
Training Materials For OSHA'S Powered Industrial Truck Operator Training Standard



U.S. Department of Labor

Occupational Safety and Health Administration
Office of Training and Education
1555 Times Drive
Des Plaines, IL 60018



POWERED INDUSTRIAL TRUCK OPERATOR TRAINING

TABLE OF CONTENTS

- Standard Summary
- Powered Industrial Truck Operator Training *Federal Register* Final Rule; December 1, 1998
- Handouts of Slides Outlining the Powered Industrial Truck Operator Training Standard
- Summary of Appendix A
- Sample Daily Checklists for Powered Industrial Trucks
- Summaries of Selected Forklift Fatalities Investigated by OSHA
- Developing a Training Program for Powered Industrial Truck Operators
- Sample Powered Industrial Truck (PIT) Operator Training Program Outline
- Sample Performance Test for Forklift Operators
- Frequently Asked Questions About Powered Industrial Truck Operator Training.

Powered Industrial Truck Operator Training

Standard Summary

The Occupational Safety and Health Administration (OSHA) is revising its existing requirements for powered industrial truck operator training (codified at 29 CFR 1910.178(l)) and issuing new requirements to improve the training of these operators. The new requirements are intended to reduce the number of injuries and deaths that occur as a result of inadequate operator training. They apply to all industries (general industry, construction, shipyards, marine terminals, and longshoring operations) in which trucks are being used, except agricultural operations.

These provisions mandate a training program that bases the amount and type of training required on: the operator's prior knowledge and skill; the types of powered industrial trucks the operator will operate in the workplace; the hazards present in the workplace; and the operator's demonstrated ability to operate a powered industrial truck safely. Refresher training is required if: the operator is involved in an accident or a near-miss incident; the operator has been observed operating the vehicle in an unsafe manner; the operator has been determined during an evaluation to need additional training; there are changes in the workplace that could affect safe operation of the truck; or the operator is assigned to operate a different type of truck. Evaluations of each operator's performance are required as part of the initial and refresher training, and at least once every three years.

OSHA estimates that this rule will prevent 11 deaths and 9,422 injuries per year. OSHA estimates that the annualized cost of this rule is approximately \$16.9 million for all affected industries.

Effective Date: The effective date is March 1, 1999.

Compliance Dates: The dates by which powered industrial truck operators must be trained are shown on the following table.

If the employee was hired:	The initial training and evaluation of that employee must be completed:
Before December 1, 1999.	By December 1, 1999.
After December 1, 1999.	Before the employee is assigned to operate a powered industrial truck.

PART 1910 -- OCCUPATIONAL SAFETY AND HEALTH STANDARDS [AMENDED]

1. The authority citation for subpart B of part 1910 continues to read as follows:

Authority: Secs. 4, 6, and 8 of the Occupational Safety and Health Act, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 et seq.; Service Contract Act of 1965, 41 U.S.C 351 et seq.; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41, Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 et seq.; Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable; and 29 CFR Part 1911.

2. Section 1910.16 is amended by adding new paragraphs (a)(2)(x) and (b)(2)(xiv), by removing the word "and" from the end of paragraph (b)(2)(xii) and by removing the period at the end of paragraph (b)(2)(xiii)(D) and adding in its place a semicolon and the word "and" as follows:

Sec. 1910.16 Longshoring and marine terminals. [AMENDED]

(a) * * *

(2) * * *

(x) Powered industrial truck operator training, Subpart N, Sec. 1910.178(l).

(b) * * *

(2) * * *

(xiv) Powered industrial truck operator training, Subpart N, Sec. 1910.178(l).

3. The authority citation for subpart N of part 1910 is revised to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655,657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable.

Sections 1910.176, 1910.177, 1910.178, 1910.179, 1910.180, 1910.181, and 1910.184 also issued under 29 CFR parts 1911.

4. Section 1910.178 is amended by revising paragraph (l) and by adding appendix A at the end of the section to read as follows:

Sec. 1910.178 Powered Industrial Trucks

(l) Operator Training.

(1) Safe Operation.

- (i) The employer shall ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the training and evaluation specified in this paragraph (1).
- (ii) Prior to permitting an employee to operate a powered industrial truck (except for training purposes), the employer shall ensure that each operator has successfully completed the training required by this paragraph (1), except as permitted by paragraph (1)(5).

(2) Training Program implementation.

- (i) Trainees may operate a powered industrial truck only:
 - (A) Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence: and
 - (B) Where such operation does not endanger the trainee or other employees.
- (ii) 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.
- (iii) All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.

(3) 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.

(i) Truck-related topics:

- (A) Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate;
- (B) Differences between the truck and the automobile;
- (C) Truck controls and instrumentation: where they are located, what they do, and how they work;
- (D) Engine or motor operation;
- (E) Steering and maneuvering;
- (F) Visibility (including restrictions due to loading);

- (G) Fork and attachment adaptation, operation, and use limitations;
- (H) Vehicle capacity;
- (I) Vehicle stability;
- (J) Any vehicle inspection and maintenance that the operator will be required to perform;
- (K) Refueling and/or charging and recharging of batteries;
- (L) Operating limitations;
- (M) 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.

(ii) Workplace-related topics:

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

(iii) The requirements of this section.

(4) Refresher training and evaluation.

- (i) Refresher training, including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (l)(4)(ii) to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely.
- (ii) Refresher training in relevant topics shall be provided to the operator when:
 - (A) The operator has been observed to operate the vehicle in an unsafe manner;
 - (B) The operator has been involved in an accident or near-miss accident;
 - (C) The operator has received an evaluation that reveals that the operator is not operating the truck safely;
 - (D) The operator is assigned to drive a different type of truck; or
 - (E) A condition in the workplace changes in a manner that could affect safe operation of the truck.
- (iii) An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years.

(5) **Avoidance of duplicative training.** If an operator has previously received training in a topic specified in paragraph (l)(3) of this section, and such training is appropriate to the truck and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the truck safely.

(6) **Certification.** The employer shall certify that each operator has been trained and evaluated as required by this paragraph (l). 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.

(7) **Dates.** The employer shall ensure that operators of powered industrial trucks are trained, as appropriate, by the dates shown in the following table.

If the employee was hired:	The initial training and evaluation of that employee must be completed:
Before December 1, 1999.	By December 1, 1999.
After December 1, 1999.	Before the employee is assigned to operate a powered industrial truck.

Appendix A to Section 1910.178 provides non-mandatory guidance to assist employers in implementing this paragraph (l). This appendix does not add to, alter, or reduce the requirements of this section.

Appendix A – Stability of Powered Industrial Trucks (Nonmandatory appendix to paragraph (l) of this section)

A-1. 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.

A-2. General.

A-2.1. 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).

A-2.2. The "stability triangle," used in most stability discussions, demonstrates stability simply.

A-3. Basic Principles.

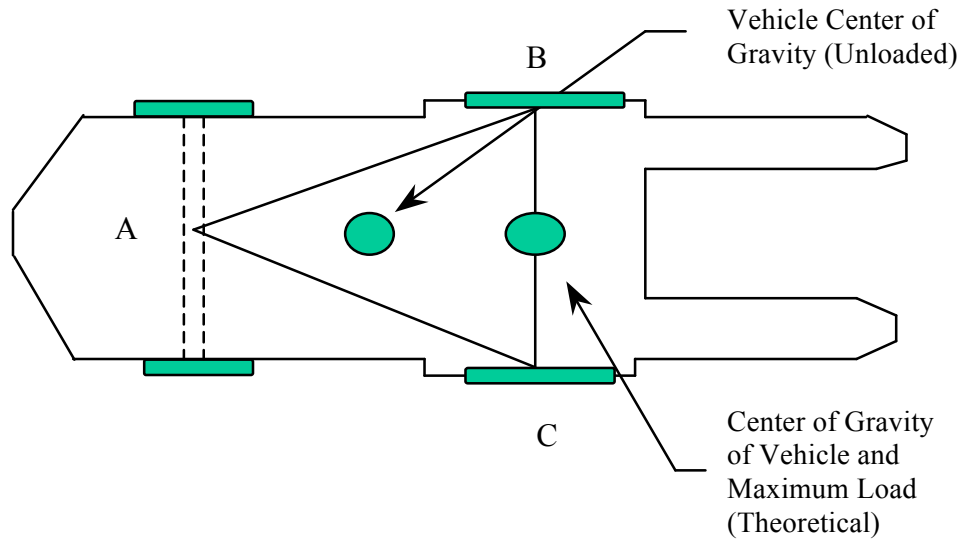
A-3.1. Whether an object is stable depends on the object's moment at one end of a system being greater than, equal to, or smaller than the object's moment at the system's other end. This principle can be seen in the way a see-saw or teeter-totter works: that is, if the product of the load and distance 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.

A-3.2. 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.

A-4. The stability Triangle.

A-4.1. 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.



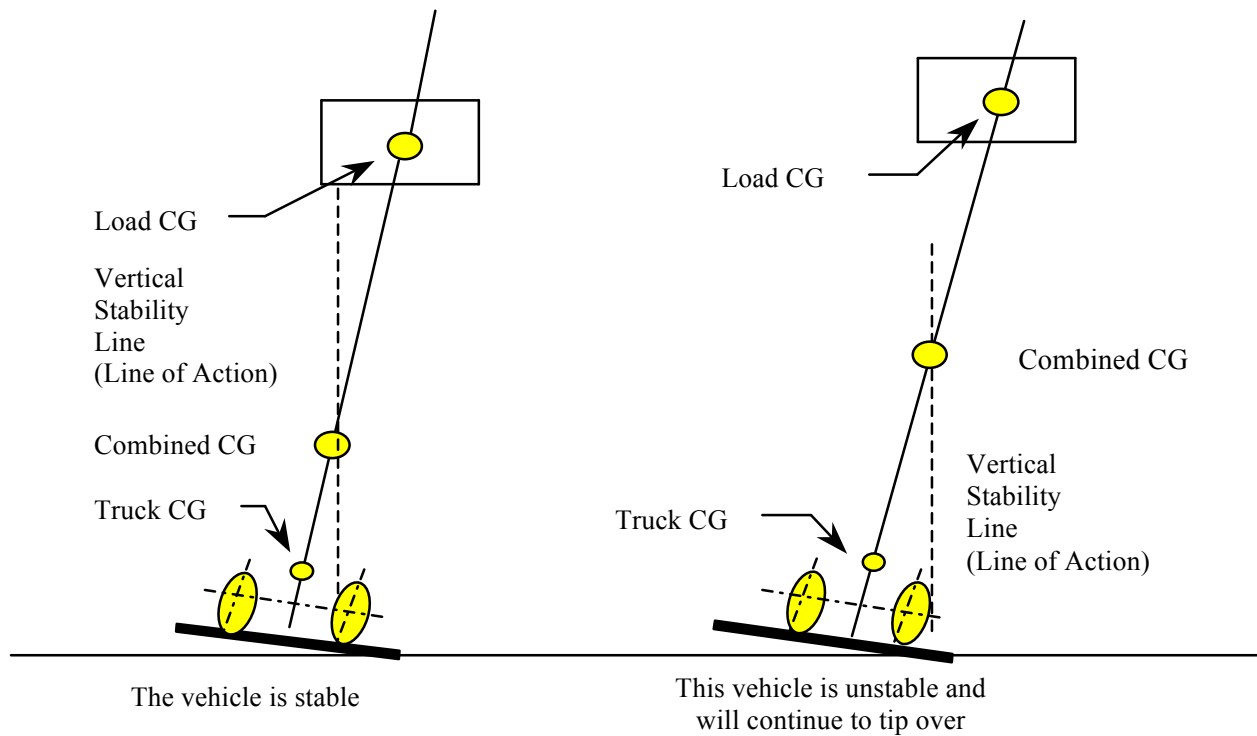
Notes:

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.

A-4.2. 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.



A-5. Longitudinal Stability.

A-5.1 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 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.

A-5.2. 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.

A-5.3. 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 3,000 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 weight is 2,400 pounds (72,000 divided by 30).

A-6. Lateral Stability.

A-6.1. 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.

A-6.2. 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.

A-7. Dynamic Stability.

A-7.1. 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.

A-7.2. 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.

PART 1915 -- CCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT [AMENDED]

1. The authority citation for part 1915 is revised to read as follows:

Authority: Section 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655,657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable.

Section 1915.120 and 1915.152 also issued under 29 CFR 1911.

2. A new section 1915.120 is added to read as follows:

Sec. 1915.120 Powered Industrial Truck Operator Training

NOTE: The requirements applicable to shipyard employment under this section are identical to those set forth at 1910.178(l) of this chapter.

PART 1917 -- MARINE TERMINALS [AMENDED]

1. The authority citation for part 1917 continues to read as follows:

Authority: Section 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655,657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), or 6-96 (62 FR 111), as applicable; and 29 CFR Part 1911.

Section 1917.28 also issued under 5 USC 553.

Subpart A – Scope and Definitions

2. Section 1917.1 is amended by adding a new paragraph (a)(2)(xiv), by removing the word “and” from the end of paragraph (a)(2)(xii), and by removing the period at the end of paragraph (a)(2)(xiii)(D), and adding in its place a semicolon and the word “and” as follows:

Sec. 1917.1 Scope and applicability.

(a) * * *

(2) * * *

(xiv) Powered industrial truck operator training, Subpart N, 1910.178(l)

**PART 1918 -- SAFETY AND HEALTH REGULATIONS FOR LONGSHORING
[AMENDED]**

1. The authority citation for part 1918 is revised to read as follows:

Authority: Section 4, 6, and 8 of the Occupational Safety and Health Act of 1970, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 et seq.; Service Contract Act of 1965, 41 U.S.C. 351 et seq.; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41 of the Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 et seq.; Secretary of Labor's Order No. 6-96 (62 FR 111); and 29 CFR Part 1911.

Subpart A -- Scope and Definitions

2. Section 1918.1 is amended by adding a new paragraph (b)(10), by removing the word "and" from the end of paragraph (b)(8) and by removing the period from the end of paragraph (b)(9)(iv), and adding in its place a semicolon and the word "and" as follows:

Sec. 1918.1 Scope and Application

* * * * *

(b) * * *

(10) Powered industrial truck operator training, Subpart N, Sec. 1910.178(l)

PART 1926 -- OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR CONSTRUCTION [AMENDED]

1. The authority citation for subpart O of part 1926 is revised to read as follows:

Authority: Section 107, Construction Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and health Act of 1970 (29 U.S.C. 653, 655,657); Secretary of Labor’s Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR-111), as applicable. Section 1926.602 also issued under 29 CFR part 1911.

2. Section 1926.602 is amended by adding a new paragraph (d) to read as follows:

Sec. 1926.602 Material Handling Equipment [Amended]

* * * * *

(d) Powered Industrial Truck Operator Training.

Note: The requirements applicable to construction work under this paragraph are identical to those set forth at 1910.178(l) of this chapter.

* * * * *



POWERED INDUSTRIAL TRUCK OPERATOR TRAINING - STABILITY OF POWERED INDUSTRIAL TRUCKS

SUMMARY OF APPENDIX A

➔ A-1 Definitions

- The following definitions help to explain the principle of stability:
 - ✓ Center of Gravity is a point on an object at which all of the object's weight can be considered to be concentrated.
 - ✓ Counterweight is the weight that is a part of the truck's basic structure that 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 a surface's slope that is usually measured as the number of feet of rise or fall over a hundred foot horizontal distance (measured as a per cent).
 - ✓ Lateral stability is a truck's resistance to tipping over sideways.
 - ✓ Line of action is an imaginary 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. In the case of a powered industrial truck, the distance is measured from the point that 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 wheels on the vehicle's same axle.
 - ✓ Wheelbase is the distance between the centerline of the vehicle's front and rear wheels.

➔ A-2 General

- Stability determination for a powered industrial depends on a few basic principles. There are many factors that contribute to a vehicle's stability:
 - ✓ vehicle wheelbase;
 - ✓ track;
 - ✓ height;
 - ✓ the load's weight distribution; and,
 - ✓ the vehicle's counterweight location (if so equipped).
- The "stability triangle," used in most stability discussions, demonstrates stability simply.

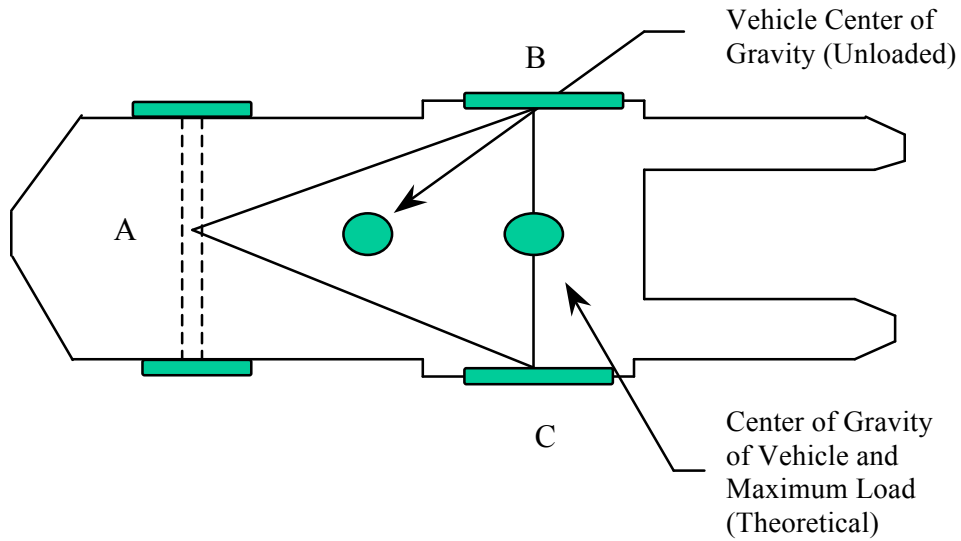
➔ A-3 Basic Principles

- Determining whether an object is stable is dependent 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 is the same principle on which a seesaw works. 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 will not move. However, if there is a greater moment at the device's one end, the device will try to move downward at the end with the greater moment.
- 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 point about which the vehicle would tip over) 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-moment is greater than the vehicle-moment, the greater load-moment will force the truck to tip forward.

➔ A-4 The stability Triangle

- Almost all counterbalanced powered industrial trucks have a three-point suspension system, that is, the vehicle is supported at three points. 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

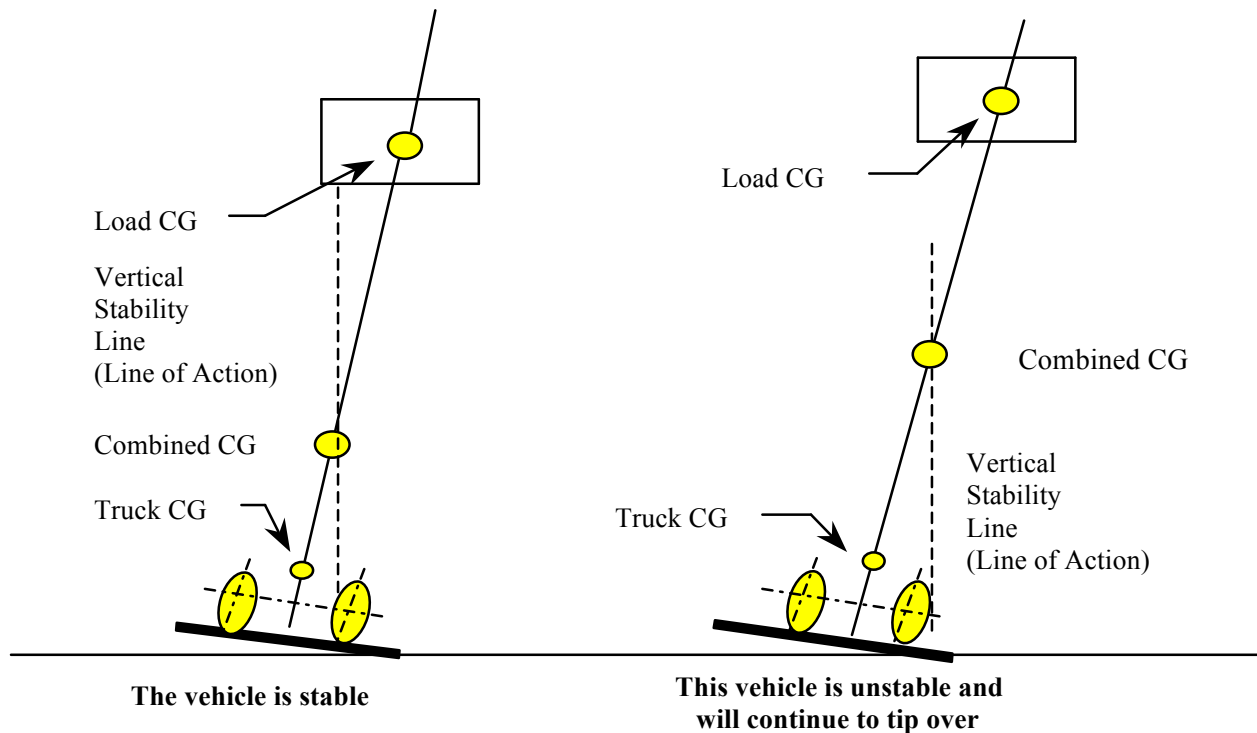


Notes:

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.



→ A-5 Longitudinal Stability

- The axis of rotation when a truck tips forward is the front wheel's 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 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 a load center. Trucks with a 30,000 pounds or less capacity are normally rated at a given load weight at a 24-inch load center. For trucks of greater than 30,000 pounds capacity, the load center is normally rated at 36- or 48-inch load center distance. **To safety 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. Calculation of 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 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 3,000 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 probable load moment is 72,000 inch pounds (3,000 times 24). If a probable 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).

→ A-6 Lateral Stability

- The vehicle's lateral stability is determined by the lines 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.
- 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.

→ A-7 Dynamic Stability

- The dynamic forces that result when the vehicle and load are put into motion must also be considered. 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 weight load, the load should be carried at the lowest practical height, the truck should be accelerated slowly and evenly, and forks should be tilted forward cautiously. However, no precise rules can be formulated to cover all of these eventualities.

SAMPLE DAILY CHECKLISTS FOR POWERED INDUSTRIAL TRUCK

The following checklists are intended to assist in providing training on OSHA's revised powered industrial truck operator standards. They are not a substitute for any of the provisions of the Occupational Safety and Health Act of 1970, or for any standards issued by the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA). OSHA wishes to acknowledge the UAW-Ford National Joint Committee on Health and Safety for granting permission to use the checklists and related graphics.

The revised OSHA standard for powered industrial truck training requires that an employer provide training to truck operators on a variety of topics. Among these topics are vehicle inspections and maintenance that the operator will be required to perform. The following checklists are being provided as part of OSHA's ongoing effort to assist employers and employees in ensuring that a safe and healthful workplace is provided. The lists 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. The OSHA standards for powered industrial trucks should be evaluated to ensure compliance.

Your workplace may have a variety of trucks that are being operated. They may include the following types of vehicles:

- Electric forklift trucks
- Propane forklift trucks
- Yard forklift trucks
- Electric transtacker
- Riding grip tow
- Stand-up riding tow tractor
- Walking pallet truck
- Walking transtacker
- Tow tractors
- Industrial tractors
- Reach trucks
- Order pickers

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. Below are some sample checklists for various types of trucks, as well as a generic list that can be modified to suit your workplace needs.

DAILY INSPECTION CHECKLIST

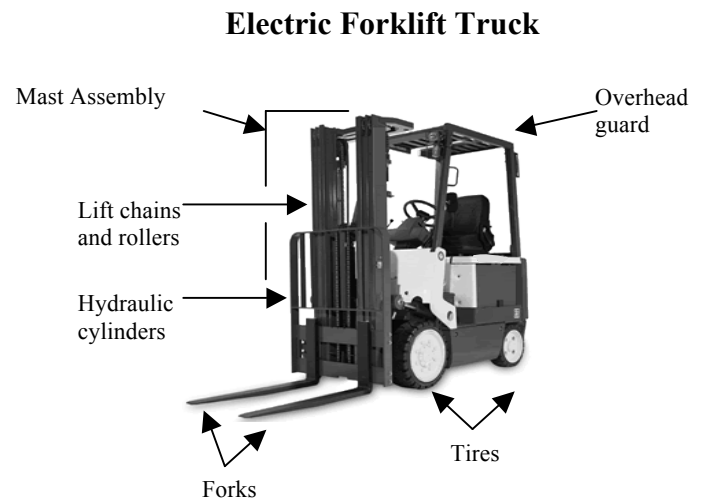
Electric Forklift Truck

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

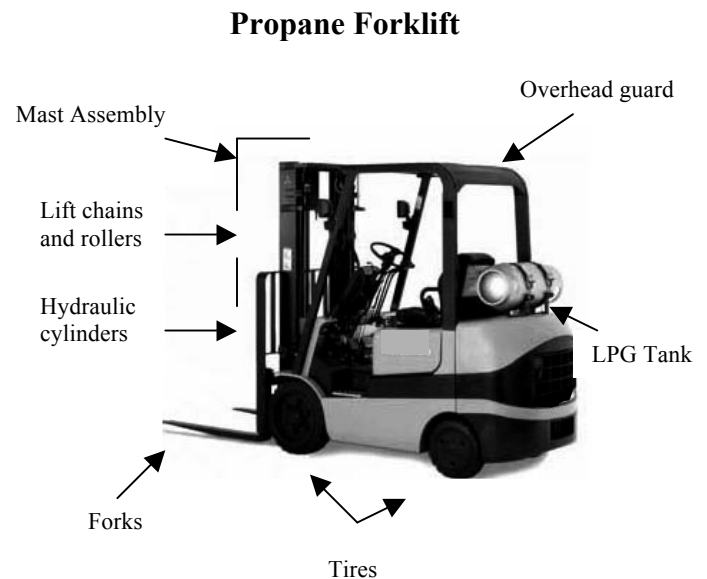
- The vehicle inspection
 - Overhead guard
 - Hydraulic cylinders
 - Mast assembly
 - Lift chains and rollers
 - Forks
 - Tires
 - LPG tank and locator pin
 - LPG tank hose
 - Gas gauge
- Check the engine oil level
- Examine the battery
- Check the hydraulic fluid level
- Check the engine coolant level

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

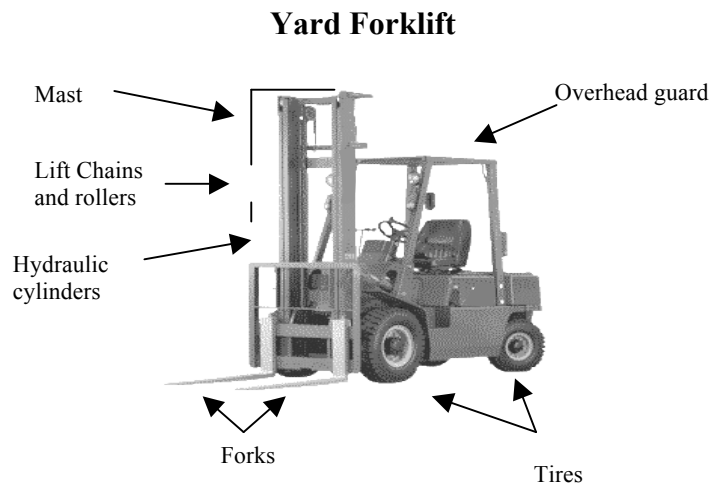
- The vehicle inspection
 - Overhead guard
 - Hydraulic cylinders
 - Mast assembly
 - Lift chains and rollers
 - Forks
 - Tires
 - LPG tank and locator pin
 - LPG tank hose
 - Gas gauge
- Check the engine oil level
- Examine the battery
- Inspect the hydraulic fluid level
- Check the engine coolant level

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

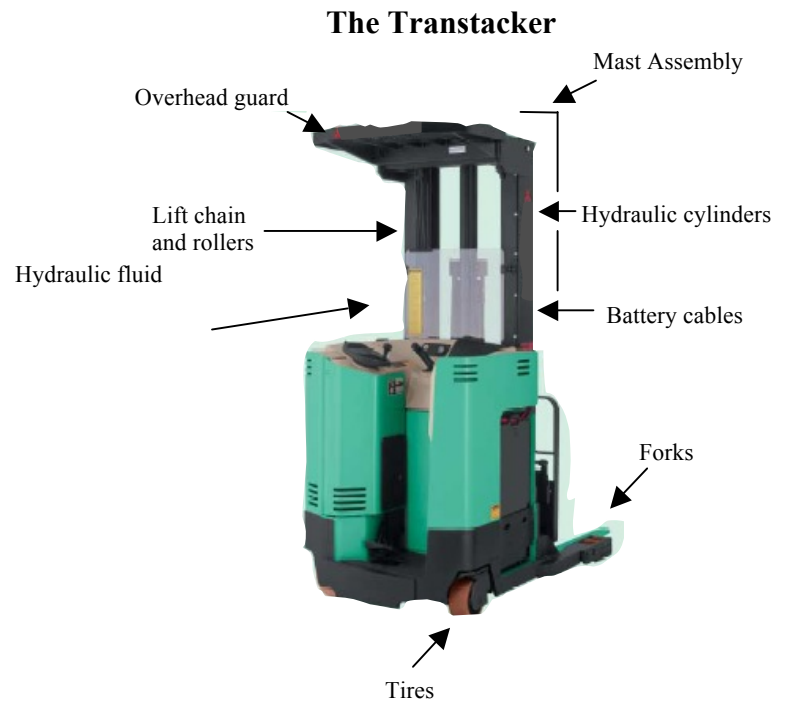
Electric Transtacker

KEY OFF Procedures

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

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

Riding Grip Tow

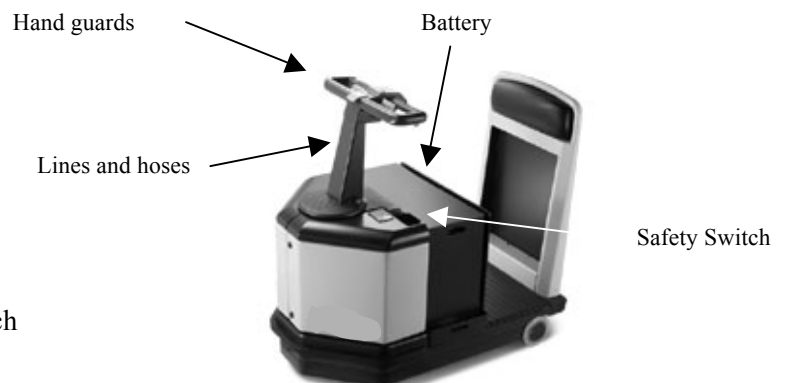


DAILY INSPECTION CHECKLIST

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

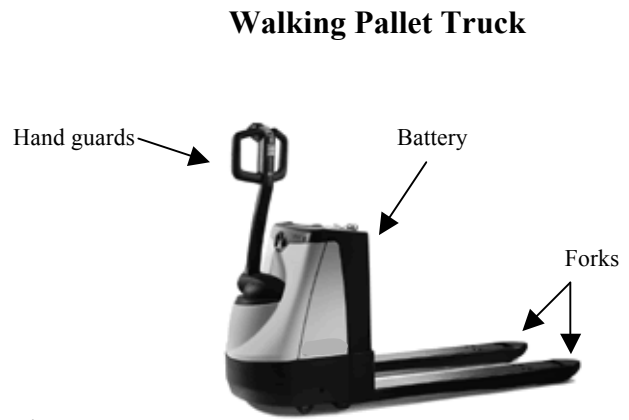
Stand-up Riding Tow Tractor



DAILY INSPECTION CHECKLIST

Walking Pallet Truck

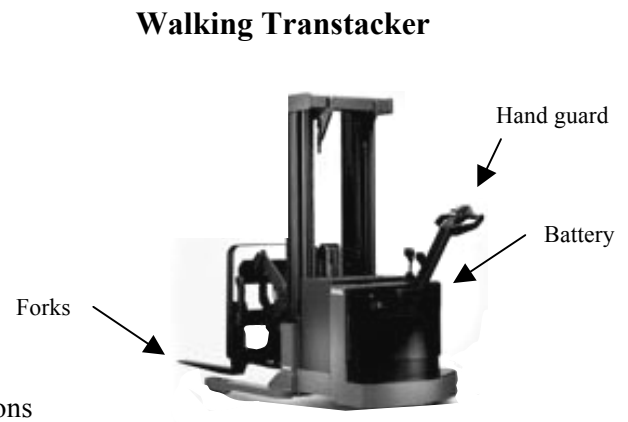
- The vehicle inspection
 - Forks
 - Battery
 - Hand guards
- The operations inspection
 - Check the drive operations
 - Test the brakes
 - Check the horn
 - Inspect the load-handling attachment operations



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

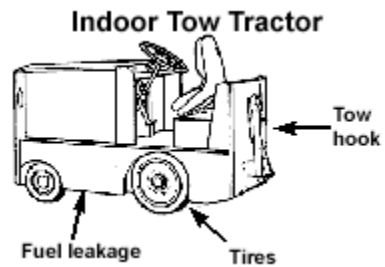


DAILY INSPECTION CHECKLIST

Indoor Tow Tractor

KEY OFF Procedures

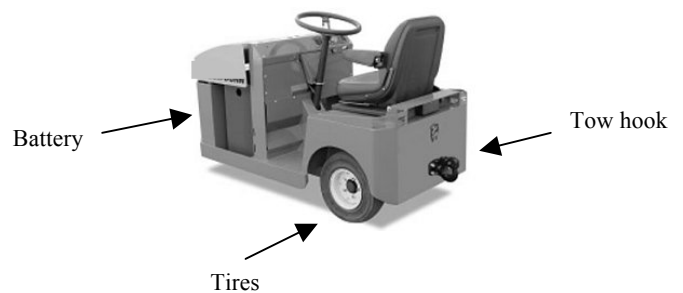
- The vehicle inspection
 - Fluid leakage
 - Tires
 - Tow hook
 - Windshield (if equipped)
 - Battery cables
 - LPG tank and locator pin (if equipped)
 - LPG tank hose (if equipped)
 - Gas gauge
- Check the engine oil level
- Check the engine coolant level
- Examine the battery



KEY ON Procedures

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

Indoor Tow Tractor



ENGINE RUNNING Procedures

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

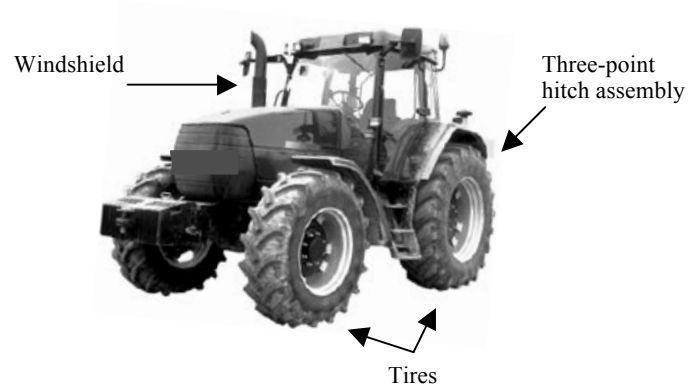
DAILY INSPECTION CHECKLIST

Industrial Tractors

Industrial Tow Tractor

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

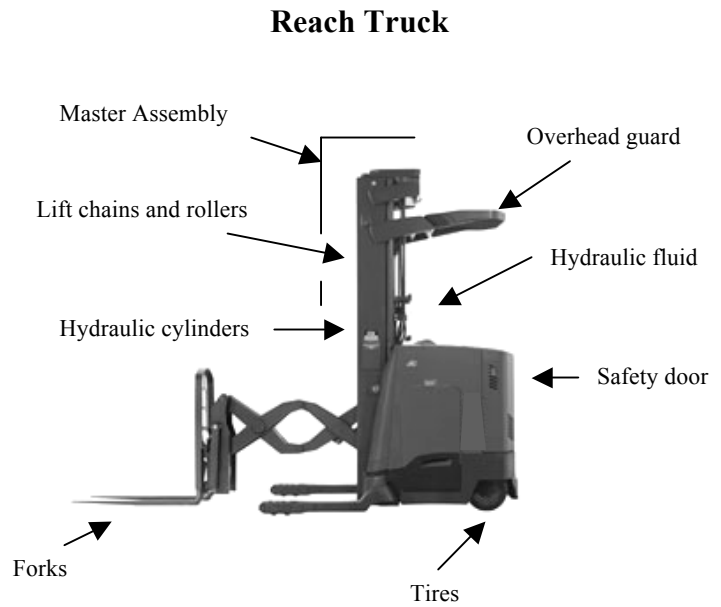
Reach Truck

KEY OFF Procedures

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

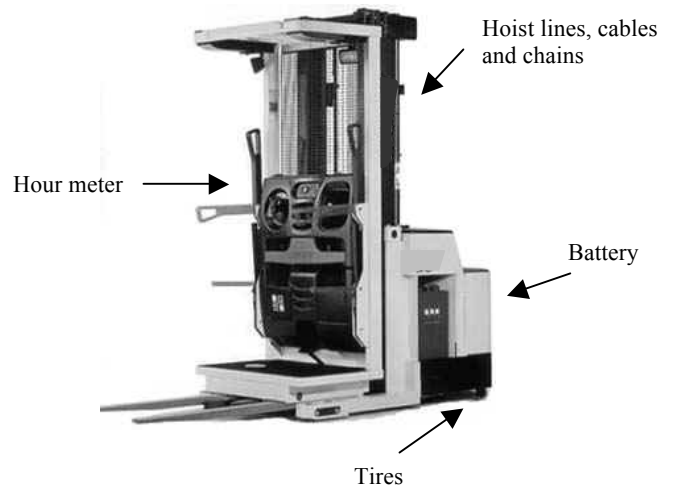
KEY OFF Procedures

- 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

Order Picker



SAMPLE GENERIC CHECKLIST FOR POWERED INDUSTRIAL TRUCKS

- 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 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?

Summaries of Selected Forklift Fatalities Investigated by OSHA

Selected Fatalities Investigated in 1998

- ◆ EMPLOYEE STRUCK BY FORKLIFT: Employee #1, a clerk assigned to the marine terminal, was walking on the wharf alongside a container top lift machine. A forklift truck, with a squeeze attachment carrying two rolls of paper, was traveling in the same direction as employee #1. The forklift truck continued forward and apparently the load (which was approximately 11 inches higher than the steering wheel) obstructed the driver's forward view. He struck and crushed employee #1 beneath the load.
- ◆ FORKLIFT TIPOVER: While an employee was operating a forklift, the forklift tipped over while the operator was apparently making a sharp turn at excessive speed. No seat belt was installed and when employee fell from the seat he was crushed by the rollover bar.
- ◆ FALL FROM PLATFORM ON FORKLIFT: The victim (employee #1) was found pinned between the mast and the frame of the forklift. Prior to the accident, employee #1 was raised approximately 6 feet high by the forklift operator while the employee was standing on a pallet that was not secured to the frame of the forklift. The operator left the forklift unattended while the employee was on the pallet pouring spice into a mixing tank.
- ◆ CRUSHED BY FORKLIFT: The victim was driving a stand up forklift into a tractor trailer to start unloading when the truck driver pulled away from the dock. The forklift fell back onto the forklift driver, striking his head, and apparently breaking his neck.
- ◆ STRUCK BY FORKLIFT: The employee was given instructions to take the forklift to unload a truck. The employee picked up the forklift located on the premises less than one half mile from where the accident occurred. Traveling down an incline, the employee attempted to make a left turn into a parking lot, struck a pothole in the road, and the forklift began to tip over to the right. The employee attempted to jump clear of the forklift, but was struck and killed as the forklift fell.
- ◆ STRUCK BY FORKLIFT: The victim was assigned as the scrap dumpster forklift operator and was in route to a dumpster located in the remote southeast section of the outside material storage area. The victim was utilizing a forklift rated at 4500 pounds. A metal dump hopper, equipped with a manual dump release handle, was attached to the forks of the forklift. The hopper was filled with scrap shingles. The victim positioned the load above the north side of the dumpster. He dismounted from the right side of the forklift, closest to the north wall of the dumpster, and tripped the dump handle of the hopper. As he dismounted, he failed to set the parking brake. As the load suddenly dropped, apparently the forklift jerked, causing the transmission, low on fluid, to slip into drive, and the right rear side of the forklift to travel toward the dumpster, pinning the victim against north wall of the dumpster. A crushing chest injury resulted. The primary cause of the accident was that the employee failed to set the parking brake prior to dismounting the powered forklift.

- ◆ STRUCK BY LOAD TOPPLING FROM FORKLIFT: A longshoreman was crushed when he was struck by a toppling load of fiber-board. This cargo had just been off-loaded from a ship and was on the dock awaiting transfer by forklift to an adjacent warehouse. The forklift intended to pick up a stack of three crates. The width of the crates had changed from previous loads to more narrow gauges. The forklift operator did not realize he was dealing with a more narrow cargo, which allowed his forks to extend beyond the intended cargo's base. The forks extended some 10 inches under the base of an adjacent stack of three crates, which was some 31 inches wide. When the operator raised his forks he not only picked up his intended load, but caused the adjacent stack of crates to topple onto the nearby longshoreman.
- ◆ FALL FROM FORKS: Two employees were riding the load which was tied onto the forks of a forklift. The load was being lifted additionally with the aid of a crane. The men were standing on the load as it was lifted about 23 feet in the air, above packed dirt. The load shifted and slipped off the forks, propelling the two men off the load. One man was seriously injured and the other died of his injuries.
- ◆ STRUCK BY FORKLIFT: Operator was driving a forklift forward with a load on the forks which obstructed his view. The operator did not see the employee walking by and struck her.
- ◆ FORKLIFT TIPOVER: An employee was driving an unloaded forklift down a ramp with a 13% slope when the forklift started to tip over. The operator attempted to jump clear and the ROP of the forklift landed on him and killed him. The employee was not wearing the supplied seatbelt.
- ◆ STRUCK BY: The operator of a sit-down forklift (Forklift #1) was in the process of delivering a pump to the drum/bleach line, unaware he was being followed by the operator of a stand-up forklift (Forklift #2). The operator of Forklift #1 received a page to turn off a valve, in route to deliver the pump. Parking his forklift next to three pallets of materials without lowering the forks, he went to answer the page. The distance between Forklift #1 and Forklift #2 was less than the required three truck lengths. In addition, there was insufficient passage in the aisle way and the presence of water leaking from a steam pipe in the area. Having nowhere to maneuver, and little traction because of the wet floor, Forklift #2 collided with the parked Forklift #1. The right fork of Forklift #1 stabbed into the left leg of the operator of Forklift #2. The operator of the Forklift #2 was pronounced dead upon arrival at the hospital.

Selected Fatalities Investigated in 1997

- ◆ **FORKLIFT TIPPED OVER WHILE BEING TOWED:** An employee was behind the wheel of a forklift being towed by a pick-up truck operated by another company employee when the operator lost control of the forklift. The forklift veered from the roadway into a ditch, pinning the operator underneath. Prior to the accident the forklift was operational and was being driven with the forks forward, on a newly paved two-lane roadway. The employee in the truck caught up with the forklift, and the two employees decided that they could get the forklift back to town faster and get the operator out of the cold weather by towing the forklift. Together they attached a tow strap to the counterweight of the forklift and began to tow the forklift down the road at approximately 15 to 18 miles per hour, with the steering wheel to the front and the forks to the rear. At some point thereafter, the operator lost control of the forklift and it veered from the roadway into a ditch along side of the road and flipped, eventually landing on its side with the operator pinned underneath. The forklift was not equipped with seatbelt.
- ◆ **FALL FROM FORKLIFT PLATFORM:** The victim fell approximately 17 feet from an improper work platform while raised on a 3 stage industrial truck (forklift). The work platform used was a wooden appliance pallet placed on the top edge of the squeeze clamps used to move appliances by vertically squeezing them. The victim fell from the pallet head first, landing on the concrete below when the lift operator started to lower the platform.
- ◆ **FORKLIFT TIPOVER:** The victim/operator drove a forklift down a ramp rapidly and appeared to be attempting to make a sharp left turn. The forklift overturned. Apparently, the employee was unaccustomed to the quickness and sharp turning radius of the new forklift. The victim was not wearing the provided seatbelt. The driver/victim was dislodged from the seat and his head was caught under the overhead protective cage.
- ◆ **FALL FROM FORKLIFT PLATFORM (PALLET):** The employee was in the process of pulling orders from the top shelf of the storage racks in the warehouse area of the grocery store. He was on the raised forks of the forklift on a wooden pallet. Neither he nor the pallets were secured to the forks. The forklift operator was moving along the aisle next to the racks when he hit something with the tire next to the shelf and the forklift stopped suddenly. The employee on the pallet was standing on the front edge of the pallet facing towards the back of the lift. The sudden stop threw him and he fell to the concrete floor hitting his head. The pallet and most of the products remained on the forklift. The victim dies the following day from head injuries.
- ◆ **FALL FROM LADDER STRUCK BY FORKLIFT:** Employee #1, an inventory control person, was standing on a step of a portable stairway stand placed against and parallel to a rack containing rolls of carpeting. Another employee (Employee #2) was operating a forklift with a pole attached to the front on which had been placed a roll of carpeting. When the forklift operator (Employee #2) turned a corner from one aisle to another, the roll caught the rear leg of the stairway stand. This jostled Employee #1 and he fell three feet to the concrete floor, landing on his back and then his head struck the floor. He received head injuries and died twenty days later.

DEVELOPING A TRAINING PROGRAM FOR POWERED INDUSTRIAL TRUCK OPERATORS



This handout is intended to be used for training purposes only. It is not a substitute for any provisions of the Occupational Safety and Health Act of 1970, or for any standards issued by the U.S Department of Labor's Occupational Safety and Health Administration (OSHA).

HOW DO I DEVELOP A POWERED INDUSTRIAL OPERATOR TRAINING PROGRAM?

Before you begin developing your operator training program you should become familiar with the OSHA standard for powered industrial trucks and any operator's manual pertinent to the equipment you have in your workplace.

✓ IDENTIFY YOUR OPERATORS

First, you need to determine the employees that will be required to operate powered industrial trucks in your workplace. If an employee has other duties, but sometimes operates a powered industrial truck, training must be provided.

✓ IDENTIFY THE TYPES OF POWERED INDUSTRIAL TRUCKS YOU HAVE IN YOUR WORKPLACE AND THOSE EMPLOYEES WHO WILL BE REQUIRED TO OPERATE THE VEHICLES.

There are many different types of powered industrial trucks. Typically, these types of vehicles are known as forklifts or lift trucks. Some types of trucks are not capable of being ridden by the operator. These are also covered by the OSHA standard and training is required. Some trucks are fitted with attachments purchased from the manufacturer. The use of these attachments may affect the manner in which the truck is handled; therefore training on the use of the attachment would also be required. If your employees will be expected to operate several different types of powered industrial trucks, then training is required on the unique handling characteristics of the vehicles.

✓ METHODS OF TRAINING

Once you have identified your truck operators and types of trucks you have in your workplace, you should determine the methods of training you will use.

Training must consist of a combination of formal instruction and practical training. Using both methods is the only way to ensure that the trainee receives and comprehends the instruction and uses the information to safely operate a powered industrial truck. Note that the formal training need not take place in a classroom. Discussions can consist of the trainer talking to the trainee and explaining the training material, either in the

workplace or in another location. The training must, however, include an explanatory element as well as a practical element.

Formal instruction may include lectures, conferences, classroom discussions, demonstrations, and written or oral tests. To enhance the training and make it more understandable to the employee, employers and other trainers may use movies, slides, computers, video tapes and other visual presentations.

Using visual aids has several advantages, including:

- (1) The employees being trained remain more attentive, thereby increasing the training's effectiveness;
- (2) The trainer can use visual presentations to ensure that the necessary information is covered during the training;
- (3) Graphical presentations make better use of the training time by decreasing the need for the instructor to carry on long discussions about the instructional material; and,
- (4) Trainees have greater retention of information learned from graphical presentations.

While some employees can learn instructional material while seated in a classroom, other employees may learn best by observing an operation (demonstration) and/or by personally performing an operation (practical exercise). In most cases, a combination of different training methods provides the best training in the least amount of time.

Once you have selected the method of training, then the content of the training program must be considered to include all pertinent training items.

✓ **TRAINING PROGRAM CONTENT**

Because each type (make and model) of powered industrial truck has different operating characteristics, limitations, and other unique features, a good employee-training program for powered industrial truck operators should be based upon the type of vehicle that the employee would be trained and authorized to operate. The training should also emphasize the workplace's features that will affect how the vehicle must be operated. Finally, the training should include the general safety rules applicable to operating any powered industrial truck.

The following is an outline of a generic powered industrial truck operator training program:

- (1) Characteristics of the powered industrial truck(s) the employee will be allowed to operate:
 - (a) Differences from the automobile;
 - (b) Controls and instrumentation: location, what they do, and how they work;
 - (c) Engine or motor operation;
 - (d) Steering and maneuvering;
 - (e) Visibility;
 - (f) Fork and/or attachment adaption, operation, and limitations of their use;
 - (g) Vehicle capacity;

- (h) Vehicle stability;
- (i) Vehicle inspection and maintenance the operator will be required to perform;
- (j) Refueling or charging and recharging batteries;
- (k) Operating limitations; and
- (l) Any other operating instruction, warning, or precaution listed in the operator's manual for the type of vehicle the employee is being trained to operate.

(2) The operating environment:

- (a) Floor surfaces and/or ground conditions where the vehicle will be operated;
- (b) Composition of probable loads and load stability;
- (c) Load manipulation, stacking, unstacking;
- (d) Pedestrian traffic;
- (e) Narrow aisle and restricted place operation;
- (f) Operating in classified hazardous location;
- (g) Operating the truck on ramps and other sloped surfaces that would affect the stability of the vehicle;
- (h) Other unique or potentially hazardous environmental conditions that exist or may exist in the workplace; and
- (i) Operating the vehicle in closed environments and other areas where insufficient ventilation and/or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.

(3) The requirements of the OSHA Standard.

After the training program has been completed, the employer must evaluate the trainee's knowledge and skills and determine that the employee is competent to operate the truck safely.

EMPLOYEE EVALUATION

When the employee completes the training exercises and prior to operating the truck in the workplace, an evaluation of the employee must be performed. This evaluation will determine the adequacy of training and the ability of the employee to perform truck operations safely in the workplace. The OSHA standard also requires that an evaluation of the operator's performance be conducted at least once every three years and after refresher training.

The employer should then complete a certification of training record containing 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.

✓ REFRESHER TRAINING

During the course of truck operation, the supervisor may observe the employee performing an unsafe act, such as riding with the load too high or traveling at an unsafe speed. The person making the correction should point out the incorrect manner of operation of the truck or other unsafe act being conducted, tell the employee how to do the operation correctly, and then ensure the employee does the operation correctly. When there have been multiple on-the-spot corrections, the employer may decide to

conduct a more structured retraining program which would include the following information:

- (1) Common unsafe situations encountered in the workplace;
- (2) Unsafe operating methods observed or known to be used;
- (3) The need for constant attentiveness to the vehicle, the workplace conditions, and the manner in which the vehicle is operated.

The above subject areas need to be taught so that the trainee receives all the information needed for safe vehicle operation. Specific details of the above subject areas may be found in the vehicle manufacturers' literature, the national consensus standards [e.g., the ASME B56 series of standards (current revisions)], and the OSHA standards relating to powered industrial truck operator training.

SAMPLE POWERED INDUSTRIAL TRUCK (PIT) OPERATOR TRAINING PROGRAM OUTLINE*

1. Introduction
 - a. Overview of the program
 - b. Goal of the program: to provide a training program based on the trainee's prior knowledge, the types of vehicles used in the workplace, and the hazards of the workplace.
 - c. Course will utilize video, group discussion and hands-on practice. Each operator must obtain the knowledge and skills needed to do their job correctly and safely.
2. Types, Features and Physics
 - a. Familiarize each operator with the basic types and functions of powered industrial trucks.
 - b. Develop an understanding of the information shown on a data plate.
 - c. Understand the critical truck measurements that effect safety.
 - d. Understand the forces that cause tipovers, and the truck design considerations and safety ratings that help prevent them, including the "stability triangle."
3. Inspecting the vehicle
 - a. Understand the purpose and importance of pre-operational checkouts.
 - b. Provide a basic understanding of areas covered during a pre-operational checkout.
 - c. Familiarize each operator with a checklist for pre-operational checkouts, and what to do if a problem is discovered.
4. Driving the Truck
 - a. Understand the elements of safe movement of a powered industrial truck.
 - b. Understand the differences between an automobile and a powered industrial truck.
 - c. Recognize the safety hazards associated with operating a powered industrial.
5. Load Handling.
 - a. Understand the elements of load lifting safety.
 - b. Understand the safe operating procedures for raising and lowering loads in aisles.

*This outline is intended as a resource in implementing a powered industrial truck operator training program. It is not a substitute for any standards issued by the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA). OSHA's Office of Training and Education wishes to acknowledge Material Handling Services for contributing some of the information used in this outline. This acknowledgment does not imply endorsement by the U.S. Department of Labor.

6. LPG for lift Trucks.
 - a. Discuss LPG and its properties.
 - b. Understand the elements and procedures of safely refueling internal combustion vehicles.
 - c. Describe tank components: service valve, surge valve, relief valve, etc.
 - d. Discuss related safety issues.

7. Battery and Charging
 - a. Understanding the elements and procedures of safely changing and charging batteries.
 - b. Discuss filling procedures and maintenance.
 - c. Discuss related safety issues.

8. Safety Concerns
 - a. Review/reinforce potential of serious injury.
 - b. Review/reinforce safety procedures in your facility.

9. Specific Truck and Workplace Training/Hands-On
 - a. Review features of specific PIT's to be operated.
 - b. Review operating procedures of specific PIT's to be operated.
 - c. Review safety concerns of specific Pit's to be operated.
 - d. Review workplace conditions and safety concerns of areas where PIT's will be operated.
 - e. Learn/practice actual operation of specific PIT's to be operated and specific workplace conditions where PIT's will be operated.
 - f. Demonstrate proficiency performing the powered industrial truck operator duties specific to the trainee's position and workplace conditions.

10. Certification of Completion of the Course.

SAMPLE PERFORMANCE TEST FOR FORKLIFT OPERATORS

EMPLOYEE _____ DATE _____ TIME _____ A.M.
P.M.

- 1. Shows familiarity with truck controls.
- 2. Gave proper signals when turning.
- 3. Slowed down at intersections.
- 4. Sounded horn at intersections.
- 5. Obeyed signs.
- 6. Kept a clear view of direction of travel.
- 7. Turned corners correctly – was aware of rear end swing.
- 8. Yielded to pedestrians.
- 9. Drove under control and within proper traffic aisles.
- 10. Approached load properly.
- 11. Lifted load properly.
- 12. Maneuvered properly.
- 13. Traveled with load at proper height.
- 14. Lowered load smoothly/slowly.
- 15. Stops smoothly/completely
- 16. Load balanced properly.
- 17. Forks under load all the way.
- 18. Carried parts/stock in approved containers.
- 19. Checked bridge plates/ramps.
- 20. Did place loads within marked area.
- 21. Did stack loads evenly and neatly.
- 22. Did drive backward when required.
- 23. Did check load weights.
- 24. Did place forks on the floor when parked, controls neutralized, brake on set, power off.
- 25. Followed proper instructions for maintenance - checked both at beginning and end.

**Total
Rating**

Evaluator _____

Note: This sample test was developed by the State of Michigan Department of Consumer and Industry Services, Safety Education and Training Division.

FREQUENTLY ASKED QUESTIONS ABOUT POWERED INDUSTRIAL TRUCK OPERATOR TRAINING

On December 1, 1998, the Occupational Safety and Health Administration (OSHA) published a standard that revised the existing requirements and issued new requirements to improve the training of powered industrial truck operators. The standard becomes effective on March 1, 1999. This new standard is intended to reduce the number of injuries and deaths that occur as a result of inadequate operator training. The powered industrial truck operator training requirements will apply to all industries where trucks are being used, except agricultural operations.

1. What is the definition of a powered industrial truck?

Any mobile power-propelled truck used to carry, push, pull, lift, stack or tier materials. Powered industrial trucks can be ridden or controlled by a walking operator. Earth moving and over the road haulage trucks are not included in the definition. Equipment that was designed to move earth but has been modified to accept forks are also not included.

2. What does the new standard require?

The new 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.

3. Does OSHA provide a list of topics to include in my training program?

Yes. The standard provides a list of training topics; however, the employer may exclude those topics which are not relevant to safe operation at the employee's work location.

4. Who should conduct the training?

All training and evaluation must be conducted by persons with the necessary knowledge, training, and experience to train powered industrial truck operators and evaluate their competence. An example of a qualified trainer would be a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has demonstrated the ability to train and evaluate powered industrial truck operators.

There are many resources available to the employer if he/she chooses not to perform the training himself. Truck manufacturers, local safety and health safety organizations, such as the National Safety Council local chapters, private consultants with expertise in powered industrial trucks, local trade and vocational schools are some available resources.

Various Internet sites are devoted to forklift safety. Private companies who provide forklift safety training services, including videos and written programs, can be located on various Internet websites. Most videos can be either leased or purchased. One important thing to remember is that simply by showing employees a video or videos on some aspect of forklift safety does not meet the full requirements of the OSHA standard. Site specific information must be conveyed as well as a method to evaluate the employee's acquired knowledge subsequent to the training.

5. If my employees receive training from an outside consultant, how will I know that these employees have been adequately trained?

Outside qualified training organizations can provide evidence that the employee has successfully completed the relevant classroom and practical training. However, each employer must ensure that each powered industrial truck operator is competent to operate a truck safely, as demonstrated by the successful completion of the training and evaluation.

6. My employees receive training from the union on the use of powered industrial trucks. Will I have to provide any additional training?

When a worker reports to work, the employer must evaluate the employee to ensure that he/she is knowledgeable about the operation of the powered industrial trucks he/she will be assigned to operate. This evaluation could be as simple as having a person with the requisite skills, knowledge and experience observe the operator performing several typical operations to ensure that the truck is being operated safely and asking the operator a few questions related to the safe operation of the vehicle. If the operator has operated the same type of equipment before in the same type of environment that he/she will be expected to be working, then duplicative or additional training is not required.

7. Will testing be required?

No. The standard does not specifically require testing; however, some method of evaluation is necessary.

8. Does OSHA require the employer to issue licenses to employees who have received training?

No. The OSHA standard does not require employees to be licensed. An employer may choose to issue licenses to trained operators.

9. What type of records or documentation must I keep?

The OSHA standard requires that the employer certify that each operator has received the training and has been evaluated. The written certification record must 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.

10. How long must I keep the certification records?

Employers who evaluate the operator's performance more frequently than every three years may retain the most recent certification record; otherwise, certification records must be maintained for three years.

11. If my employees receive training, but accidents still continue to occur, what should I do?

Refresher training in relevant topics is necessary when the operator has been involved in an accident or near-miss incident.

12. Is annual training required?

No. An evaluation of each powered industrial truck operator's performance is required to be conducted after initial training, after refresher training, and at least once every three years.

13. How often must refresher training be given?

The standard does not require any specific frequency of refresher training. Refresher training must be provided when:

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

14. If my employees have already received training, or have been operating trucks for many years, must I retrain them?

No. An employer does not need to retrain an employee in the operation of a powered industrial truck if the employer certifies that the operator has been evaluated and has proven to be competent to operate the truck safely. The operator would need additional training in those elements where his or her performance indicates the need for further training and for new types of equipment and areas of operation.

15. How do I evaluate my employee's competency to operate a truck safely?

Evaluation of an operator's performance can be determined by a number of ways, such as:

- ♦ A discussion with the employee
- ♦ An observation of the employee operating the powered industrial truck
- ♦ Written documentation of previous training
- ♦ A performance test

16. Will OSHA provide training to my truck operators?

No. It is the employer's responsibility to train the employees.

17. Will I have to train all employees in my workplace?

Any employee that operates a powered industrial truck must be trained.

18. Will I have to ensure that my operator's are physically capable of driving a powered industry truck?

The new standard does not contain provisions for checking vision, hearing or general medical status of employees operating powered industrial trucks. The Americans with Disabilities Act (ADA) addresses the issue of whether employers may impose physical qualifications upon employees or applicants for employment. The ADA permits employers do adopt medical qualification requirements which are necessary to assure that an individuals does not pose a "direct threat to the health or safety of other individuals in the workplace", provided all reasonable efforts are made to accommodate otherwise qualified individuals.

19. I have three different types of trucks in my workplace. Can I provide training on just one type of truck?

If an operator will be expected to operate all three types of vehicle, then training must address the unique characteristics of each type of vehicle the employee is expected to operate. When an attachment is used on the truck to move odd-shaped materials, then the operator training must include instruction on the safe conduct of those operations so that the operator knows and understand the restrictions or limitations created by each vehicle's use.

20. I only have powered hand trucks in my workplace. Do the training requirements cover the operators of this type of vehicle? The operator walks alongside the unit while holding onto the handle to guide it.

Yes, The use of powered hand trucks present numerous hazards to employees who operate them and those working in the area where they are used.

21. I employ drivers from a temporary agency. Who will provide them training - the temporary service or me?

OSHA has issued several letters of interpretations on the subject of training of temporary employees. Basically, there is a shared responsibility for assuring employees are adequately trained. The responsibility for providing training should be spelled out in the contractual agreement between the two parties. The temporary agency or the contracting employer may conduct the training and evaluation of operators from a temporary agency as required by the standard; however, the host employer (or other employer who enters into a contract with the temporary agency) must provide site-specific information and training on the use of the particular types of trucks and workplace-related topics that are present in the workplace.

22. Should my training include the use of operator restraint devices (e.g. seat belts)?

Employers are required to train employees in all operating instructions, warnings, and precautions listed in the operator's manual for the type of vehicle which the employee is being trained to operate. Therefore, operators must be trained in the use of operator restraint systems when it is addressed in the operating instructions.

23. What does OSHA expect to achieve as a result of improved operator's training?

OSHA's goal is to reduce the number of injuries and illnesses that occur to workers in the workplace from unsafe powered industrial truck-usage. By providing an effective training program many other benefits will result. Among these are the lower costs of compensation insurance, less property damage, and less product damage.

24. Where can I get additional information about OSHA and new standards?

For more information, contact your local or Regional OSHA office (listed in the telephone directory under United States Government - Department of Labor-Occupational Safety and Health Administration). OSHA also has a Home Page on the Internet. The address is: <http://www.osha.gov/>

QUESTIONS AND ANSWERS SPECIFIC TO THE MARITIME INDUSTRY

1. What OSHA standards apply to the training of powered industrial truck operators in the maritime industry?

Maritime standards include 29 CFR 1915 for Shipyard Employment, 29 CFR 1917 for Marine Terminals and 29 CFR 1918 for Long shoring. The new standards for training of powered industrial truck operators in the maritime industry are located in 29 CFR 1915.120 (Shipyard Employment), 29 CFR 1917.1(a)(2)(xiv)(Marine Terminals) and 29 CFR 1918.1(b)(10)(Longshoring). These standards will improve but not replace the present training requirements for powered industrial truck operators in the maritime industries.

The OSHA standard for Longshoring, 29 CFR 1918.98 includes requirements for the qualifications of machinery operators of mechanically powered vehicles. This standard states that only those employees considered by the employer to be competent by reason of training or experience, and who understands the signs, notices, and operating instructions and are familiar with the signal code in use shall be permitted to operate any powered operated vehicle. 29 CFR 1918.65 includes requirements for the safe operation of mechanically powered vehicles used aboard vessels.

The OSHA standard for marine terminals, 29 CFR 1917.27 includes requirements for personnel on the shore side segment of marine cargo handling. This standard state that only those employees determined by the employer to be competent by reason of training or experience and who understand the signs, notices and operating instructions and are familiar with the signal code in use shall be permitted to operate any power operated vehicle. 29 CFR 1917.43 also includes requirements for powered industrial trucks. However, these requirements are for operating, maintaining, and outfitting the vehicles and do not cover training.

2. What types of equipment are covered by the standard?

Besides the typical forklifts, the following equipment is covered:

- Container top handlers
- Container reach stackers.
- Straddle carriers
- Hustlers
- Top loaders
- Semi-tractor/utility vehicles
- Side handlers
- Yard tractors.

QUESTIONS AND ANSWERS SPECIFIC TO GENERAL INDUSTRY

1. What OSHA standards apply to the training of powered industrial truck operators in general industry?

The OSHA standard for the training of truck operators is located in 29 CFR 1910.178(l).

2. What types of equipment are covered by the standard?

Vehicles covered include:

- High lift trucks
- Counter-balanced trucks
- Cantilevered trucks
- Rider trucks
- Forklift trucks
- High lift platform trucks
- Low lift trucks
- Low lift platform trucks
- Motorized hand trucks
- Pallet trucks
- Narrow aisle rider trucks
- Straddle trucks
- Reach rider trucks
- Single side loader rider trucks
- High lift order picker rider trucks
- Motorized hand/rider trucks
- Rough terrain trucks

3. What types of Industries are covered by the standard?

Every type of establishment (except agricultural operations) that has employees who operate powered industrial trucks will have to comply with the requirements of the standard. Powered industrial trucks are used in a wide variety of workplaces, including but not limited to retail establishments, warehousing and distribution operations, and manufacturing establishments.

QUESTIONS AND ANSWERS SPECIFIC TO CONSTRUCTION

1. What OSHA standards apply to the training of powered industrial truck operators in construction?

The OSHA standard on training of powered industrial truck operators applicable to construction is 29 CFR 1926.602 (d).

2. What types of equipment are covered by the standard?

The construction standard covers the same types of equipment as covered by the general industry standard. Specialized equipment used in the construction industry includes rough terrain, straight-mast and extended reach forklift trucks.

This handout is intended only as a general description of the Powered Industrial Truck Operator Training Requirements. It does not carry the force of legal opinion. For more detailed information, consult the OSHA standards.

DAILY CHECK LIST - FORK TRUCKS

ID/Model #:	Date	Date	Date	Date	Date
Hour Meter:					
Walk around. Note condition of: Forks; Back Rest; Tires; Overhead Guards; Mast Assembly; Hydraulics; Lift Chains; Rollers; LPG Tank, Hoses, Locator Pin (If applicable)					
Start Truck					
Raise Mast-full height-Then lower					
Tilt Boom-full forward, full back					
Reverse - Stop - Forward - Stop					
Set Parking Brake-Place in forward, Check for creep					
Check floor for Oil/Hydraulic leaks					
Check Lights (If applicable)					
Check Fire Extinguisher					
Check Horn					
O.K. FOR USE - <u>NO</u> EXCEPTIONS					
O.K. FOR USE - <u>NON HAZARDOUS</u> EXCEPTIONS					
1.					
2.					
3.					
<u>REMOVE FROM SERVICE - GIVE KEY TO MAINTENANCE</u> HAZARDS:					
1.					
2.					
3.					

Note: Initials are required for verification of each item. Inspections are to be conducted at start of each shift and returned to Supervisor/Office prior to operation.