FORKLIFT TRAINING

Reference: 29 CFR, §1910, 178.

Summary

Training and certification is required before an employee may operate a lift truck. Refresher training is required when warranted by the circumstances but a reevaluation must be made at least every three years.

Trainers

Trainers must have knowledge, training and experience to train operators and evaluate their effectiveness. A combination of trainers may be used. For example, a previously trained employee may conduct training with supervisors.

Content of Training Program

Initial training must cover specific topics, unless you can show that they do not apply to your workplace. If any are not applicable, you should document this in your forklift training file. You may use a checklist to ensure that all required topics are covered during your training program.

Training must consist of a combination of *formal instruction* (e.g., lecture, video, discussion, etc.), *practical training* (demonstrations by the trainer and practical exercises by the trainee), and *evaluation* of the trainee's performance.

Refresher Training

Refresher training is required when:

- The operator has been observed operating the vehicle in an unsafe manner.
- The operator has been involved in an accident or near-miss.
- The operator has received an evaluation which indicates unsafe operation.
- The operator is assigned a different type of truck.
- A workplace condition changes in a manner which could affect safe operation.

Evaluations

An evaluation is required upon completion of the initial training, when a new driver has previously received appropriate training, and *at least every three years*.

Duplicate Training

If a driver has previously received training in one or more topics on the checklist (see following page), additional training in that topic is not required if the driver has been evaluated and found competent.

Certification

You must certify that each driver has been trained and evaluated. The certification must include:

- The name of the driver.
- The date of the training.
- The date of the evaluation.
- The identity of the person(s) performing the training or evaluation.

Training Guidelines

Non-mandatory OSHA guidance is offered in the Appendix to this section.

Required Training Content for Powered Industrial Truck Operators

- ☐ Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- ☐ Differences between the industrial 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 limitations of use.
- ☐ Vehicle capacity.
- ☐ Vehicle stability.
- ☐ Any vehicle inspection and maintenance that the operator must perform.
- ☐ Refueling and/or charging and recharging of batteries.
- ☐ Operating limitations.
- ☐ Other operating instructions, warnings or precautions listed in the operator's manual.
- ☐ 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 locations where the vehicle will be operated.
- ☐ Ramps and other sloped surfaces that could affect the vehicle's stability.
- ☐ Closed environments and other areas of insufficient ventilation.
- ☐ Other unique or potentially hazardous workplace conditions.

Evaluation Form for Forklift Operators

EMPLOYEE: _____

- ☐ Familiarity with controls.
- ☐ Proper signals when turning.
- ☐ Slowed down at intersections.
- ☐ Sounded horn at intersections.
- ☐ Obeyed signs.
- ☐ Kept clear view of travel.
- ☐ Turned corners correctly - aware of rear end swing.
- ☐ Yielded to pedestrians.
- ☐ Drove under control and within proper traffic aisles.
- ☐ Approached load properly.
- ☐ Lifted load properly.
- ☐ Maneuvered properly.
- ☐ Traveled with load at proper height.
- ☐ Lowered load smoothly/slowly.
- ☐ Stopped smoothly/completely.
- ☐ Load balanced properly.
- ☐ Forks under load all the way.
- ☐ Carried parts/stock in approved containers.
- ☐ Checked bridgeplates/ramps.
- ☐ Placed loads within marked area.
- ☐ Stacked loads evenly and neatly.
- ☐ Drove backward when required.
- ☐ Checked load weights.
- ☐ Placed forks on the floor when parked, controls neutralized, brake on set, power off.
- ☐ Followed proper instructions for maintenance - checked both at beginning and end.

This is to certify that _____ has been trained and evaluated as required by 29 CFR, 1910.178(L).

Date of training: _____ Taining performed by: _____

Date of evaluation:_____ Evaluation performed by: _____

Appendix

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Sample Generic Daily Checklist for Powered Industrial Trucks

This checklist is designed to serve as a guide only and may not be totally inclusive. Each type of powered industrial truck is unique and checklists pertinent to each type of vehicle should be modified accordingly. It is recommended that the manufacturer's instructions on vehicle maintenance and owner's and operator's responsibilities also be consulted. You may choose to use a checklist for each type of industrial truck you have in your workplace or compile one that can be used for any type of truck.

- ☐ **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?

  - ☐ Overhead 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 Cylinder** - Is the cylinder 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 cylinder 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 Door** - (found on stand up rider models) Is it in place?

☐ **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?

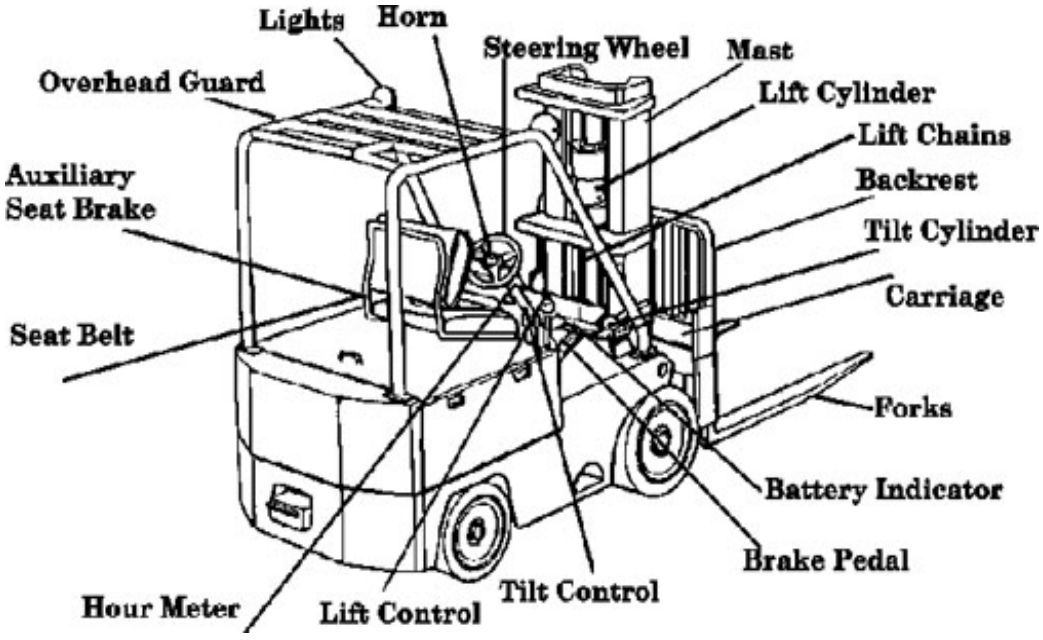
☐ **Tow Hook**
- ☐ Does it engage and release smoothly?
- ☐ Does the safety catch work properly?

☐ **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?



Stability of Powered Industrial Trucks

Definitions

The following definitions help to explain the principle of stability:

Center of gravity is the point on an object at which all of the object's weight is concentrated. For symmetrical loads, the center of gravity is at the middle of the load. Counterweight is the weight that is built into the truck's basic structure and is used to offset the load's weight and to maximize the vehicle's resistance to tipping over.

Fulcrum is the truck's axis of rotation when it tips over.

Grade is the slope of a surface, which is usually measured as the number of feet of rise or fall over a hundred foot horizontal distance (the slope is expressed as a percent).

Lateral stability is a truck's resistance to overturning sideways.

Line of action is an imaginary vertical line through an object's center of gravity. Load center is the horizontal distance from the load's edge (or the fork's or other attachment's vertical face) to the line of action through the load's center of gravity.

Longitudinal stability is the truck's resistance to overturning forward or rearward.

Moment is the product of the object's weight times the distance from a fixed point (usually the fulcrum). In the case of a powered industrial truck, the distance is measured from the point at which the truck will tip over to the object's line of action. The distance is always measured perpendicular to the line of action.

Track is the distance between the wheels on the same axle of the truck.

Wheelbase is the distance between the centerline of the vehicle's front and rear wheels.

General

Determining the stability of a powered industrial truck is simple once a few basic principles are understood. There are many factors that contribute to a vehicle's stability: the vehicle's wheelbase, track, and height; the load's weight distribution; and the vehicle's counterweight location (if the vehicle is so equipped).

The ‘‘stability triangle,’’ used in most stability discussions, demonstrates stability simply.

Basic Principles

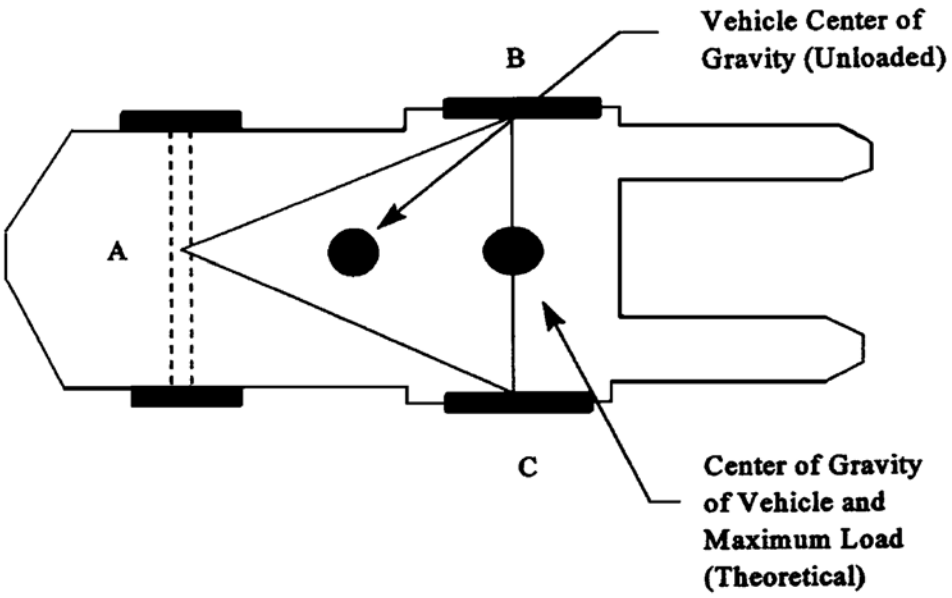
Whether an object is stable depends on the object's moment at one end of a system being greater than, equal to, or smaller than the object's moment at the system's other end. This principle can be seen in the way a see-saw or teeter-totter works: that is, if the product of the load and distance from the fulcrum (moment) is equal to the moment at the device's other end, the device is balanced and it will not move. However, if there is a greater moment at one end of the device, the device will try to move downward at the end with the greater moment.

The longitudinal stability of a counterbalanced powered industrial truck depends on the vehicle's moment and the load's moment. In other words, if the mathematic product of the load moment (the distance from the front wheels, the approximate point at which the vehicle would tip forward) to the load's center of gravity times the load's weight is less than the vehicle's moment, the system is balanced and will not tip forward. However, if the load's moment is greater than the vehicle's moment, the greater load-moment will force the truck to tip forward.

The Stability Triangle

Almost all counterbalanced powered industrial trucks have a three-point suspension system, that is, the vehicle is supported at three points. This is true even if the vehicle has four wheels. The truck's steer axle is attached to the truck by a pivot pin in the axle's center. When the points are connected with imaginary lines, this three-point support forms a triangle called the stability triangle. Figure 1 depicts the stability triangle.

Figure 1.



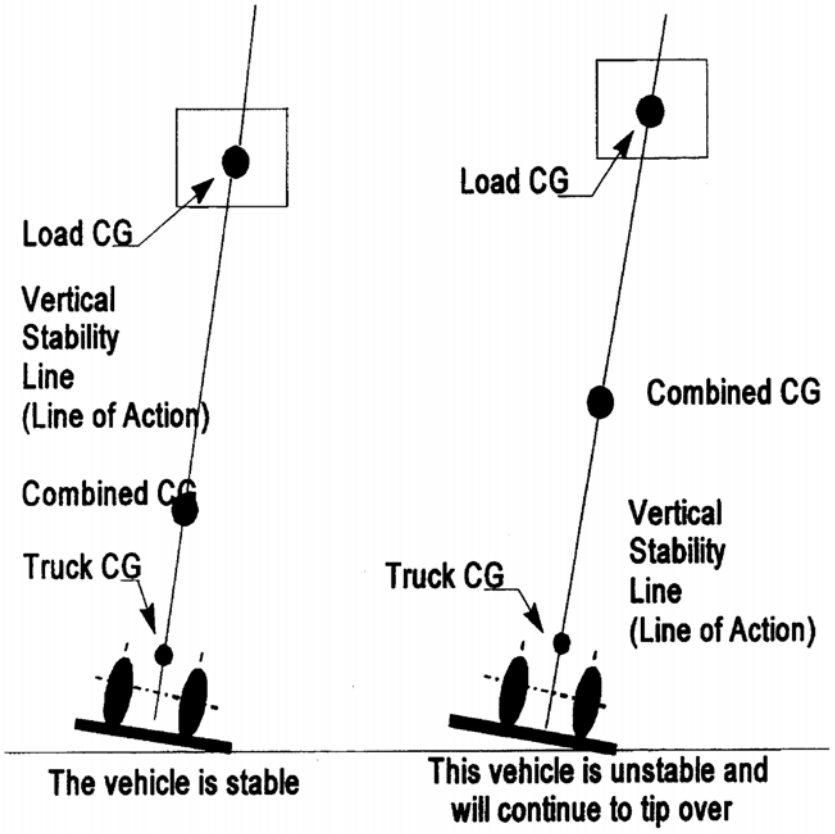
Notes:

1. When the vehicle is loaded, the combined center of gravity (CG) shifts toward line B-C. Theoretically, the maximum load will result in the CG at the line B-C. In actual practice, the combined CG should never be at line B-C.

2. The addition of additional counterweight will cause the truck CG to shift toward point A and result in a truck that is less stable laterally.

When the vehicle's line of action, or load center, falls within the stability triangle, the vehicle is stable and will not tip over. However, when the vehicle's line of action or the vehicle/load combination falls outside the stability triangle, the vehicle is unstable and may tip over. (See Figure 2.)

Figure 2.



Longitudinal Stability

The axis of rotation when a truck tips forward is the front wheels' points of contact with the pavement. When a powered industrial truck tips forward, the truck will rotate about this line. When a truck is stable, the vehicle-moment must exceed the load-moment. As long as the vehicle-moment is equal to or exceeds the load-moment, the vehicle will not

tip over. On the other hand, if the load moment slightly exceeds the vehicle-moment, the truck will begin to tip forward, thereby causing the rear to lose contact with the floor or ground and resulting in loss of steering control. If the load-moment greatly exceeds the vehicle moment, the truck will tip forward.

To determine the maximum safe load-moment, the truck manufacturer normally rates the truck at a maximum load at a given distance from the front face of the forks. The specified distance from the front face of the forks to the line of action of the load is commonly called the load center. Because larger trucks normally handle loads that are physically larger, these vehicles have greater load centers. Trucks with a capacity of 30,000 pounds or less are normally rated at a given load weight at a 24-inch load center. Trucks with a capacity greater than 30,000 pounds are normally rated at a given load weight at a 36- or 48-inch load center. To safely operate the vehicle, the operator should always check the data plate to determine the maximum allowable weight at the rated load center.

Although the true load-moment distance is measured from the front wheels, this distance is greater than the distance from the front face of the forks. Calculating the maximum allowable load-moment using the load-center distance always provides a lower load-moment than the truck was designed to handle. When handling unusual loads, such as those that are larger than 48 inches long (the center of gravity is greater than 24 inches) or that have an offset center of gravity, etc., a maximum allowable load-moment should be calculated and used to determine whether a load can be safely handled. For example, if an operator is operating a 3000 pound capacity truck (with a 24-inch load center), the maximum allowable load-moment is 72,000 inch-pounds (3,000 times 24). If a load is 60 inches long (30-inch load center), then the maximum that this load can weigh is 2,400 pounds (72,000 divided by 30).

Lateral Stability

The vehicle's lateral stability is determined by the line of action's position (a vertical line that passes through the combined vehicle's and load's center of gravity) relative to the stability triangle. When the vehicle is not loaded, the truck's center of gravity location is the only factor to be considered in determining the truck's stability. As long as the line of action of the combined vehicle's and load's center of gravity falls within the stability triangle, the truck is stable and will not tip over. However, if the line of action falls outside the stability triangle, the truck is not stable and may tip over. Refer to Figure 2.

Factors that affect the vehicle's lateral stability include the load's placement on the truck, the height of the load above the surface on which the vehicle is operating, and the vehicle's degree of lean.

Dynamic Stability

Up to this point, the stability of a powered industrial truck has been discussed without considering the dynamic forces that result when the vehicle and load are put into motion. The weight's transfer and the resultant shift in the center of gravity due to the

dynamic forces created when the machine is moving, braking, cornering, lifting, tilting, and lowering loads, etc., are important stability considerations.

When determining whether a load can be safely handled, the operator should exercise extra caution when handling loads that cause the vehicle to approach its maximum design characteristics. For example, if an operator must handle a maximum load, the load should be carried at the lowest position possible, the truck should be accelerated slowly and evenly, and the forks should be tilted forward cautiously. However, no precise rules can be formulated to cover all of these eventualities.