) clearances for transition in floor and pavement slope. Use of PITs on ramps that are too steep, or pavement with changes in slope too abrupt for their design is very dangerous. When a PIT 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.
- 6. Floor Loading** - Care should be taken to ensure that the PIT is not too heavy for the floors, ramps, hatches, truck trailers etc. on which it is to operate. An engineer should determine the safe "wheel load" for floors, ramps etc., and a PIT selected



that is within this parameter. Since it is the “wheel load”, not gross weight that counts, the smallest PIT isn’t necessarily the right one for the job.

7. **Auxiliary Equipment** - All ANSI B56 compliant trucks will have a basic lighting system, horn, backup alarm, and warning light. There are however differences in warning lights and different backup alarm wattages for indoor vs. outdoor use. “Smart alarms” that adjust to ambient noise levels are also available. Speed governors are available, as are special seats for extended operation. Each truck should have a fire extinguisher, unless it operates exclusively in an area where a Class B extinguisher is always within 50’.
8. **Fire Prevention Rating** - The basic trucks are listed by letter designation by fuel/power type. G- for gasoline, D- for diesel, LP- for LP gas, and E- for electric. The basic “LP” or “E” truck is suitable for most municipal work. However, there are several special ratings for specific fire hazards. These are addressed by ME 1910.178, so you should look carefully at the fire hazards present in the area where the truck will operate.
  - a. **GS, DS, and LPS** trucks have special controls installed for operation in areas where accumulations of combustible dust are possible. They are required in areas where paper dust, wood dust, and combustible fibers are present in quantities where they form accumulations, and dust fires can be expected.
  - b. **DY** - This is a diesel truck with no electrical system. It is most often found in coal mining and not usually seen in municipal workplaces.
  - c. **EE** - An electric truck with an enclosed motor, required for environments where combustible metal, or explosive organic dusts are present. It is not likely to be found in municipal service.
  - d. **EX** - This is an electrical truck approved for areas where a flammable atmosphere could occur during normal operation. It is required for trucks working in warehouses where flammable liquids are stored and handled by trucks and in areas of industrial plants where flammable gas or vapor excursions are possible.

Power-operated industrial trucks designated as DY, EE, or EX may be used in locations where volatile flammable liquids or flammable gases are handled, processed or used, but in which the hazardous liquids, vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in the case of abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation but which might become hazardous through failure or abnormal operation of the ventilating equipment; or in locations which are adjacent to Class I, Division 1 locations, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clear air, and effective safeguards against ventilation failure are provided.

**Table N-1-Summary Table on Use of PITs in Various Locations**

<b>Classes</b>	<b>Unclassified</b>	<b>Class I locations</b>	<b>Class II locations</b>	<b>Class III locations</b>
Description of classes	Locations not possessing atmospheres as described in other columns	Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitable mixtures	Locations which are hazardous because of the presence of combustible dust	Locations where easily ignitable fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.

<b>Groups in classes</b>	<b>None</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>None</b>
Examples of locations or atmospheres in classes and groups	Piers and wharves inside and outside general storage, general industrial or commercial properties	Acetylene	Hydrogen	Ethyl ether	Gasoline Naphtha Alcohols Acetone Lacquer solvent Benzene	Metal dust	Carbon black coal dust, coke dust	Grain dust, flour dust, starch dust, organic dust	Baled waste, cocoa fiber, cotton, excelsior, hemp, istle, jute, kapok, oakum, sisal, Spanish moss, synthetic fibers, tow

		1	2	1	2	1	2
Divisions (nature of hazardous conditions)	None	Above condition exists continuously, intermittently, or periodically under normal operating conditions	Above condition may occur accidentally as due to a puncture of a storage drum	Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking of electrical equipment, or where dusts of an electrically conducting nature may be present	Explosive mixture not normally present, but where deposits of dust may cause heat rise in electrical equipment, or where such deposits may be ignited by arcs or sparks from electrical equipment	Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used	Locations in which easily ignitable fibers are stored or handled (except in the process of manufacture)

Authorized uses of trucks by types in groups of classes and divisions

Groups in classes	None	A	B	C	D	A	B	C	D	E	F	G	E	F	G	None	None
Type of truck authorized:																	
Diesel:																	
Type D	D**																
Type DS									DS						DS		DS
Type DY									DY						DY	DY	DY
Electric:																	
Type E	E**																E
Type ES									ES						ES		ES
Type EE									EE						EE	EE	EE
Type EX					E X				EX	EX	EX				EX	EX	EX
Gasoline:																	
Type G	G**																
Type GS									GS						GS		GS

Paragraph Ref. in No. 505 (OSHA)	210.211	201 (a)	203 (a)	209 (a)	204 (a), (b)	202 (a)	205 (a)	209 (a)	206 (a), (b)	207(a)	208 (a)
Type LP	LP**										
Type LPS					LPS				LPS		LPS
Paragraph Ref. in No. 505	210.211	201 (a)	203 (a)	209 (a)	204 (a), (b)	202 (a)	205 (a)	209 (a)	206 (a), (b)	207(a)	208 (a)

## Maintenance and Inspection of PITs

Repairs and maintenance of PITs should be performed only by qualified mechanics trained and qualified in powered industrial truck service. All major manufacturers of PITs certify dealers and provide training for mechanics to work on their equipment.

**ANY MODIFICATION** of a PIT’s load handling equipment, counterweights, or safety related equipment (seatbelts, backup alarm etc.) requires manufacturer approval. In some cases, modification to load handling equipment will require installing new load rating plates.

Each manufacturer provides a recommended preventative and predictive maintenance (PPM) schedule for each PIT model. This is usually found in the operator’s manual. When a PIT is placed in service, this should be developed into a “maintenance file” system of some type and strictly adhered to.

**DANGER! - Failure to perform proper PPM on LPG powered forklifts can result in dangerous levels of carbon monoxide gas in the workplace. This can occur with no changes detectable to the human senses.**

Areas where LPG PITs operate indoors for extended periods should be equipped with fixed carbon monoxide monitors to provide early warning of problems.

An inspection is required before each PIT is used for the first time each shift. This should include a visual walk-around to look for leaks, tire condition, damage, worn hoses etc., checking all fluid levels and belt condition, a check of all safety equipment, and starting the truck to check proper control operation and listen for unusual noises. This should be documented in writing. **APPENDIX A** is an example of a pre-shift inspection checklist.

If safety related issues are discovered on a PIT during operation or inspection, it should be immediately taken out of service and tagged out until repaired.

## Operator Training

Only individuals trained to current standards and authorized by the employer can operate powered industrial trucks. More stringent training and education requirements were added to ME 1910.178 in 1998, as an effort to reduce employee deaths and serious injuries associated with PIT accidents. State law prohibits operation of PITs by persons under 18 years of age.

The employer should maintain written records of operator training, evaluations and authorization to operate specific types of PITs. Although not specifically required by the standard, many employers issue employees “Forklift Licenses” valid for 3 years, the maximum allowed period between operator evaluations.

Training is required both initially, before being allowed to operate PITs, and periodically thereafter. Each employer is responsible for selecting a designated trainer with education, training, and experience to effectively deliver training and evaluate operators. Some municipal and quasi-municipal organizations find it effective to have an in-house trainer. Manufacturers, distributors, and several safety organizations provide Train-The-Instructor classes and training materials. Other employers find it more practical to have training provided directly by a PIT dealer, consultant, or other outside entity. Either way, the employer must ensure that the training is specific enough to the PITs and operating environment in their workplaces. There is no “generic” or “national” certification to meet this requirement.



## Training Requirements:

### 1. Initial Operator Training

- a. Must be a combination of classroom and hands on operation.
- b. Must include "PIT related" topics:
  - Operating instructions, warnings, and precautions for the types of PITs the operator will be authorized to operate;
  - Differences from an automobile
  - PIT controls and instrumentation: where they are located, what they do, and how they work;
  - Engine/motor operation
  - Steering and maneuvering
  - Visibility (including restrictions due to loading)
  - Fork and attachment adaptation, operation, and use limitations.
  - Capacity and stability
  - Any vehicle inspection and maintenance that the operator will be required to perform.
  - Refueling and/or charging and recharging of batteries.
  - Limitations for safe operation
  - Personal protective equipment
  - Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.
- c. Must include "Workplace Related" topics:
  - 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
  - Hazardous Environments
- d. Must include the requirements of ME 1910.178.

## 2. Initial Operator Evaluation

- a. Must simulate or be representative of the actual workplace requirements
- b. May be a laid out “skills course” type exercise or performing actual workplace operations under supervision of a trainer.
- c. Should utilize an objective checklist.

## 3. Refresher Training- Required if:

- a. The operator has been observed operating the PIT in an unsafe manner
- b. The operator has been involved in an accident or near-miss incident
- c. The operator has received an evaluation that reveals that the operator is not operating the PIT safely
- d. The operator is assigned to drive a different type of PIT;
- e. New types of PITs are put into service
- f. A condition in the workplace changes in a manner that could affect safe operation of the truck

## 4. Operator Evaluation – Required:

- a. An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years in conjunction with refresher training..
- b. If an operator has previously received training in PIT operation and hazards and such training is appropriate to the PIT and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the PIT safely.

**Appendix B** is an example of a refresher evaluation checklist to be used by a trained supervisor or trainer.

### **Certification of Training - must at a minimum include:**

The employer shall certify that each operator has been trained and evaluated as required. The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

## **PIT Operations**

CFR 1910.178 outlines specific information regarding operations of all PITs, these requirements are:

- PITs shall not be driven up to anyone standing in front of a bench or other fixed object.
- No person shall be allowed to stand or pass under the elevated portion of any PIT, whether loaded or empty.
- Unauthorized personnel shall not be permitted to ride on PITs. A safe place to ride shall be provided where riding of PITs is authorized.

- The employer shall prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the PIT.
- When a PIT 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 PIT is parked on an incline.
- A PIT is considered to be unattended when the operator is 25 ft. or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view.
- When the operator of a PIT is dismounted and within 25 ft. of the vehicle still in his view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement.
- A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. PITs shall not be used for opening or closing freight doors.
- Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.
- There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.
- An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.
- A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.
- Only approved PITs shall be used in hazardous locations.
- Fire aisles, access to stairways, and fire equipment shall be kept clear.

## Traveling

- All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three PIT lengths from the PIT ahead, and the vehicle shall be kept under control at all times.
- The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations.
- Other PITs traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed.
- The driver shall be required to 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.
- Railroad tracks shall be crossed diagonally wherever possible. Parking closer than 8 feet from the center of railroad tracks is prohibited.

- The operator shall be required to look in the direction of, and keep a clear view of the path of travel.
- Grades shall be ascended or descended slowly.
- When ascending or descending grades in excess of 10 percent, loaded PITs shall be driven with the load upgrade.
- On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.
- Under all travel conditions the PIT shall be operated at a speed that will permit it to be brought to a stop in a safe manner.
- Stunt driving and horseplay shall not be permitted.
- The driver shall be required to slow down for wet and slippery floors.
- Dock board or bridge plates, shall be properly secured before they are driven over. dock board or bridge plates shall be driven over carefully and slowly and their rated capacity never exceeded.
- Elevators shall be approached slowly, and then entered squarely after the elevator car is properly leveled. Once on the elevator, the controls shall be neutralized, power shut off, and the brakes set.
- Motorized hand trucks must enter elevator or other confined areas with load end forward.
- Running over loose objects on the roadway surface shall be avoided.
- While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

### **Loading.**

- Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.
- Only loads within the rated capacity of the truck shall be handled.
- The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.
- PITs equipped with attachments shall be operated as partially loaded vehicles when not handling a load.
- 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.
- 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.

### **Operation of the PIT.**

- If at any time a PIT is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition.
- Fuel tanks shall not be filled while the engine is running. Spillage shall be avoided.
- Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.
- No PIT shall be operated with a leak in the fuel system until the leak has been corrected.
- Open flames shall not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks.

### **Maintenance of PITs.**

- Any PIT not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel.
- No repairs shall be made in Class I, II, and III locations.
- Those repairs to the fuel and ignition systems of PITs which involve fire hazards shall be conducted only in locations designated for such repairs.
- PITs in need of repairs to the electrical system shall have the battery disconnected prior to such repairs.
- All parts of any such PIT requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.
- PITs shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts. Additional counterweighting of fork trucks shall not be done unless approved by the equipment manufacturer.
- PITs shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily.
- Where PITs are used on a round-the-clock basis, they shall be examined after each shift. Defects when found shall be immediately reported and corrected.
- Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. 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.
- When the temperature of any part of any PIT 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.
- PITs shall be kept in a clean condition, free of lint, excess oil, and grease. Noncombustible agents should be used for cleaning PITs. Low flash point (below



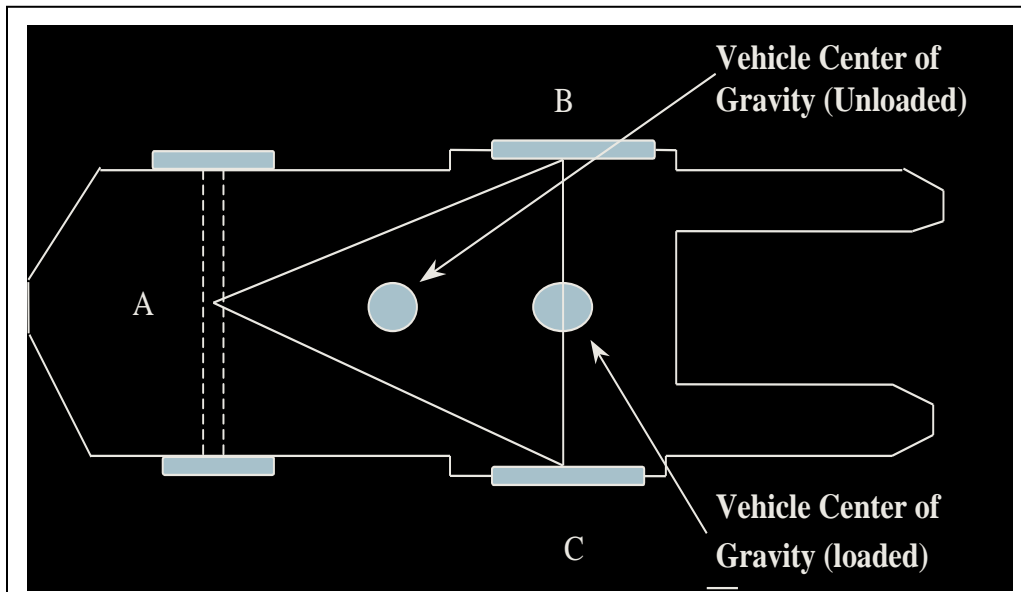
100 °F.) solvents shall not be used. High flash point (at or above 100 °F.) solvents may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be consonant with the agent or solvent used.

- PITs originally approved for the use of gasoline for fuel may be converted to liquefied petroleum gas fuel provided the complete conversion results in a PIT which embodies the features specified for LP or LPS designated vehicles. Such conversion equipment shall be approved. The description of the component parts of this conversion system and the recommended method of installation on specific PITs are contained in the "Listed by Report."

## Safe Operation of PITs

### 1. PIT Stability

The center of gravity of an unloaded PIT is designed to be along the centerline, half way between the rear and front axles. The "stability triangle" of a PIT is represented in the diagram below. If the center of gravity moves outside of the triangle, the PIT will tip over, with potentially fatal results. Loading of the forks, raising the forks, and braking all move the center of gravity forward. Turning or the mast being struck by falling material moves the center of gravity side to side.



With the PIT loaded to capacity, the center of gravity is at the front axle. Any further force in this direction will cause the PIT to roll forward.

- PIT stability is effected by:
  1. Load weight
  2. Load stability (shifting loads can cause tip-overs!)
  3. Travel speed
  4. Cornering technique
  5. Braking technique/brake condition
  6. Driving surface (slippery, uneven, depressions etc.)



7. Objects striking the mast (i.e. falling bales)

**Remember – Tip-overs are the leading cause of fatal and serious accidents. Seat belts are nearly 100% effective at preventing death during a tip-over!**

2. **Attachments**

These affect the load rating and stability of the PIT. Common attachments include jib booms, personnel platforms, and pans/plows. Care must be taken to ensure that these are securely attached to the PIT and that the load rating is appropriately decreased when they are attached. Supplemental load rating plates should be installed showing the impact of the attachment on the truck's rating.

3. **Safety equipment**

a. **Overhead Guard** (“cage”) - is designed to protect the operator from falling objects.

1. ALL RIDER FORKLIFTS must have this guard. If yours does not, take it out of service until replaced.
2. Removal of the guard is allowed if the PIT must be used in an area where it will not fit, but the PIT must be restricted to this area only until it is replaced.
3. Damaged or bent guards must be repaired or replaced per manufacturer specifications.

b. **Passive Restraint (“Seatbelt”)**

1. Is required on all PITs originally so equipped and on all PITs for which the manufacturer has offered a retrofit kit. (This is virtually every ride on PIT in service today.) No PITs are “grandfathered”.
2. Its use, at all times when the PIT is in operation, is required to assure operator safety. Failure to do so can be cited by MBOL under Section 5(a)(1), the “general duty” clause.
3. The passive restraint is highly effective at preventing death and reducing injury in the event of a tip-over, collision, drive off from a dock or oversteering/fell off truck type accident.
4. Most newer PITs also have side guards and other seat attachments to help keep the operator in the seat if a tip-over occurs.

c. **Horn**- This is required equipment. It must be sounded when approaching doorways, aisles, corners, and other limited visibility areas.

d. **Backup alarm** - This must be in working order. Do not modify, remove, install a switch or change it without written manufacturer approval. If a PIT frequently operates in areas of high pedestrian traffic (i.e. civic center), it should be equipped with a bi-directional alarm that sounds when the PIT moves in either direction.

e. **Driving, directional lights** - Driving (headlights) lights are required if operated in areas not lighted to ANSI industrial lighting standards. All original equipment lights on a PIT should be kept in good order and inspected each shift.

- f. **Warning Light** - Most PITs are delivered with a small single flash strobe. This is acceptable for many workplaces, but if you have high pedestrian traffic and blind corners or aisles, you may want to specify or request manufacturer approval to replace it with a rotating halogen beacon on top of the overhead guard. This will reflect off walls etc. and better warn of an approaching PIT.
- g. **Load Backrest Extension** - This is the steel “fence” like guard behind the forks to keep material from falling back toward the operator. They are mandatory on high lift type rider forklifts.
- h. **Fire Extinguisher** - If the PIT operates exclusively indoors, in areas where a class B extinguisher is available within 50’ at all times, then it is not required. Otherwise, a 2.5# minimum dry chemical extinguisher should be mounted in an approved vehicle bracket. It must be maintained annually and inspected monthly.

#### 4. **Truck Docks**

- a. Truck trailer floors and landing gear (if tractor is detached) must be visually inspected before entering the truck/trailer.
- b. Jack stands should be used under the front of trailers if the tractor is detached.
- c. Trailers/trucks must be secured to the loading dock by:
  - 1) A mechanical lock that secures to the ICC bar, or
  - 2) Substantial chains secured to the dock and around the ICC bar, or
  - 3) Wheel chocks meeting DOT standards
- d. Communication with the driver must be clear and concise. Even a well secured truck can pull away under the right conditions. Some entities require the driver to stay in a designated area until loading/unloading is finished.
- e. Dock plates must be checked and securely in place before crossing them.
- f. No matter who performs the above duties, it is the responsibility of the PIT operator to verify that they are done before entering the truck.

#### 5. **Rail Cars**

- a. Rail car doors may not be pushed open or closed with forks. Special devices are available if PITs must be used to open/close cars.
- b. Rail cars must be chocked before being opened.
- c. Loading tracks must be protected by derails and blue flags during loading/unloading operations.
- d. Dock plates must be checked and securely in place before crossing them.
- e. No matter who performs the above duties, it is the responsibility of the PIT operator to verify that they are done before entering the car.

#### 6. **Safe Operating Practices**

- a. Review operator’s manual, required to be kept on all PITs.
- b. Observe safe operating speeds for conditions.

- c. Always keep the load UPGRADE on ramps or steep hills. PITs must back down if loaded.
- d. Travel in reverse if carrying a load that obstructs forward vision.
- e. Sound horn when approaching doorways, aisles, pedestrian walkways, pedestrian doors, and blind corners.
- f. Cross railroad tracks at an angle.
- g. Keep the load high enough to avoid fetching up on inclines or uneven surfaces.
- h. Mast (tilt) the load back as soon as possible after picking it up.
- i. NO RIDERS!
- j. Keep people away from raised loads.
- k. NEVER reach or put any part of your body between the mast and PIT.
- l. NEVER carry a "spare" fuel cylinder.
- m. Don't carry cargo on the truck body or cage.
- n. Don't add field counter weights. (people, concrete blocks etc.)
- o. ALWAYS be aware of your rear swing zone.
- p. Proper PPE must be worn. Hearing protection and safety glasses are needed for typical PIT operations. Other PPE may be needed for some tasks.
- q. To prevent fire, the engine compartment, radiator, and drive train areas must be kept free of accumulations of dust, paper, grease etc. Periodic blow down with compressed air or pressure washing is necessary. (Observe proper compressed air safety.) The frequency varies from several times per year in "clean" areas to once per shift where debris/dust is an issue.

## 7. **Safe Parking**

- a. The parking brake must be set before the operator leaves. (If the parking brake does not work, tag the truck out of service and apply wheel chocks immediately.)
- b. If the operator is more than 25' from the PIT, or out of direct sight of it, the engine must be shut off.
- c. Wheel chocks must be used if parking on inclines.

## 8. **Safe Fueling**

- a. The LP gas cylinder storage area should be outside, if possible.
- b. Whether indoors or out, a cylinder cage or other protective enclosure should be used.
- c. LP storage cannot be within 50' of an exit.
- d. Limit LP storage to the minimum required. Under no circumstances should the capacity of full and empty cylinders indoors exceed 300#.
- e. The storage area should be located or protected to avoid being damaged by vehicles.

- f. Seasonal overfilling can result in indoor gas leaks. Be sure that your fuel vendor strictly adheres to Compressed Gas Institute standards for cylinder fills in cold weather.
- g. When changing cylinders, the engine must be turned off.
- h. All tools used in refueling must be non-sparking.
- i. Eye protection and neoprene gloves should be worn when changing cylinders.
- j. Check for leaks before starting truck.
- k. If you have a leak- **EVACUATE**. Follow the facility emergency plan for a hazardous materials incident.
- l. Always install the LP cylinder on the PIT with the orientation hole on the cylinder collar with the cylinder alignment pin on the PIT.

## 9. **Safe Battery Charging/Changing**

- a. A designated battery charging area should be set up with adequate ventilation to avoid explosive hydrogen gas buildups and be free of potential ignition sources.
- b. A water hose is required for flushing spills.
- c. The charging area must have a safety eye wash station.
- d. If batteries are removed from trucks, an approved battery hoist must be provided.
- e. Indirect vent goggles must be worn when checking or adding electrolyte.
- f. Batteries must be properly secured in the truck.
- g. Inspect cables and replace any with visible insulation damage/deterioration.

## 10. **Use of PITs to Elevate Personnel**

- a. Only engineer designed and approved platforms (manlifts) should be used to elevate personnel. People should never climb or stand on the mast or forks.
- b. Approved personnel platforms must be securely attached.
- c. An emergency stop must be provided at the platform.
- d. Proper restraint fall protection must be worn by elevated personnel. Tie off to objects outside the platform must be prohibited.



## Sources of Additional Help

MMA, Risk Management Services - Please call Loss Control Services at (800) 590-5583 or visit our website at [www.memun.org/rms/lc/default.htm](http://www.memun.org/rms/lc/default.htm).

Maine Department of Labor- Safety Works- <http://www.safetyworksmaine.com/>

OSHA – <https://www.osha.gov/SLTC/powerindustrialtrucks/>

OSHA ETools- <https://www.osha.gov/SLTC/etools/pit/index.html>

NIOSH- <https://www.cdc.gov/niosh/docs/2001-109/default.html>

Area Vendors (training-service)

WD Matthews, <https://www.wdmatthews.com/>

Southworth Milton, <https://www.miltoncat.com/dealer-locations/scarborough-me>

New England Industrial Trucks, <https://neit.com/home-2/>

NiTco, <https://www.nitco-lift.com/>

This information is intended to assist you in your loss control efforts. "Best Practices" are developed from available current information but may not address every possible cause of loss. We do not assume responsibility for the elimination of all hazards that could possibly cause accidents or losses. Adherence to these recommendations does not guarantee the fulfillment of your obligation under local, state, or federal laws.

# Appendix A

## Pre-Shift Powered Industrial Truck Inspection

Department \_\_\_\_\_ Truck \_\_\_\_\_

Date \_\_\_\_\_ Operator \_\_\_\_\_

Item	Satisfactory	Corrected	Unsatisfactory
Visual for leaks, worn parts, damage			
Tire inflation/condition			
Fluid levels- oil, hydraulic, coolant, electrolyte			
Engine compartment, radiator cleanliness			
Fire extinguisher (if equipped)			
Lights, backup alarm, horn			
Overhead guard			
Seatbelt			
Start- normal operation, noises etc.			
Proper control function, return to neutral			
Steering, brakes- proper operation			

Total engine hours \_\_\_\_\_

Comments:

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**TAG OUT UNSAFE PITS AND SEEK MAINTENANCE**



# Appendix B

## Forklift Operator's Daily Check List

Check each item Before Start of Each Shift

Date \_\_\_\_\_

Check one:

- Gas/LGP/Diesel Truck    Electric Sit-down    Electric Stand-up    Electric Pallet

Truck Serial Number: \_\_\_\_\_ Hour meter reading: \_\_\_\_\_

Operator: \_\_\_\_\_ Supervisor's OK: \_\_\_\_\_

Let you supervisor and/or maintenance know of any problem.

DO NOT OPERATE A FAULTY TRUCK. Your safety is at risk.

Check boxes:  ok    NG = needs attention, or repair – circle problem and comment  
\* = (if equipped)

OK	NG	Visual Check	Comment
		Tires/wheels: wear, damage, nuts tight	
		Head/Tail/Working Lights: damage, mounting, operation	
		Gauges/Instruments: damage, operation	
		Operator Restraint: damage, mounting, operation, oily, dirty	
		Warning Decals/Operator's Manual: missing, not readable	
		Data Plate: not readable, missing	
		Overhead Guard: bent, cracked, loose, missing	
		Load Back Rest: bent cracked, loose, missing	
		Forks: bent, worn, stops OK	
		Engine Oil: level, dirty, leaks	
		Hydraulic Oil: level, dirty, leaks	
		Radiator: level, dirty, leaks	
		Fuel: levels, leaks	
		Battery: connections loose, charge, electrolyte low	
		Covers/Sheet metal: damaged, missing	
		Brakes: linkage, reservoir fluid level, leaks debris on floor	
		Engine: runs rough, noisy, leaks	
		Steering: loose/binding, leaks, operation	
		Service Brake: linkage loose/binding, stops OK, grab	
		Parking Brake: loose/binding, operational, adjustment	
		Seat Belt: loose/binding, operational, adjustment	
		Horn: operation	

		Backup Alarm: mounting, operation	
		*Warning lights	
		Lift/Lower: loose/binding, excessive drift, "chatters", leaks	
		Attachments: mounting, damaged, operation, leaks	
		Control Levers: loose/binding, find neutral OK	
		Directional Control: loose/binding, freely return to neutral	
		Electric Trucks Only Indicator in green while holding full forward tilt	

# Appendix C

## Periodic Powered Industrial Truck Operator Evaluation

Date \_\_\_\_\_ Operator \_\_\_\_\_

Location \_\_\_\_\_ Truck(s) \_\_\_\_\_

Task(s) Performed \_\_\_\_\_

Observable Safe Behavior	Safe	At Risk	Comments
Completes Pre-shift Inspection.			
Wears seatbelt.			
Wears proper PPE			
Operates at safe speed for conditions.			
Uses smooth and safe turning technique .			
Eyes on workpath, looks where going, before backing.			
Sounds horn at corners, doors, blind spots.			
Travels in reverse when load obstructs vision.			
Observes load handling/stacking rules.			
Keeps load uphill on ramps/hills.			
Observes safe battery charging, refueling rules.			
Parks truck properly- brake.			
<p>Reviewed safe and at risk items with operator _____</p> <p>___ Operator evaluation satisfactory</p> <p>___ Operator evaluation satisfactory after coaching on at risk items</p> <p>___ Operator referred for refresher training/follow-up evaluation</p> <p>Evaluator _____</p>			

## Appendix D

### PERFORMANCE TEST FOR FORKLIFT OPERATORS

EMPLOYEE \_\_\_\_\_ DATE \_\_\_\_\_ TIME \_\_\_\_\_ a.m./p.m.

- Y N 1. Showed familiarity with truck controls.
- Y N 2. Gave proper signals when turning.
- Y N 3. Sounded horn at intersections.
- Y N 4. Kept a clear view of direction of travel.
- Y N 5. Turned corners correctly – was aware of rear end swing.
- Y N 6. Drove under control and within proper traffic aisles.
- Y N 7. Approached load properly.
- Y N 8. Lifted load properly.
- Y N 9. Maneuvered properly.
- Y N 10. Traveled with load at proper height.
- Y N 11. Lowered load smoothly/slowly.
- Y N 12. Stopped smoothly/completely.
- Y N 13. Balanced load properly.
- Y N 14. Carried load back against the backrest.
- Y N 15. Carried parts/stock in approved containers.
- Y N 16. Checked bridge plates / ramps.
- Y N 17. Placed loads within marked area.
- Y N 18. Stacked loads evenly and neatly.
- Y N 19. Drove in reverse when required.
- Y N 20. When required, determined weight of load.
- Y N 21. When parking, placed forks flat on floor, neutralized controls, set brake, shut power off.
- Y N 22. Participated in pre-use inspection.

Total Rating

Evaluator \_\_\_\_\_

Employee Signature \_\_\_\_\_

