

Powered Industrial Trucks

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Powered Industrial Trucks

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Articles, Resources, and Bibliography

One Hour Presentation

OBJECTIVES

Upon completion of the class, participants will be able to:

1. return to their workplace to complete a training program begun in class, which:
 - includes both classroom and hands-on operator's training,
 - meets OSHA requirements,
 - is customized to their own company's site specifications,
 - includes their company's type(s) of PIT, with their controls, their loads, their operating environment, their hazards, and their operational considerations,
2. find the necessary resources and information required to complete or improve their current training program,
3. analyze operator needs for training, then customize a training program to meet those needs,
4. after training, evaluate operator's skills and knowledge and appropriately document the training, and
5. plan for refresher training.

AGENDA

8:30	Introduction
11:45	Lunch
12:45	Continue
4:30	Dismiss

There will be breaks in the morning and afternoon.

Powered Industrial Trucks Training Program

Follow up Activities:

- Wrote or revised our P.I.T. training program.
- Developed evaluation procedures to appropriately evaluate our P.I.T. operators' skills and knowledge.
- Developed a plan for refresher training.
- Took photos of damage to equipment or facilities and/or improper material placement that blocks exits, electrical panels, eyewash stations, etc. or of improper operation, such as body parts outside the lift truck and overhead cage, parking with forks raised, parking without the brake set, not fastening the seat belt, etc. for use in our training program.
- Audited our forklift operation program to assure its effectiveness. Surveyed employees to determine their level of satisfaction regarding forklift operations.
- Accessed the OSHA website to access/download useful information. Registered for the OSHA bi-weekly e-news to stay informed of regulatory changes.
- Looked up how many citations were issued for forklift operation in our SIC Code. Researched accident stats and case histories for use in our training program.

Activity Plan

	Activity	Other people involved	Target Deadline
<input type="checkbox"/>			

Powered Industrial Trucks (P.I.T.)



Powered Industrial Truck
29 CFR 1910.178
Final Rule



“1.5 million workers operating nearly 1 million powered industrial trucks.”

Roughly 100 workers killed per year related to powered industrial truck operations.

36,340 Serious injuries.

95,000 Injured (lost work days) per year

An estimated 20- 25% of accidents are caused by, a lack of training or inadequate training.

Powered Industrial Truck
Source: OSHA Analysis of Serious Accident Reports 1984-1991

- Operator inattention-----59
- Overturn ----- 53
- Unstable load----- 45
- Operator struck by load----- 37
- Elevated employees ----- 26
- No training ----- 19
- Overload, improper use----- 15
- Accident during maintenance----- 14

Powered Industrial Truck
Source: OSHA Analysis of Serious Accident Reports 1984-1991 Cont....

- Improper equipment----- 10
- Obstructed view ----- 10
- Falling from platform or curb ----- 9
- Carrying excess passenger----- 8
- Other employee struck by load----- 8
- Falling from trailer ----- 6
- Vehicle left in gear----- 6
- Speeding ----- 5

From 1991 - 1992
170 Fatalities - Bureau of Labor Statistics

- 41 Truck Overturned
- 13 Struck something or ran off a dock
- 19 Worker pinned between objects
- 29 Worker struck by material
- 24 Worker struck by lift truck
- 24 Worker fell from lift truck
- 10 Worker died during lift truck repair
- 10 Other accidents

Fatalities by Age Group

1992 - 1996

27%	35 - 44
22%	25 - 34
21%	45 - 54
12%	56 - 64
10%	20 - 24
5%	65 & Over
3%	Under 20

Original vs New

- *Original* - Only trained and authorized operators shall be permitted to operate a powered industrial truck (*Did not define type of training*)
- *New: December 1, 1999*
 1. Operators must be trained per truck.
 2. Operators must be trained in their environment.
 3. Operators must be evaluated and certified.
Competency on truck - in their environment.

Effective date: March 1, 1999

Compliance date: December 1, 1999

OSHA estimated that - after its regulations are fully effective. The U.S. will begin saving 11 of those lives and avoiding 10% of the current toll of injuries in the U.S.

Or, one life a month.

**Performance - Oriented
Requirements**

The powered industrial truck operator training requirements are performance-oriented to permit employers to tailor a training program to the characteristics of their workplaces and the particular types of powered industrial trucks operated.

**Powered Industrial Truck
ANSI B56.1-1969**

A powered industrial truck is defined as a mobile, power-propelled vehicle used to carry, push, pull, lift, stack, or tier material. Powered Industrial Trucks can be ridden or controlled by a walking operator.

**Powered Industrial Truck
ANSI B56.1-1969 Continued**

Excluded are trucks used for earthmoving and over-the-road hauling. Equipment that was designed to move earth but has been modified to accept forks are also not included.













**New Standard
Mandates:**

- Development of a Training Program
- Amount of Training
- Type of Training
- Sufficiency of Training of operator to:
Acquire, Retain, & Use Knowledge, Skills , and Ability to Operate Safely
- Periodic evaluation - each operator's performance
- Refresher Training Required when :
 - « Unsafe operation
 - « Accident or near miss
 - « Deficiency found in periodic evaluation

Operator Qualification

- **1910.178 (L)(1)(i)** - The employer shall ensure: each potential 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 (L)
- **1910.178 (L)(1)(ii)** - Prior to permitting an employee to operate a powered industrial truck (except for training purposes) the employee has successfully completed the training required by this paragraph (L), except as permitted by paragraph (L)(5)

Training program implementation

- **1910.178 (L)(2)(i)** - Trainees may operate a powered industrial truck only:
- **1910.178 (L)(2)(i)(A)** - Under the direct supervision of a person who has the knowledge, training, and experience to train operators and evaluate their competence; and,
- **1910.178 (L)(2)(i)(B)** - Where such operator does not endanger the trainee or other employees

Training program implementation

- **1910.178 (L)(2)(ii)-Training must consist of a combination of formal classroom instruction, operator practical exercises, and evaluation of the operator’s performance in the workplace**
- **1910.178 (L)(2)(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**

Training Program Content:

1910.178 (L)(3)

- **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**

Truck Related Topics Content:

1910.178 (L)(3)(i)

- **(A) All operating instructions - warnings and precautions for the types of trucks the operator will be authorized to operate**
- **(B) Similarities to, and differences from the automobile:**

Forklift

Narrow wheel track
Short wheelbase
High structure
3-point suspension
Center of Gravity is higher and moves in a significant range w/loads
3 or 4 wheels, Steers from the rear

Automobile

Wide wheel track
Long wheelbase
Low structure
4- point suspension
Center of Gravity is low and moves in a narrow range
4 wheels, Steers from the front

**Truck Related Topics Content:
1910.178 (L)(3)(i) Continued**

- (C) Controls & Instruments - Location, What they do, How they operate
- (D) Engine or Motor - operation and maintenance
- (E) Steering & Maneuvering
- (F) Visibility - including restrictions due to loading
- (G) Fork and attachments - adaptation operations and limitations
- (H) Vehicle capacity
- (I) Vehicle stability

**Truck Related
Content Continued:
1910.198 (L)(3)(i)**

- (J) Vehicle Inspection and maintenance / that the operator will be required to perform
- (K) Refueling and/or charging, recharging batteries
- (L) Operating limitations - and
- (M) Any other operating instructions, warnings or precautions listed in the operator's manual for the types of vehicles that the employee is being trained to operate

**Workplace Related Topics
Content Continued: 1910.178 (L)(3)(ii)**

- (A) Surface conditions where the vehicle will be operated
- (B) Composition of loads to be carried & load stability
- (C) Load manipulation, stacking , unstacking
- (D) Pedestrian traffic in areas where vehicle will be operated
- (E) Narrow aisles and other restricted places
- (F) Hazardous classified locations

**Workplace Related Content
Continued: 1910.178 (L)(3)(ii)**

- **(G) Ramps and other sloped surfaces that could effect the vehicle's stability**
- **(H) Closed environments and other areas where insufficient ventilation or poor 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**

Other Hazards

- **Falling Loads**
- **Falling from Platforms, Curbs, Trailers, etc..**
- **Obstructed Views**
- **Inattention**
- **Riders**
- **Vehicle Not Maintained**
- **Carbon Monoxide**
- **Rough - Uneven - Unleveled floors**
- **Unusual Loads**
- **Classified Areas**
- **Narrow Aisles**
- **Pedestrians**



Refresher Training and Evaluation

1910.178 (L) (4)(i)

Refresher training , including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (L)(4)(ii) to ensure the operator has the skills needed to operate the powered industrial truck safely

Refresher Training or Back to School

1910.178 (L)(4)(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: When the operator has been involved in an accident or a near miss incident**
- **C: When the operator has received an evaluation that reveals that the operator is not operating the truck**

Refresher Training Continued:

1910.178 (L)(4)(ii)

- **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**

Evaluation
1910.178 (L)(4)(iii)

- **An evaluation of each powered industrial truck operator's performance shall be conducted at least every three years**

Avoidance of
Duplicative Training

1910.178 (L)(5)

- **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**

Certification

1910.178 (L)(6)

The employer shall certify that each operator has :

- **Has been trained and evaluated as required in paragraph (L)**
- **The certification shall include:**
 - Name of Trainee Operator**
 - Date of Training**
 - Date of the Evaluation**
 - Identify the person(s) performing the training and evaluation**

Out Source and Obligation

The user is responsible. When you hire an outside source to perform some of the training, you, the user, are fully responsible for everything that is done in the evaluation.

If something is ignored you are responsible.

The employer will be cited.

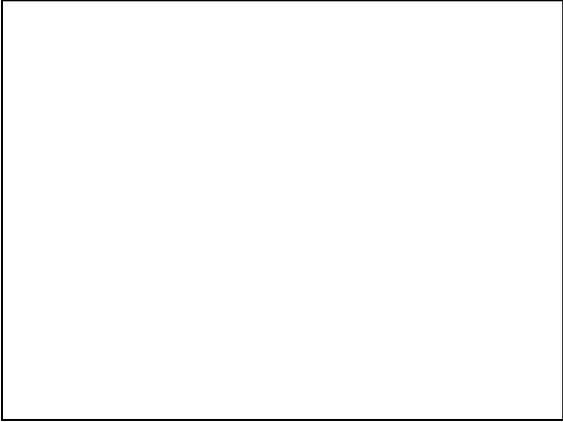
How well does an outsider know your trucks and your facility?

Medical and ADA Issues

- ANSI B56.1 -69 - Operators of P.I.T.'s shall be qualified as to visual, auditory, physical, and mental ability to operate equipment safely.
- ADA does not consider visual impairment (less than legal blindness), monocular vision or hearing loss (less than total deafness) as disabilities. Therefore the ADA does not apply, and reasonable accommodations for these operators of P.I.T.'s should not be a consideration.

General Inspection Guidelines

- Method of training. Formal, practical, evaluation, and review if trainer has knowledge, training, and experience.
- Did employer train in applicable topics.
- Determine if operator received training. IE Operators manual.
- Observe operations of trucks.
- Has employer certified the training?





POWERED INDUSTRIAL TRUCK POLICY CHECKLIST AND EVALUATION

Student's

Name: _____ Company: _____

I. GENERAL POLICY STATEMENT - Signed by CEO _____

A. Management's Responsibilities

1. In order to comply with the law _____
2. In order to provide a safe work environment _____
3. Protect employees and visitors _____
4. Every attempt will be made to reduce accidents _____
5. Safety will not be sacrificed _____
6. Safe equipment and in adequate numbers _____
7. Provide training _____
8. Development of safe rules and regulations _____
9. Review accident record in order to prevent reoccurrence _____
10. Monitor program and update it as required _____

B. Supervisor's Responsibilities

1. The safety of all employees under their supervision _____
2. Conduct safety meetings and contacts _____
3. Conduct accident investigations _____
4. Provide leadership and direction _____
5. Insure employees have been properly trained _____
6. Be actively involved in safety program _____
7. Enforce all safety rules and regulations _____
8. Correct unsafe conditions _____
9. Develop employee cooperation and interest in safety _____

C. Employees' Responsibilities

1. Follow safe working practices _____
2. Protect yourself and others _____
3. Use all safeguards and safety equipment _____
4. Operate in a safe manner _____
5. Report all accidents _____
6. Be actively involved in the safety program _____

II. SPECIFIC POLICIES DEALING WITH POWERED INDUSTRIAL TRUCKS

- A. Only trained and authorized individuals shall operate trucks _____

- B. Establishment of specific rules and regulations
 - 1. Pre-operational safety inspection _____
 - 2. Battery charging/refueling _____
 - 3. Handling of lift truck _____
 - 4. Traveling through plant _____
 - 5. Loading/unloading of material _____
 - 6. Maintenance (reporting and responsibility) _____
 - 7. Accident reporting _____
 - 8. Other special conditions or hazards _____

- C. Establishment of even and fair enforcement/discipline procedures
 - 1. Follow union contract _____
 - 2. Develop progressive system of discipline _____
 - 3. Periodically review discipline procedure _____

- D. Establishment of minimum standards for operator physical and mental fitness

Consult medical and legal experts _____

COMMENTS:

POWERED INDUSTRIAL TRUCKS - DEVELOPING A TRAINING PROGRAM

CHECKLIST FOR CLASSROOM TRAINING OUTLINE

Name: _____ Organization: _____

The classroom training should address the following items:

	<u>Included</u>
1. Review of organization's general safety policy	ρ
2. Goals and objectives of the training	ρ
3. General characteristics of truck, its load capacity, and controls	ρ
4. Applications: surface, grades, operating environment, loads, and attachments	ρ
5. Principles of operation: stability triangle, traveling, loading and unloading material, parking	ρ
6. Employer safety rules, including	
▪ Operator training and authorization	ρ
▪ Pre-operational inspection	ρ
▪ Battery charging/refueling	ρ
▪ Maintenance	ρ
▪ Operation of the truck	ρ
▪ Special conditions: restricted areas, hazardous materials and areas	ρ
▪ Accident reporting	ρ
▪ Disciplinary procedures	ρ
7. Use of operator's manual	ρ
8. Distribution of safety policy and employer safety rules	ρ
9. Pedestrians	ρ
10. Separate training for new operators and experienced operators	ρ
11. Test (written or oral)	ρ

(over for comments)

Comments:

Sample Policy Statement

To: All employees

From: (Name of organization)

Subject: Lift Truck Training

Our organization is committed to providing associates with the safest working environment possible. Producing quality products without considering safety as a key element of the process is impossible.

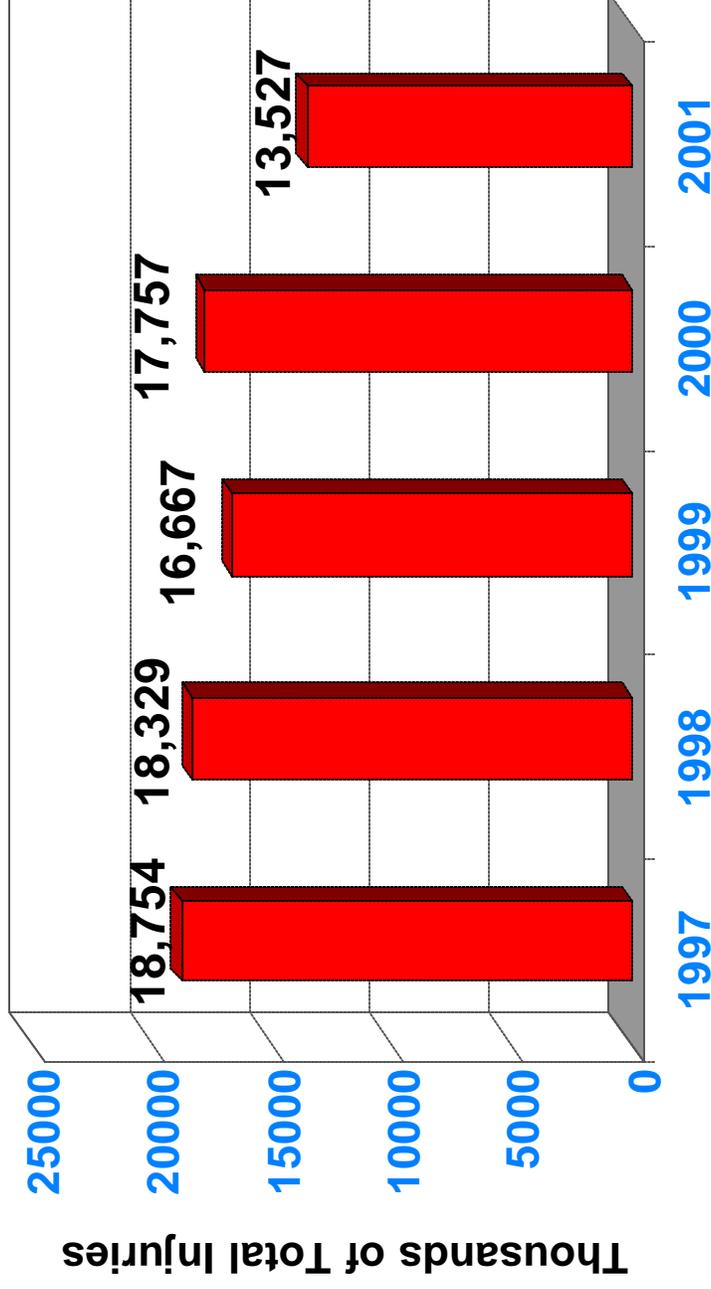
Safe efficient material handling is an essential part of our commitment. Safety training for both new and experienced lift truck operators will allow material handlers to develop and continue to practice safe operating methods. Our organization is committed to providing all personnel who operate lift trucks with this resource. Only those associates who have successfully completed this training will be allowed to operate a lift truck in our organization.

Lift truck operator safety training is only part of the overall goal of providing a safe work environment. Ensuring the safety of those who work around lift trucks and maintaining all lift truck equipment in the safest condition possible are equally vital steps to assure our commitment.

We encourage everyone - management, supervisors, lift truck operators and associates - to work together to ensure that our organization continues to improve our work environment.

National Forklift Injuries

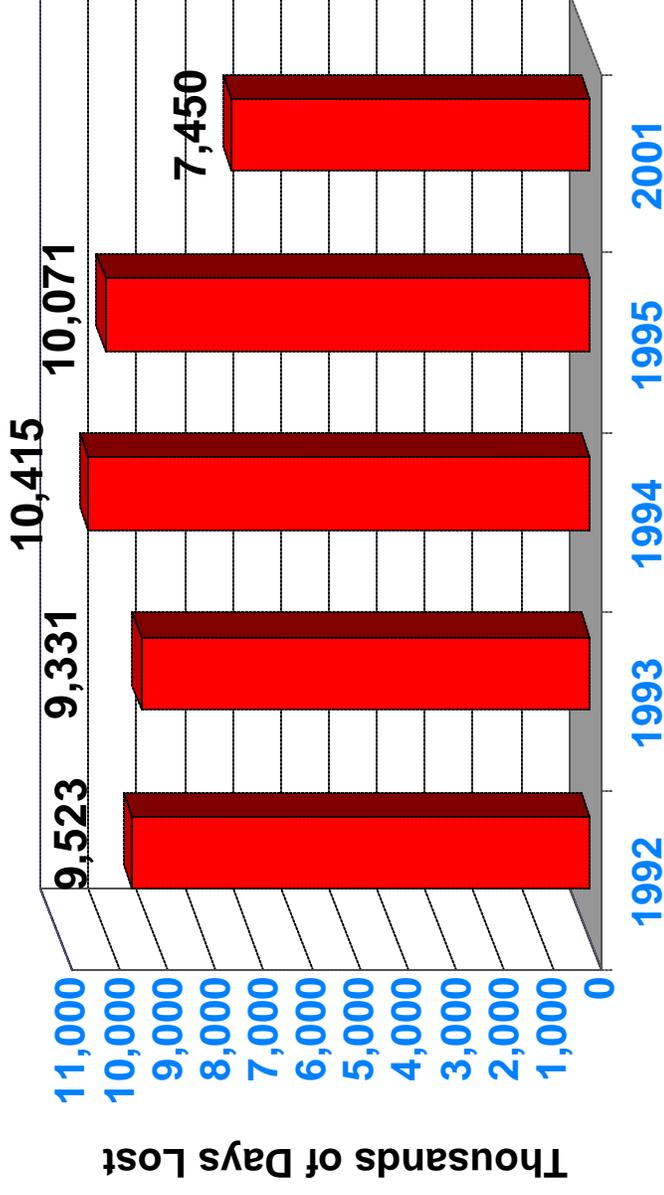
Total Injuries by Year



Source: Bureau of Labor Statistics

National Forklift Injuries

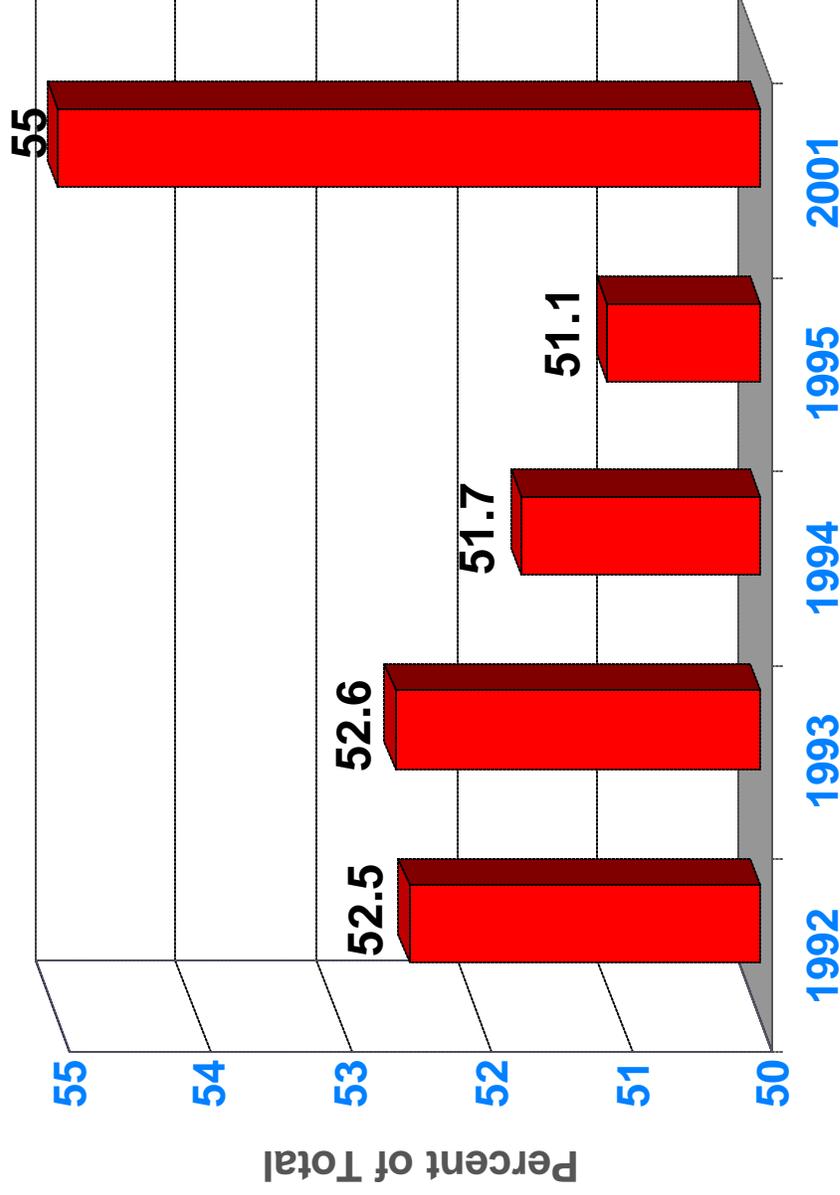
Days Lost (6 or more)



Source: Bureau of Labor Statistics

National Forklift Injuries

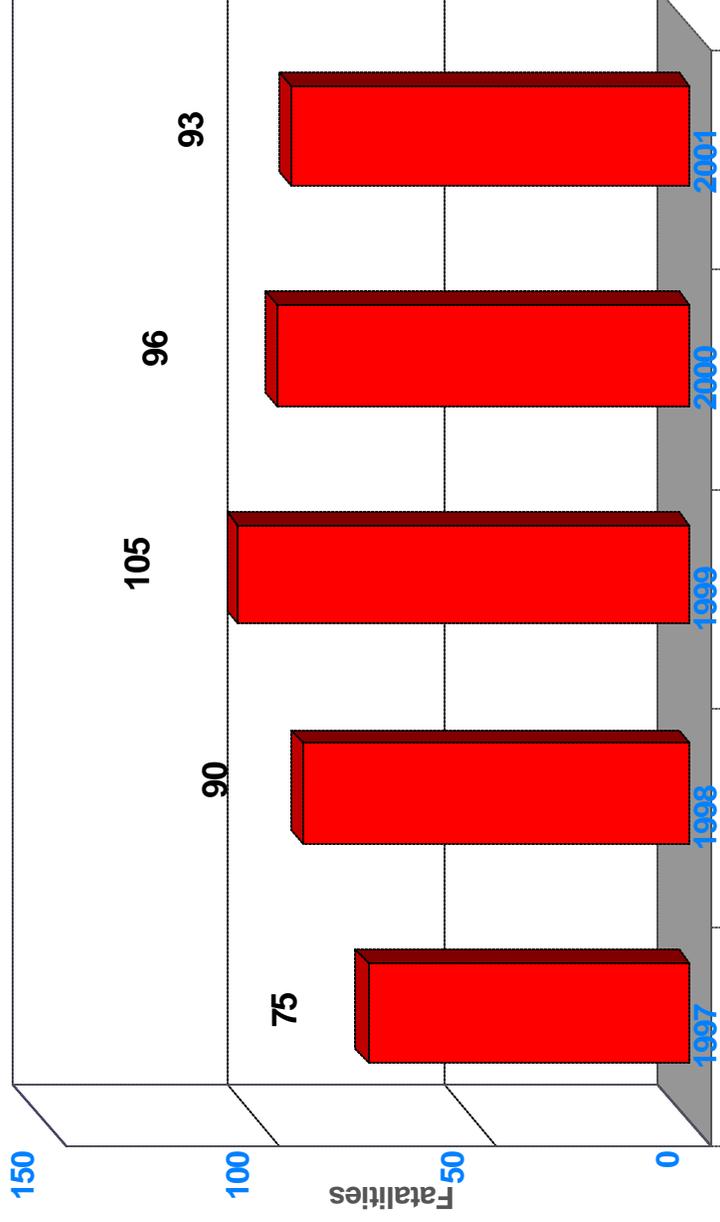
Injuries Involving 6 or More Days Away From Work (% total)



Source: Bureau of Labor Statistics

National Forklift Fatalities

Fatality Totals by Year



Source: Bureau of Labor Statistics

Ohio Bureau of Workers Compensation

Merit Rate Experience Exhibit Example

Policy #0000000000		Fis	Claim	Comp	Comp	Medical	Medical	R.C.	TML	HC %	H-Comp	H-Med	H-Med	H-Med
Manual	Number	Year	Number	Awarded	Reserve	Reserve	Reserve				Awarded	Paid	Paid	Reserve
7308-02	92-XXXX	92		15,853	15,853	0	17,835	28	49,541		0	0	0	0
7308-02	92-XXXX	92	125	125	0	152	0	28	402		0	0	0	0
7308-02	92-XXXX	92	380	380	0	0	0	28	760		0	0	0	0
7308-02	92-XXXX	92	45	45	0	80	0	28	170		0	0	0	0
7308-02	92-XXXX	92	600	600	0	1,072	0	28	2,272		0	0	0	0
7308-02	92-XXXX	92	20,914	20,914	0	25,131	0	06	66,959		0	0	0	0
8207-00	92-XXXX	92	1,181	886	0	0	0	76	2,067		0	0	0	0
7308-02	93-XXXX	93	0	0	0	161	0	00	161		0	0	0	0
8010-00	93-XXXX	93	9,299	13,949	0	17,884	0	05	41,132		0	0	0	0
7308-02	93-XXXX	93	810	810	0	2,886	0	28	4,506		0	0	0	0
7308-02	93-XXXX	93	154	154	0	139	0	28	447		0	0	0	0
7308-02	93-XXXX	93	70,599	0	0	13,683	0	00	84,282		0	0	0	0
8207-00	93-XXXX	93	70,819	0	0	91,681	0	80	162,500*		0	0	0	0
8207-00	93-XXXX	93	33,275	99,824	0	29,401	0	25	162,500*		0	0	0	0
8207-00	93-XXXX	93	88	88	0	446	0	28	622		0	0	0	0
7308-02	93-XXXX	93	1,497	1,497	0	1,304	0	28	4,298		0	0	0	0
8010-00	93-XXXX	93	111	111	0	719	0	28	941		0	0	0	0
7308-02	94-XXXX	94	47	94	0	139	0	27	280		0	0	0	0
7308-02	94-XXXX	94	0	0	0	205	0	00	205		0	0	0	0
7308-02	94-XXXX	94	555	1,110	0	352	0	27	2,017		0	0	0	0
7308-02	94-XXXX	94	0	0	0	707	0	00	707		0	0	0	0
7308-02	94-XXXX	94	2,660	3,990	0	8,394	0	06	15,044		0	0	0	0
8207-00	94-XXXX	94	1,539	3,078	0	550	0	27	5,167		0	0	0	0
8207-00	94-XXXX	94	1,554	1,554	0	3,544	0	28	6,652		0	0	0	0
7308-02	94-XXXX	94	6,427	9,641	0	10,335	0	54	26,403		0	0	0	0
7308-02	94-XXXX	94	517	1,034	0	0	0	27	1,551		0	0	0	0
7308-02	94-XXXX	94	0	0	0	0	0	00	0		0	0	0	0
7308-02	95-XXXX	95	1,454	4,362	0	564	0	26	6,380		0	0	0	0
7308-02	95-XXXX	95	5,019	15,057	0	8,713	0	26	28,789		0	0	0	0
7308-02	95-XXXX	95	528	1,584	0	480	0	26	2,592		0	0	0	0
7308-02	95-XXXX	95	0	0	0	67	0	00	67		0	0	0	0
7308-02	95-XXXX	95	0	0	0	0	0	00	0		0	0	0	0
8207-00	OD-XXX	92	0	0	0	512	0	00	512		0	0	0	0
7308-02	OD-XXX	93	3,853	2,890	0	2,852	0	76	9,595		0	0	0	0
8207-00	OD-XXX	95	0	0	0	0	0	00	0		0	0	0	0
	MED					5,461		M	5,461					
	MED					8,959		M	8,959					
	MED					20,314		M	20,314					
	MED					13,063		M	13,063					
Totals			249,903	199,630	0	287,785	0		737,318		0	0	0	0

Ohio Bureau of Workers Compensation Rate Making Formula

TML	TLL	DIFF	DIFF/TLL	C%		TM	EM
737,312	412,762	324,550	0.7262	65%	X	.51	151
					=		=

Manual	Payroll	Expected Loss Rate	Limited Loss Ratio	Limited Losses	Base Rate Per / \$100.00	Premium Rate Per / \$100.00
7308-02	4,616,431	5.86	0.9477	220,062	12.27	18.53
2223-00	630,214	3.27	0.9477	19,549	6.97	10.52
2010-00	467,979	1.41	0.9426	6,220	3.34	5.04
2207-00	4,246,701	3.22	0.9426	131,297	7.57	11.43
2747-00	7,622,661	0.25	0.9343	17,219	0.62	0.94
2210-00	9,536,907	0.20	0.9343	17,221	0.49	0.74

Manual	Payroll	Diff - Base Rate & Penalty Premium Rate	Approx. Additional Premium Dollar Totals
7308-02	4,616,431	\$6.26	\$ 288,988
2223-00	630,214	\$3.55	\$ 22,372
2010-00	467,979	\$1.70	\$ 7,955
2207-00	4,246,701	\$3.86	\$ 163,922
2747-00	7,622,661	.32 cents	\$ 24,392
2210-00	9,536,907	.25 cents	\$ 23,842
Approximate Additional Premium Dollars for this company Due to their claim losses = \$ 531,471			

This example Merit Rate Exhibit is from a Lumber Dealer where extensive material handling takes place with powered industrial trucks and manual handling of materials.

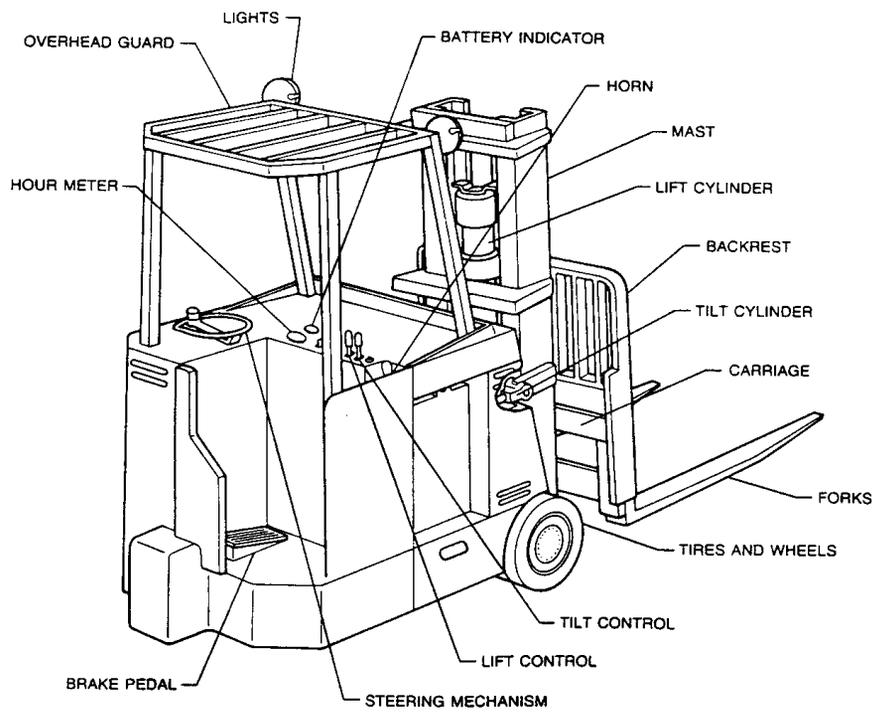
The purpose of this example is to assist you in better understanding the cost factors represented in a real company that utilizes material handling equipment.

The injuries are identified from the manual number that the injured employee's payroll is recorded, and he/she is working out of. It does not indicate what the task, function, process, or procedure was being performed at the time of the accident. Further examination of each claim would be necessary to identify specifics of each case.

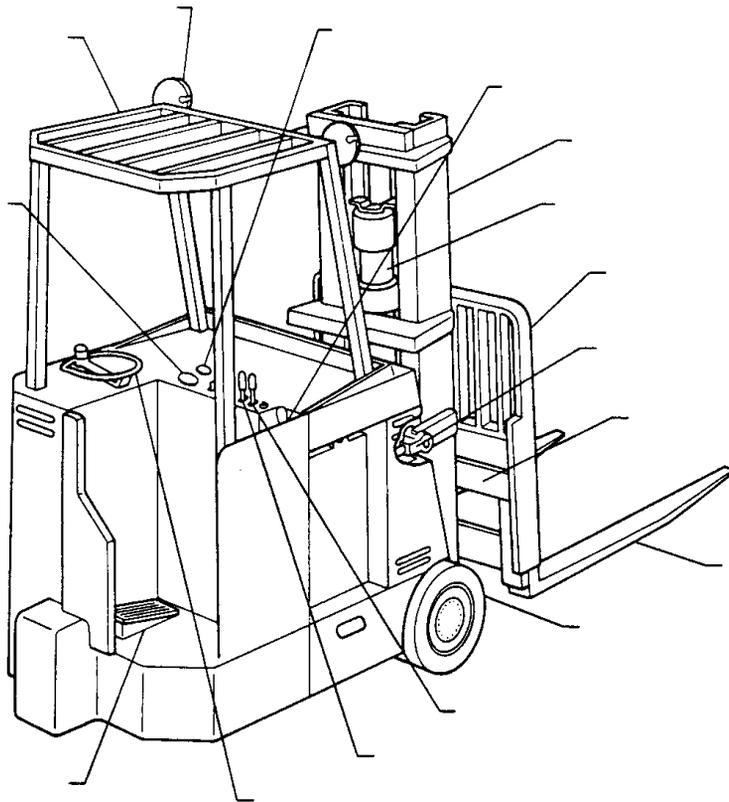
NOTE* Manual 7308-02 = Stevedoring and Freight Handling - Loading and unloading of materials or products - including all incidental operations
Manual 2207 = Building Materials Dealers

The new NCCI Classification for Towmotors will be 7310-USL & HW Stevedoring-Hand Labor, Forklift or Towmotor Operations - including all incidental operations

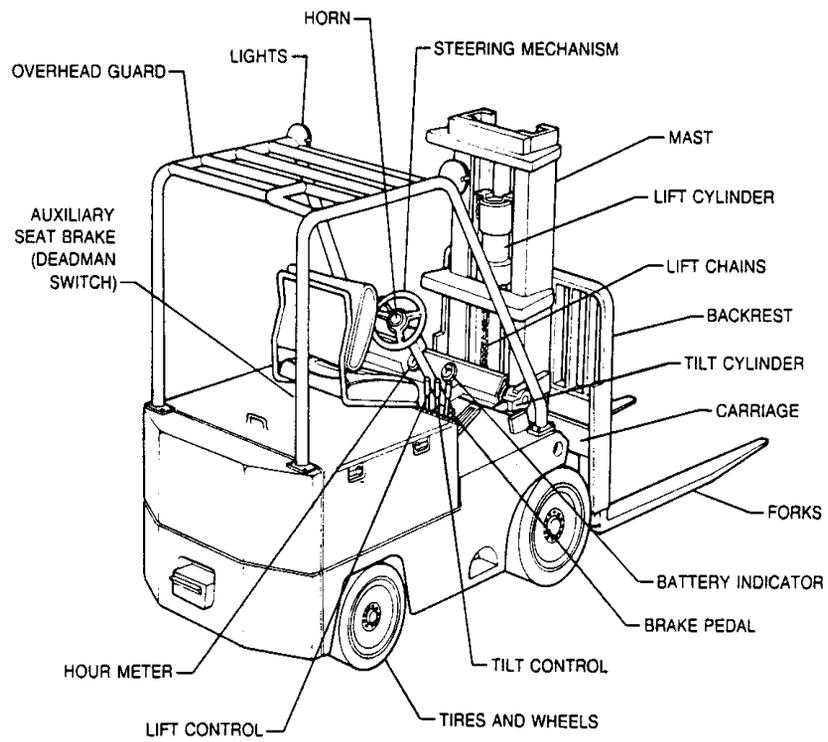
STAND UP COUNTERBALANCE



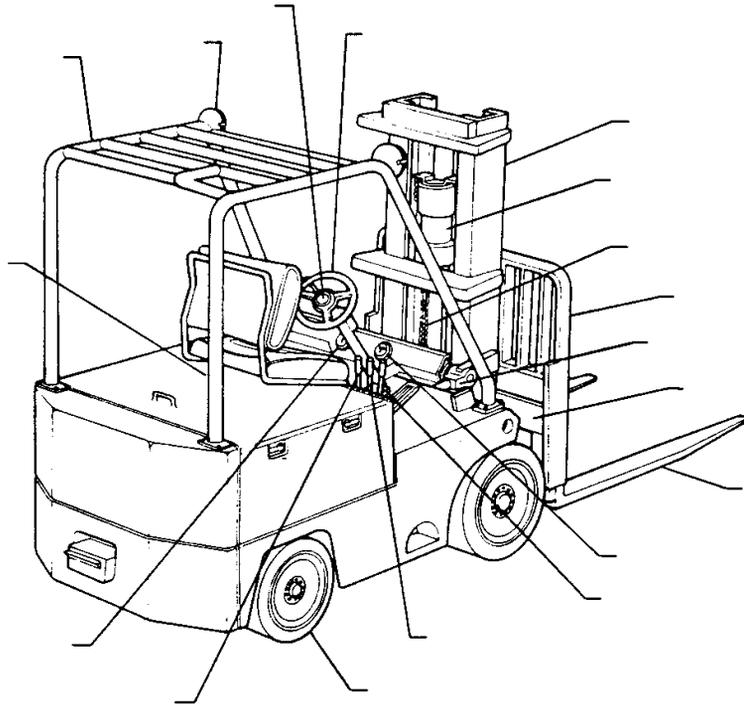
STAND UP COUNTERBALANCE



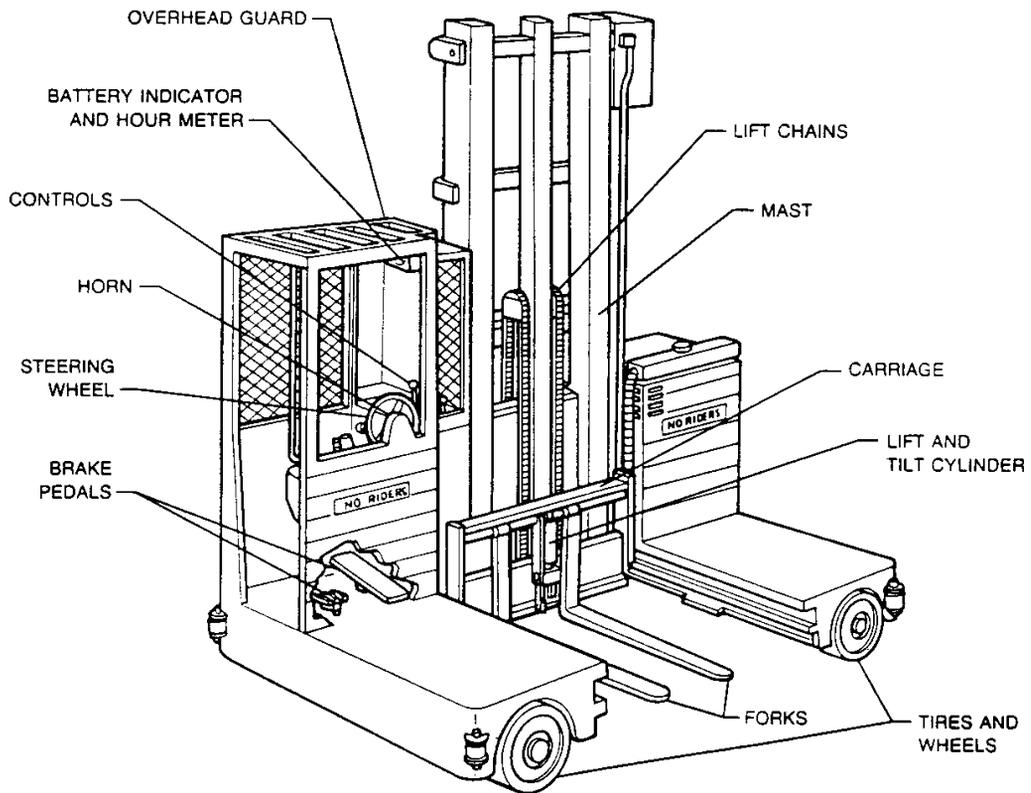
SIT DOWN COUNTERBALANCE



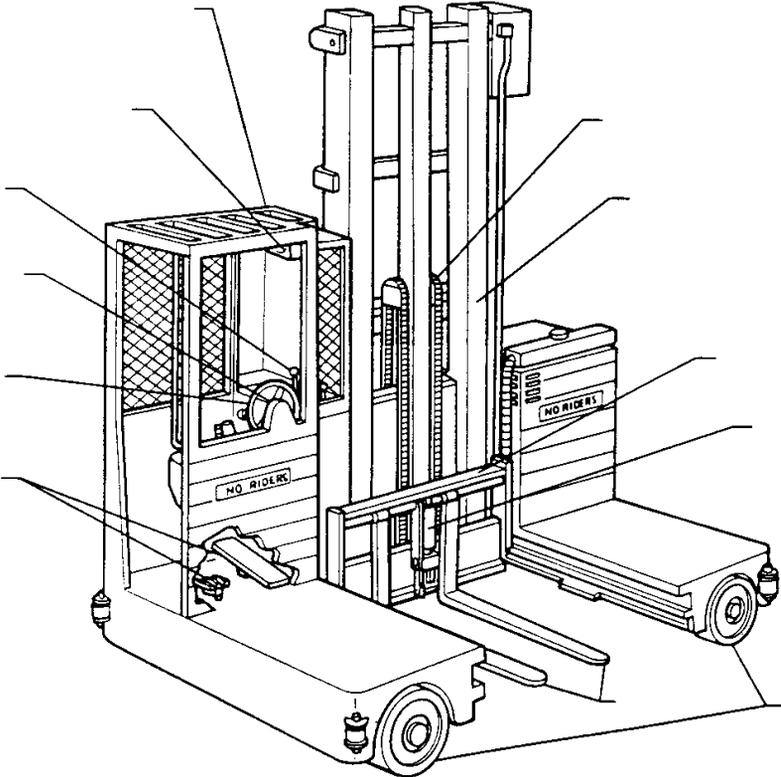
SIT DOWN COUNTERBALANCE



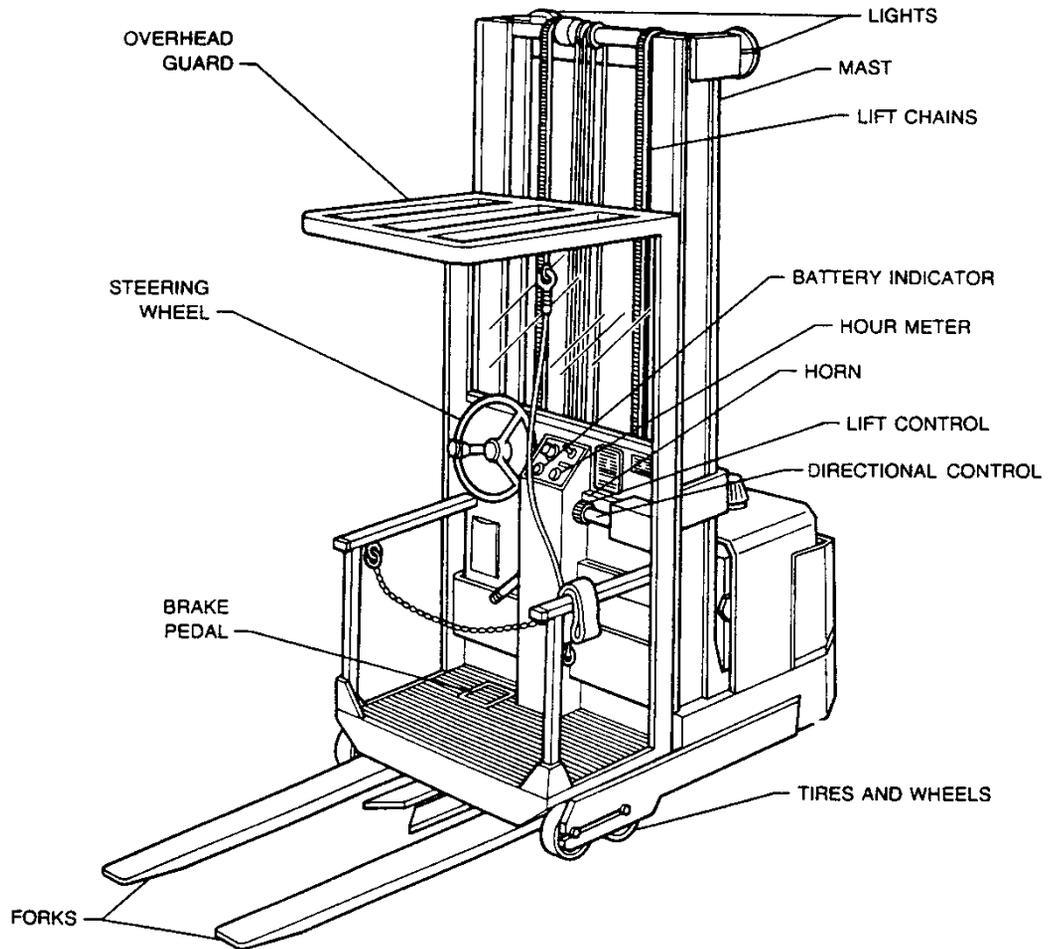
SIDE LOADER



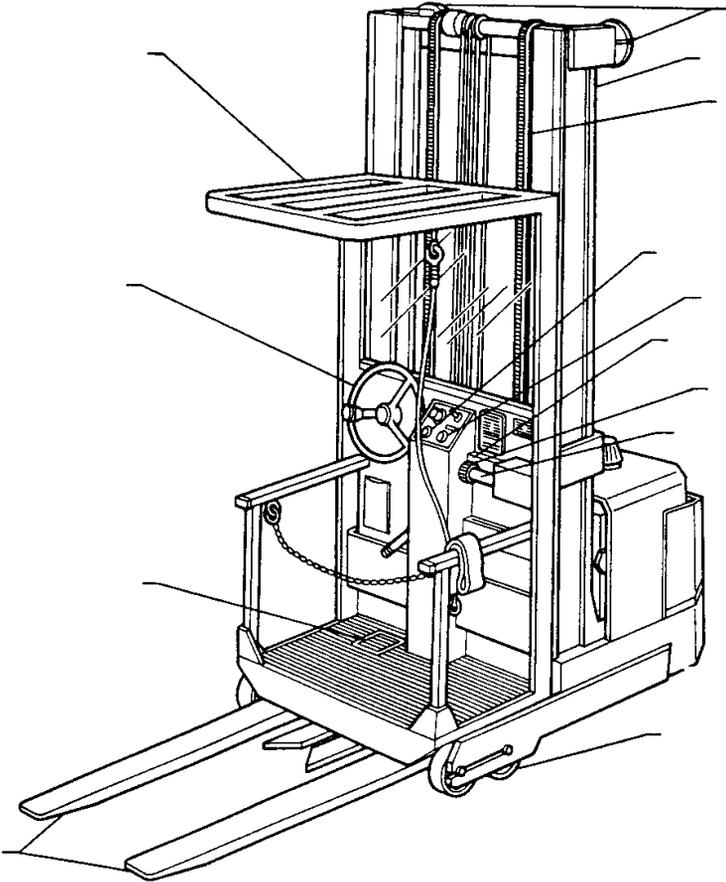
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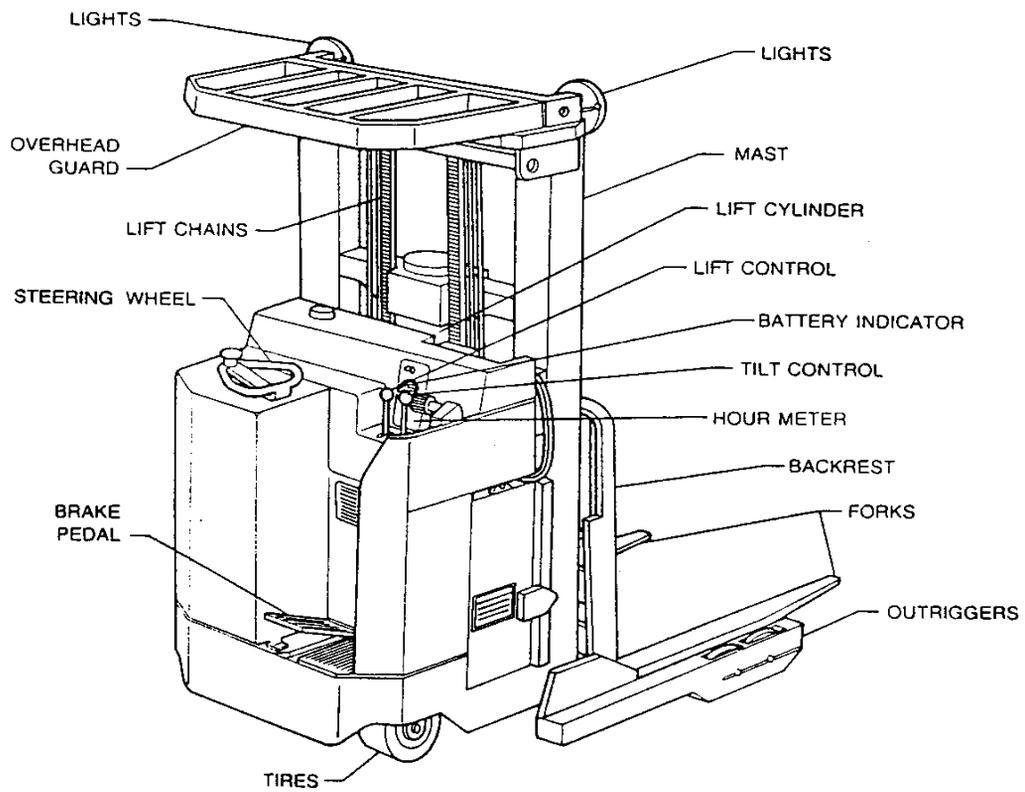
ORDER SELECTOR



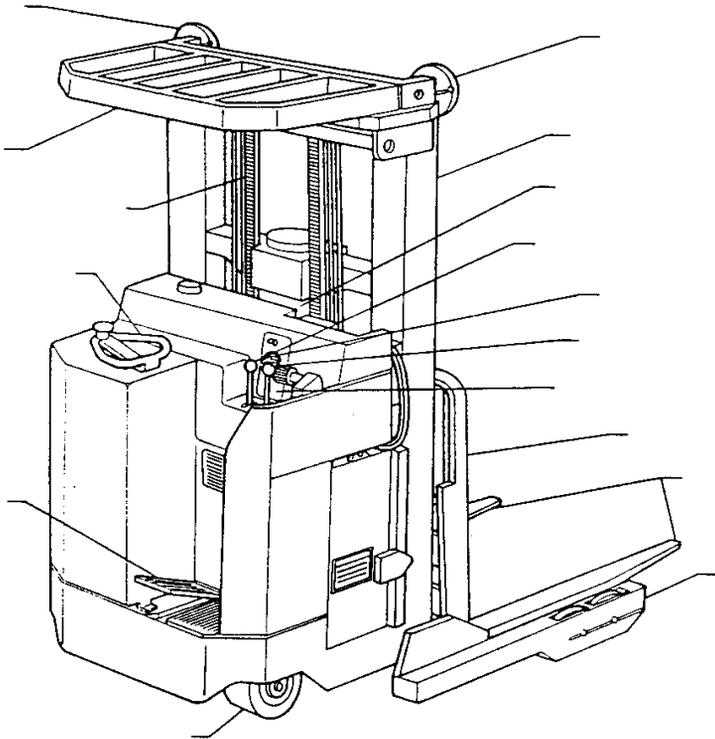
ORDER SELECTOR



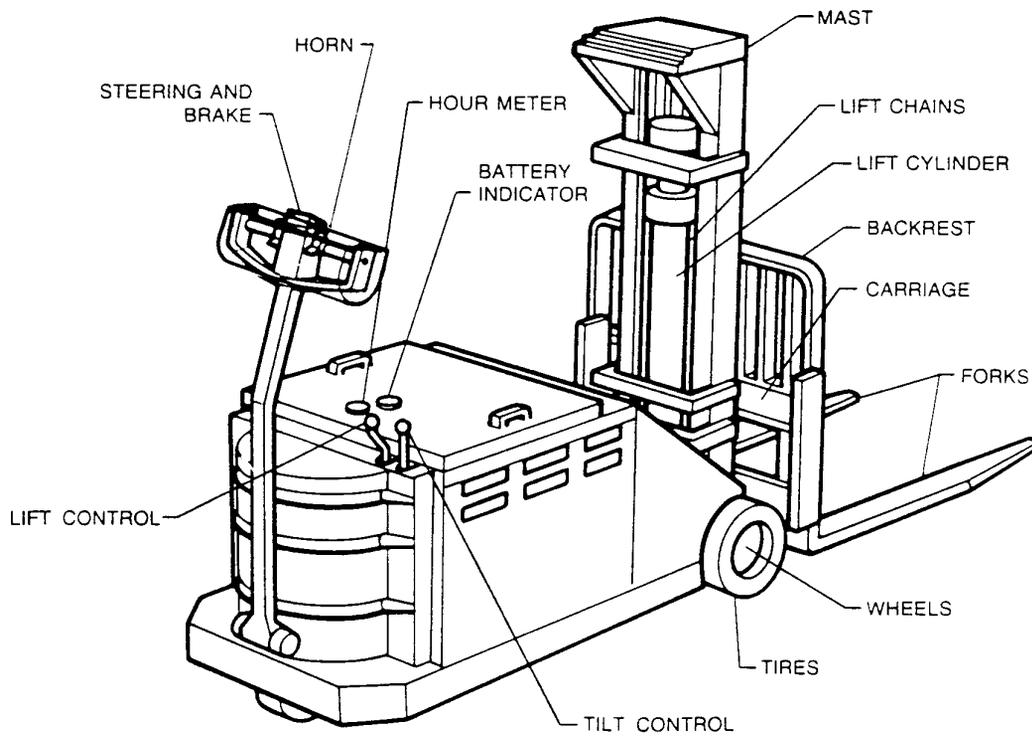
REACH FORK TRUCK



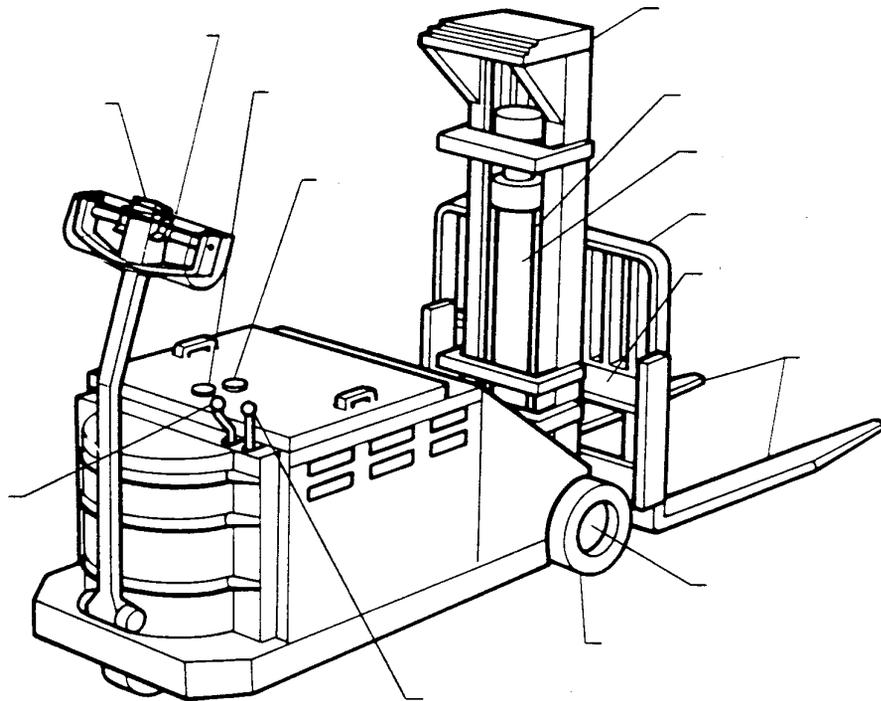
REACH FORK TRUCK



HAND WALKIE



HAND WALKIE



GUIDELINES FOR POWERED INDUSTRIAL TRUCK OPERATOR TRAINING

1. Training must be preplanned and include guidelines for the content of the training, how it is to be administered, and who will be authorized to conduct the training.
2. The training requirements apply to all employees that will operate lift trucks, powered hand trucks, or any other powered industrial trucks. The use of vehicles by unauthorized and/or untrained workers must be prohibited.
3. Training must include instruction in the physical operation of the vehicle or vehicles to be used. This instruction needs to address the characteristics of each vehicle such as the controls and their configuration, type of attachment means, types of loads to be handled, and type of operation that is likely to be encountered. In addition, it should include any specific safety instructions relating to the vehicle (such as fall protection requirements for "order picker" type units with elevatable controls).
4. Training must include a review of the rules for safe operation of a truck which would as a minimum include the applicable standards contained in OSHA regulations 1910.30, 1910.176, and 1910.178.
5. The operation instruction needs to include a review of the basic principles of lift trucks including such aspects as load center principles, determination and recognition of a vehicle's capacity, and lift truck stability factors.

29 CFR 1910.178(1); OPERATOR TRAINING

Devised methods of training for operators of powered industrial trucks shall include but are not limited to, providing the operator with an understanding of safety requirements related to the uses of powered industrial trucks such as:

- (I)
 - (a) Inspections.
 - (b) Fueling and Charging Operations.
 - (c) Traveling Operations.
 - (d) Boarding Operations
 - (e) Loading and Unloading Operations.
 - (f) Storage Operations.
 - (g) Parking Operations.

- (II) (a) Providing a controlled, "Hands On Equipment", method of training for operators enabling them to better understand the operational characteristics for each type of vehicle such as prescribed by the manufacturers of powered industrial trucks.

SAFETY REQUIREMENTS FOR POWERED INDUSTRIAL TRUCKS

INSPECTIONS

- (1) 29 CFR 1910.178(q)(6):
- (2) 29 CFR 1910.178(q)(7):
- (3) 29 CFR 1910.178(q)(8):
- (4) 29 CFR 1910.178(q)(9):
- (5) 29 CFR 1910.178(q)(10):
- (6) 29 CFR 1910.178(p)(1); (p)(4); & (p)(5):

FUELING AND CHARGING OPERATIONS

- (1) 29 CFR 1910.178(f)(1):
- (2) 29 CFR 1910.178(f)(2):
- (3) 29 CFR 1910.178(g)(1):
- (4) 29 CFR 1910.178(g)(2):
- (5) 29 CFR 1910.178(g)(3):
- (6) 29 CFR 1910.178(g)(4):
- (7) 29 CFR 1910.178(g)(5):
- (8) 29 CFR 1910.178(g)(6):
- (9) 29 CFR 1910.178(g)(7):
- (10) 29 CFR 1910.178(g)(8):
- (11) 29 CFR 1910.178(g)(9):
- (12) 29 CFR 1910.178(g)(10):
- (13) 29 CFR 1910.178(g)(11):
- (14) 29 CFR 1910.178(g)(12):
- (15) 29 CFR 1910.178(p)(2):
- (16) 29 CFR 1910.178(p)(3):

TRAVELING OPERATIONS

- (1) 29 CFR 1910.176(a):
- (2) 29 CFR 1910.176(e):
- (3) 29 CFR 1910.178(h)(2):
- (4) 29 CFR 1910.178(m)(1):
- (5) 29 CFR 1910.178(m)(2):
- (6) 29 CFR 1910.178(m)(3):
- (7) 29 CFR 1910.178(m)(4):
- (8) 29 CFR 1910.178(m)(6):
- (9) 29 CFR 1910.178(m)(8):
- (10) 29 CFR 1910.178(m)(11):
- (11) 29 CFR 1910.178(n)(1):
- (12) 29 CFR 1910.178(n)(2):
- (13) 29 CFR 1910.178(n)(3):
- (14) 29 CFR 1910.178(n)(4):
- (15) 29 CFR 1910.178(n)(5):
- (16) 29 CFR 1910.178(n)(6):

- (17) 29 CFR 1910.178(n)(7) & (7)(iii):
 - (18) 29 CFR 1910.178(n)(8):
 - (19) 29 CFR 1910.178(n)(9):
 - (20) 29 CFR 1910.178(n)(10):
 - (21) 29 CFR 1910.178(n)(14):
 - (22) 29 CFR 1910.178(n)(15):
- BOARDING OPERATIONS

- (1) 29 CFR 1910.176(f):
- (2) 29 CFR 1910.178(j):
- (3) 29 CFR 1910.30(a)(1):
- (4) 29 CFR 1910.30(a)(2):
- (5) 29 CFR 1910.30(a)(3):
- (6) 29 CFR 1910.30(a)(4):
- (7) 29 CFR 1910.30(a)(5):
- (8) 29 CFR 1910.178(k)(1):
- (9) 29 CFR 1910.178(k)(2):
- (10) 29 CFR 1910.178(k)(3):
- (11) 29 CFR 1910.178(k)(4):
- (12) 29 CFR 1910.178(m)(6):
- (13) 29 CFR 1910.178(m)(7):
- (14) 29 CFR 1910.178(m)(12)(i), (ii) & (iii):
- (15) 29 CFR 1910.178(n)(11):
- (16) 29 CFR 1910.178(n)(12):
- (17) 29 CFR 1910.178(n)(13):

LOADING AND UNLOADING OPERATIONS

- (1) 29 CFR 1910.178(e)(2):
- (2) 29 CFR 1910.178(m)(9):
- (3) 29 CFR 1910.178(m)(10):
- (4) 29 CFR 1910.178(n)(4):
- (5) 29 CFR 1910.178(n)(7)(i):
- (6) 29 CFR 1910.178(n)(7)(ii):
- (7) 29 CFR 1910.178(o)(1):
- (8) 29 CFR 1910.178(o)(2):
- (9) 29 CFR 1910.178(o)(3):
- (10) 29 CFR 1910.178(o)(4):
- (11) 29 CFR 1910.178(o)(5):
- (12) 29 CFR 1910.178(o)(6):

STORAGE OPERATIONS

- (1) 29 CFR 1910.176(b):
- (2) 29 CFR 1910.176(c):
- (3) 29 CFR 1910.178(m)(14):

PARKING OPERATIONS

- (1) 29 CFR 1910.178(m)(2):
- (2) 29 CFR 1910.178(m)(5)(i):
- (3) 29 CFR 1910.178(m)(5)(ii):
- (4) 29 CFR 1919.178(m)(5)(iii):
- (5) 29 CFR 1910.178(n)(5):
- (6) 29 CFR 1910.178(n)(12):

OHIO LAWS

Ohio Revised Code, Section 4101.11

Duty of the employer to protect employees and frequenters.

Every employer shall furnish employment which is safe for the employees engaged therein, shall furnish a place of employment which shall be safe for the employees therein and frequenters thereof, shall furnish and use safety devices and safeguards, shall adopt and use methods and processes, follow and obey orders, and prescribe hours of labor reasonably adequate to render such employment and places of employment safe, and shall do every other thing reasonably necessary to protect the life, safety, and welfare of such employees and frequenters.

Ohio Revised Code, Section 4101.12

Duty of the employer to furnish safe place of employment.

No employer shall require, permit, or suffer any employee to go or be in any employment or place of employment which is not safe, and no such employer shall fail to furnish, provide, and use safety devices and safeguards, or fail to obey and follow orders or to adopt and use methods and processes reasonably adequate to render such employment and place of employment safe. No employer shall fail to do every other thing reasonably necessary to protect the life, health, safety, and welfare of such employees or frequenters. No such employer or other persons shall construct, occupy, or maintain any place of employment that is not safe.

Ohio Revised Code, Section 4101.13

Duty of employees.

No employee shall remove, displace, damage, destroy, or carry off any safety device or safeguard furnished or provided for use in any employment or place of employment, or interfere in any way with the use thereof by any other person. No employee shall interfere with the use of any method or process adopted for the protection of any employee in such employment or place of employment, or frequenter of such place of employment, or fail to follow and obey orders and to do every other thing reasonably necessary to protect the life, safety, and welfare of such employees and frequenters.

PART 1910--OCCUPATIONAL SAFETY AND HEALTH STANDARDS

1. The authority citation for subpart N of part 1910 would be revised to read as follows:

Authority: Secs. 4, 6, 8 of the 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 1-90 (55 FR 9033), as applicable.

Section 1910.177 also issued under 5 U.S.C. 553 and 29 CFR part 1911.

Sections 1910.176, 1910.178, 1910.179, 1910.183, 1910.184, 1910.189, and 1910.190 also issued under 29 CFR part 1911.

2. Section 1910.178 would be amended by revising paragraph (l) and by adding appendices A and B at the end of the section to read as follows:

Sec. 1910.178 Powered industrial trucks.

* * * * *

(l) Operator training.

(1) Operator qualifications. (i) The employer shall ensure that each potential operator of a powered industrial truck is capable of performing the duties that are required of the job.

(ii) In determining operator qualifications, the employer shall ensure that each potential operator has received the training required by this paragraph (l), that each potential operator has been evaluated by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence, while performing the required duties, and that each potential operator performs those operations competently.

(2) Training program implementation.

(i) The employer shall implement a training program and ensure that only trained drivers who have successfully completed the training program are allowed to operate powered industrial trucks. Exception: Trainees under the direct supervision of persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence, shall be allowed to operate a powered industrial truck provided the operation of the vehicle is conducted in an area where other employees are not near and the operation of the truck is under controlled conditions.

(ii) Training shall consist of a combination of classroom instruction (Lecture, discussion, video tapes, and/or conference) and practical training (demonstrations and practical exercises by the trainee).

(iii) All 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 operator trainees shall be trained in the following topics unless the employer can demonstrate that some of the topics are not needed for safe operation.

(i) Truck related topics.

(A) All operating instructions, warnings and precautions for the types of trucks the operator will be authorized to operate;

(B) Similarities to and differences from the automobile;

(C) Controls and instrumentation: location, what they do and how they work;

(D) Power plant operation and maintenance;

(E) Steering and maneuvering;

(F) Visibility (including restrictions due to loading);

(G) Fork and attachment adaption, operation and limitations of their utilization;

(H) Vehicle capacity;

(I) Vehicle stability;

(J) Vehicle inspection and maintenance;

(K) Refueling or charging, recharging batteries;

(L) Operating limitations; and

(M) Any other operating instruction, warning or precaution listed in the operator's manual for the type vehicle which the employee is being trained to operate.

(ii) Workplace related topics.

(A) Surface 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 aisles and other restricted places of operation;

(F) Operating in hazardous classified locations;

(G) Operating the truck on ramps and other sloped surfaces that could 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 could cause a buildup of carbon monoxide or diesel exhaust.

(iii) The requirements of this section.

(4) Evaluation and refresher or remedial training.

(i) Sufficient evaluation and remedial training shall be conducted so that the employee retains and uses the knowledge, skills and ability needed to operate the powered industrial truck safely.

(ii) An evaluation of the performance of each powered industrial truck operator shall be conducted every three (3) years by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.

(iii) Refresher or remedial training shall be provided when there is reason to believe that there has been unsafe operation, when an accident or a near-miss occurs or when an evaluation indicates that the operator is not capable of performing the assigned duties.

(5) Avoidance of Duplicative Training.

- (i) Each current truck operator who has received training in any of the elements specified in paragraph (l)(3) of this section for the types of trucks the employee is authorized to operate and the type of workplace that the trucks are being operated in need not be retrained in those elements if the employer certifies in accordance with paragraph (l)(5)(i) of this section that the operator has been evaluated to be competent to perform those duties.
- (ii) Each new truck operator who has received training in any of the elements specified in paragraph (l)(3) of this section for the types of trucks the employee will be authorized to operate and the type of workplace in which the trucks will be operated need not be retrained in those elements before initial assignment in the workplace if the employer has written documentation of the training and if the employee is evaluated pursuant to paragraph (l)(4) of this section to be competent.

(6) Certification.

- (i) The employer shall certify that each operator has received the training, has been evaluated as required by this paragraph, and has demonstrated competency in the performance of the operator's duties. The certification shall include the name of the trainee, the date of training, and the signature of the person performing the training and evaluation.
- (ii) The employer shall retain the current training materials and course outline or the name and address of the person who conducted the training if it was conducted by an outside trainer.

Note to paragraph (l): Appendices A and B at the end of this section provide non-mandatory guidance to assist employers in implementing this paragraph (l).

* * * * *

Appendixes to 31910.178

Appendix A--Training of Powered Industrial Truck Operators

(Non-mandatory appendix to paragraph (l) of this section)

A-1. Operator Selection

A-1.1. Prospective operators of powered industrial trucks should be identified based upon their ability to be trained and accommodated to perform job functions that are essential to the operation of a powered industrial truck. Determination of the capabilities of a prospective operator to fulfill the demands of the job should be based upon the tasks that the job demands.

A-1.2. The employer should identify all the aspects of the job that the employee must meet/perform when doing his or her job. These aspects could include the level at which the employee must see and hear, the physical demands of the job, and the environmental extremes of the job.

A-1.3. One factor to be considered is the ability of the candidate to see and hear within reasonably acceptable limits. Included in the vision requirements are the ability to see at distance and peripherally. In certain instances, there also is a requirement for the candidate to discern different colors, primarily red, yellow and green.

A-1.4. The environmental extremes that might be demanded of a potential powered industrial truck operator include that ability of the person to work in areas of excessive cold or heat.

A-1.5. After an employee has been trained and appropriate accommodations have been made, the employer needs to determine whether the employee can safely perform the job.

A-2. The Method(s) of Training

A-2.1. Among the many methods of training are the lecture, conference, demonstration, test (written and/or oral) and the practical exercise. In most instances, a combination of these methods have been successfully used to train employees in the knowledge, skills and abilities that are essential to perform the job function that the employee is being trained to perform. To enhance the training and to make the training more understandable to the employee, employers and other trainers have used movies, slides, video tapes and other visual presentations. Making the presentation more understandable has several advantages including:

(1) The employees being trained remain more attentive during the presentation if graphical presentation are used, thereby increasing the effectiveness of the training;

(2) The use of visual presentations allows the trainer to ensure that the necessary information is covered during the training;

(3) The use of graphics makes better utilization of the training time by decreasing the need for the instructor to carry on long discussions about the instructional material; and

(4) The use of graphics during instruction provides greater retention by the trainees.

A-3. Training Program Content

A-3.1. Because each type (make and model) powered industrial truck has different operating characteristics, limitations and other unique features, an optimum employee training program for powered industrial truck operators must be based upon the type vehicles that the employee will be trained and authorized to operate. The training must also emphasize the features of the workplace which will affect the manner in which the vehicle must be operated. Finally, the training must include the general safety rules applicable to the operation of all powered industrial trucks.

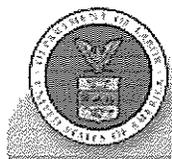
A-3.2. Selection of the methods of training the operators has been left to the reasonable determination of the employer. Whereas some employees can assimilate instructional material while seated in a classroom, other employees may learn best by observing the conduct of operations (demonstration) and/or by having to personally conduct the operations (practical exercise). In some instances, an employee can receive valuable instruction through the use of electronic mediums, such as the use of video tapes and movies. In most instances, a combination of the different training methods

may provide the mechanism for providing the best training in the least amount of time. OSHA has specified at paragraph (l)(2)(ii) of this section that the training must consist of a combination classroom instruction and practical exercise. The use of both these modes of instruction is the only way of assuring that the trainee has received and comprehended the instruction and can utilize the information to safely operate a powered industrial truck.

A-4. Initial Training

A-4.1. The following is an outline of a generalized forklift operator training program:

- (1) Characteristics of the powered industrial truck(s) the employee will be allowed to operate:
 - (a) Similarities to and differences from the automobile;
 - (b) Controls and instrumentation: location, what they do and how they work;
 - (c) Power plant operation and maintenance;
 - (d) Steering and maneuvering;
 - (e) Visibility;
 - (f) Fork and/or attachment adaption, operation and limitations of their utilization;
 - (g) Vehicle capacity;
 - (h) Vehicle stability;
 - (i) Vehicle inspection and maintenance;
 - (j) Refueling or charging, recharging batteries.
 - (k) Operating limitations.
 - (l) Any other operating instruction, warning or precaution listed in the operator's manual for the type vehicle which 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 locations;
 - (g) Operating the truck on ramps and other sloped surfaces which would affect the stability of the vehicle;
 - (h) Other unique or potentially hazardous environmental conditions which exist or may exist in the workplace.
 - (i) Operating the vehicle in closed environments and other areas where insufficient ventilation could cause a buildup of carbon monoxide or diesel exhaust.
- (3) The requirements of this OSHA Standard.



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Regulations (Standards - 29 CFR)

Powered industrial trucks. - 1910.178

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● Part Number:	1910
● Part Title:	Occupational Safety and Health Standards
● Subpart:	N
● Subpart Title:	Materials Handling and Storage
● Standard Number:	1910.178
● Title:	Powered industrial trucks.
● Appendix:	A

1910.178(a)

General requirements.

1910.178(a)(1)

This section contains safety requirements relating to fire protection, design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines. This section does not apply to compressed air or nonflammable compressed gas-operated industrial trucks, nor to farm vehicles, nor to vehicles intended primarily for earth moving or over-the-road hauling.

1910.178(a)(2)

All new powered industrial trucks acquired and used by an employer after the effective date specified in paragraph (b) of 1910.182 shall meet the design and construction requirements for powered industrial trucks established in the "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", which is incorporated by reference as specified in Sec. 1910.6, except for vehicles intended primarily for earth moving or over-the-road hauling.

..1910.178(a)(3)

1910.178(a)(3)

Approved trucks shall bear a label or some other identifying mark indicating approval by the testing laboratory. See paragraph (a)(7) of this section and paragraph 405 of "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", which is incorporated by reference in paragraph (a)(2) of this section and which provides that if the powered industrial truck is accepted by a nationally recognized testing laboratory it should be so marked.

1910.178(a)(4)

Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

1910.178(a)(5)

If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request that the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

1910.178(a)(6)

The user shall see that all nameplates and markings are in place and are maintained in a legible condition.

1910.178(a)(7)

As used in this section, the term, "approved truck" or "approved industrial truck" means a truck that is listed or approved for fire safety purposes for the intended use by a nationally recognized testing laboratory, using nationally recognized testing standards. Refer to 1910.155(c)(3)(iv)(A) for definition of nationally recognized testing laboratory.

1910.178(b)

Designations. For the purpose of this standard there are eleven different designations of industrial trucks or tractors as follows: D, DS, DY, E, ES, EE, EX, G, GS, LP, and LPS.

1910.178(b)(1)

The D designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered.

1910.178(b)(2)

The DS designated units are diesel powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where a D unit may not be considered suitable.

1910.178(b)(3)

The DY designated units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.

1910.178(b)(4)

The E designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards.

1910.178(b)(5)

The ES designated units are electrically powered units that, in addition to all of the requirements for the E units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be considered suitable.

1910.178(b)(6)

The EE designated units are electrically powered units that have, in addition to all of the requirements for the E and ES units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE unit may be used where the use of an E and ES unit may not be considered suitable.

1910.178(b)(7)

The EX designated units are electrically powered units that differ from the E, ES, or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.

1910.178(b)(8)

The G designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards.

1910.178(b)(9)

The GS designated units are gasoline powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of a G unit may not be considered suitable.

1910.178(b)(10)

The LP designated unit is similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline.

..1910.178(b)(11)**1910.178(b)(11)**

The LPS designated units are liquefied petroleum gas powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable.

1910.178(b)(12)

The atmosphere or location shall have been classified as to whether it is hazardous or nonhazardous prior to the consideration of industrial trucks being used therein and the type of industrial truck required shall be as provided in paragraph (d) of this section for such location.

1910.178(c)

Designated locations.

1910.178(c)(1)

The industrial trucks specified under subparagraph (2) of this paragraph are the minimum types required but industrial trucks having greater safeguards may be used if desired.

1910.178(c)(2)

For specific areas of use see Table N-1 which tabulates the information contained in this section. References are to the corresponding classification as used in subpart S of this part.

1910.178(c)(2)(i)

Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentration of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimethyl hydrazine (UDMH).

1910.178(c)(2)(ii)

-

1910.178(c)(2)(ii)(a)

Power-operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium, and their commercial alloys, other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal or coke dust except approved power-operated industrial trucks designated as EX may be used in such atmospheres.

1910.178(c)(2)(ii)(b)

In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers, and circuit breakers of trucks shall have enclosures specifically approved for such locations.

1910.178(c)(2)(iii)

Only approved power-operated industrial trucks designated as EX may be used in atmospheres containing acetone, acrylonitrile, alcohol, ammonia, benzene, benzol, butane, ethylene dichloride, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, propylene, styrene, vinyl acetate, vinyl chloride, or xylenes in quantities sufficient to produce explosive or ignitable mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment.

1910.178(c)(2)(iv)

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

TABLE N-1. -- SUMMARY TABLE ON USE OF INDUSTRIAL TRUCKS
IN VARIOUS LOCATIONS

Classes	Unclassified	Class I locations	Class II locations	Class III locations	
Description of classes.	Locations not possessing atmospheres as described in other columns.	Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitable mixtures.	Locations which are hazardous because of the presence of combustible dust.	Locations where easily ignitable fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.	
Groups in classes	None	A	B	C	D
Examples of locations or atmospheres in classes and groups.	Piers and wharves inside and outside general storage, general	Acetylene	Hydrogen	Ethyl ether	Gasoline Naphtha Alcohols Acetone Lacquer solvent Benzene

industrial
or
commercial
properties.

(Continued)

E	F	G	None
Metal dust	Carbon black coal dust, coke dust	Grain dust, flour dust, starch dust, organic dust.	Baled waste, cocoa fiber, cotton, excelsior, hemp, istle, jute, kapok, oakum, sisal, Spanish moss, synthetic fibers, tow.

	1	2	
Divisions (nature of hazardous conditions)	None	Above condition exists continuously, intermittently, or periodically under normal operating conditions.	Above condition may occur accidentally as due to a puncture of a storage drum.

(Continued)

1	2	1	2
Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition	Explosive mixture not normally present, but where deposits of dust may cause heat rise in electrical equipment,	Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured,	Locations in which easily ignitable fibers are stored or handled (except in the process of manufacture).

to exist simultaneously with arcing or sparking of electrical equipment, or where dusts of an electrically conducting nature may be present.	or where such deposits may be ignited by arcs or sparks from electrical equipment.	or used.
--	--	----------

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

Groups in classes	None	A	B	C	D	A	B	C
Type of truck authorized:								
Diesel:								
Type D	D** ..	....	....	....	....	....	....	....
Type DS .....	.....	....	....	....	....	....	....	....
Type DY .....	.....	....	....	....	....	....	....	....
Electric:								
Type E	E** ..	....	....	....	....	....	....	....
Type ES .....	.....	....	....	....	....	....	....	....
Type EE .....	.....	....	....	....	....	....	....	....
Type EX .....	.....	....	....	....	EX .	....	....	....
Gasoline:								
Type G	G** ..	....	....	....	....	....	....	....
Type GS .....	.....	....	....	....	....	....	....	....
LP-Gas:								
Type LP	LP** ..	....	....	....	....	....	....	....
Type LPS .....	.....	....	....	....	....	....	....	....
Paragraph	210.211		201		203		209	
Ref. in			(a)		(a)		(a)	
No. 505.								

(Continued)

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

Groups in classes	D	E	F	G	E	F	G	None	None
-------------------	---	---	---	---	---	---	---	------	------

Type of truck
authorized:

Diesel:

Type D
 Type DS DS .
 Type DY DY .

Electric:

Type E E
 Type ES ES .
 Type EE EE .
 Type EX EX . EX .

Gasoline:

Type G
 Type GS GS .

LP-Gas:

Type LP
 Type LPS LPS .

Paragraph	204	202	205	209	206	207	208
Ref. in	(a),	(a)	(a)	(a)	(a),	(a)	(a)
No. 505.	(b)				(b)		

** Trucks conforming to these types may also be used
 -- see subdivision (c)(2)(x) and (c)(2)(xii) of this section.

1910.178(c)(2)(v)

In locations used for the storage of hazardous liquids in sealed containers or liquified or compressed gases in containers, approved power-operated industrial trucks designated as DS, ES, GS, or LPS may be used. This classification includes locations where volatile flammable liquids or flammable gases or vapors are used, but which, would become hazardous only in case of an accident or of some unusual operating condition. The quantity of hazardous material that might escape in case of accident, the adequacy of ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the DS or DY, ES, EE, GS, LPS designated truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquified or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.

..1910.178(c)(2)(vi)

1910.178(c)(2)(vi)

-

1910.178(c)(2)(vi)(a)

Only approved power operated industrial trucks designated as EX shall be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures, or where mechanical failure or abnormal operation of machinery or equipment might cause such mixtures to be produced.

1910.178(c)(2)(vi)(b)

The EX classification usually includes the working areas of grain handling and storage plants, room containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers, or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors (except all-metal collectors vented to the outside), and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, and other occupancies of similar nature; coal pulverizing plants (except where the pulverizing equipment is essentially dust tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and other similar locations where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

1910.178(c)(2)(vii)

Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures but where deposits or accumulations of such dust may be ignited by arcs or sparks originating in the truck.

1910.178(c)(2)(viii)

Only approved power-operated industrial trucks designated as DY, EE, or EX shall be used in locations which are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

1910.178(c)(2)(ix)

Only approved power-operated industrial trucks designated as DS, DY, ES, EE, EX, GS, or LPS shall be used in locations where easily ignitable fibers are stored or handled, including outside storage, but are not being processed or manufactured. Industrial trucks designated as E, which have been previously used in these locations may be continued in use.

1910.178(c)(2)(x)

On piers and wharves handling general cargo, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.

1910.178(c)(2)(xi)

If storage warehouses and outside storage locations are hazardous only the approved power-operated industrial truck specified for such locations in this paragraph (c) (2) shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements for these types may be used.

1910.178(c)(2)(xii)

If general industrial or commercial properties are hazardous, only approved power-operated industrial trucks specified for such locations in this paragraph (c) (2) shall be used. If not classified as hazardous, any approved power-operated industrial truck designated as Type D, E, G, or LP may be used, or trucks which conform to the requirements of these types may be used.

1910.178(d)

Converted industrial trucks. Power-operated industrial trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel in accordance with paragraph (q) of this section, may be used in those locations where G, GS or LP, and LPS designated trucks have been specified in the preceding paragraphs.

1910.178(e)

Safety guards.

1910.178(e)(1)

High Lift Rider trucks shall be fitted with an overhead guard manufactured in accordance with paragraph (a) (2) of this section, unless operating conditions do not permit.

1910.178(e)(2)

If the type of load presents a hazard, the user shall equip fork trucks with a vertical load backrest extension manufactured in accordance with paragraph (a) (2) of this section.

1910.178(f)

Fuel handling and storage.

1910.178(f)(1)

The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code (NFPA No. 30-1969), which is incorporated by reference as specified in Sec. 1910.6.

1910.178(f)(2)

The storage and handling of liquefied petroleum gas fuel shall be in accordance with NFPA Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58-1969), which is incorporated by reference as specified in Sec. 1910.6.

1910.178(g)

Changing and charging storage batteries.

1910.178(g)(1)

Battery charging installations shall be located in areas designated for that purpose.

1910.178(g)(2)

Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries.

1910.178(g)(3)

[Reserved]

1910.178(g)(4)

A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries.

1910.178(g)(5)

Reinstalled batteries shall be properly positioned and secured in the truck.

..1910.178(g)(6)

1910.178(g)(6)

A carboy tilter or siphon shall be provided for handling electrolyte.

1910.178(g)(7)

When charging batteries, acid shall be poured into water; water shall not be poured into acid.

1910.178(g)(8)

Trucks shall be properly positioned and brake applied before attempting to change or charge batteries.

1910.178(g)(9)

Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat.

1910.178(g)(10)

Smoking shall be prohibited in the charging area.

1910.178(g)(11)

Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas.

1910.178(g)(12)

Tools and other metallic objects shall be kept away from the top of uncovered batteries.

1910.178(h)

Lighting for operating areas.

1910.178(h)(1)

[Reserved]

1910.178(h)(2)

Where general lighting is less than 2 lumens per square foot, auxiliary directional lighting shall be provided on the truck.

1910.178(i)

Control of noxious gases and fumes.

1910.178(i)(1)

Concentration levels of carbon monoxide gas created by powered industrial truck operations shall not exceed the levels specified in 1910.1000.

1910.178(j)

Dockboards (bridge plates). See 1910.30(a).

1910.178(k)

Trucks and railroad cars.

1910.178(k)(1)

The brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks.

1910.178(k)(2)

Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations.

1910.178(k)(3)

Fixed jacks may be necessary to support a semitrailer and prevent upending during the loading or unloading when the trailer is not coupled to a tractor.

1910.178(k)(4)

Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

1910.178(l)

Operator training.

1910.178(l)(1)

Safe operation.

1910.178(l)(1)(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 (l).

1910.178(l)(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 (l), except as permitted by paragraph (l)(5).

1910.178(l)(2)

Training program implementation.

1910.178(l)(2)(i)

Trainees may operate a powered industrial truck only:

1910.178(l)(2)(i)(A)

Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence; and

1910.178(l)(2)(i)(B)

Where such operation does not endanger the trainee or other employees.

1910.178(l)(2)(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.

1910.178(l)(2)(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.

1910.178(l)(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.

1910.178(l)(3)(i)

Truck-related topics:

1910.178(l)(3)(i)(A)

Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate;

1910.178(l)(3)(i)(B)

Differences between the truck and the automobile;

1910.178(l)(3)(i)(C)

Truck controls and instrumentation: where they are located, what they do, and how they work;

1910.178(l)(3)(i)(D)

Engine or motor operation;

1910.178(l)(3)(i)(E)

Steering and maneuvering;

1910.178(l)(3)(i)(F)

Visibility (including restrictions due to loading);

1910.178(l)(3)(i)(G)

Fork and attachment adaptation, operation, and use limitations;

1910.178(l)(3)(i)(H)

Vehicle capacity;

1910.178(l)(3)(i)(I)

Vehicle stability;

1910.178(l)(3)(i)(J)

Any vehicle inspection and maintenance that the operator will be required to perform;

1910.178(l)(3)(i)(K)

Refueling and/or charging and recharging of batteries;

1910.178(l)(3)(i)(L)

Operating limitations;

1910.178(l)(3)(i)(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.

1910.178(l)(3)(ii)

Workplace-related topics:

1910.178(l)(3)(ii)(A)

Surface conditions where the vehicle will be operated;

1910.178(l)(3)(ii)(B)

Composition of loads to be carried and load stability;

1910.178(l)(3)(ii)(C)

Load manipulation, stacking, and unstacking;

1910.178(l)(3)(ii)(D)

Pedestrian traffic in areas where the vehicle will be operated;

1910.178(l)(3)(ii)(E)

Narrow aisles and other restricted places where the vehicle will be operated;

1910.178(l)(3)(ii)(F)

Hazardous (classified) locations where the vehicle will be operated;

1910.178(l)(3)(ii)(G)

Ramps and other sloped surfaces that could affect the vehicle's stability;

1910.178(l)(3)(ii)(H)

Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust;

1910.178(l)(3)(ii)(I)

Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

1910.178(l)(3)(iii)

The requirements of this section.

1910.178(l)(4)

Refresher training and evaluation.

1910.178(l)(4)(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.

1910.178(l)(4)(ii)

Refresher training in relevant topics shall be provided to the operator when:

1910.178(l)(4)(ii)(A)

The operator has been observed to operate the vehicle in an unsafe manner;

1910.178(l)(4)(ii)(B)

The operator has been involved in an accident or near-miss incident;

1910.178(l)(4)(ii)(C)

The operator has received an evaluation that reveals that the operator is not operating the truck safely;

1910.178(l)(4)(ii)(D)

The operator is assigned to drive a different type of truck; or

1910.178(l)(4)(ii)(E)

A condition in the workplace changes in a manner that could affect safe operation of the truck.

1910.178(l)(4)(iii)

An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years.

1910.178(l)(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.

1910.178(l)(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.

1910.178(l)(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 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.

1910.178(l)(8)

Appendix A to this section 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.

1910.178(m)

Truck operations.

1910.178(m)(1)

Trucks shall not be driven up to anyone standing in front of a bench or other fixed object.

1910.178(m)(2)

No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.

1910.178(m)(3)

Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

1910.178(m)(4)

The employer shall prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the truck.

1910.178(m)(5)

-

1910.178(m)(5)(i)

When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set. Wheels shall be blocked if the truck is parked on an incline.

1910.178(m)(5)(ii)

A powered industrial truck is unattended when the operator is 25 ft. or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view.

..1910.178(m)(5)(iii)**1910.178(m)(5)(iii)**

When the operator of an industrial truck is dismounted and within 25 ft. of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement.

1910.178(m)(6)

A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Trucks shall not be used for opening or closing freight doors.

1910.178(m)(7)

Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.

1910.178(m)(8)

There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.

1910.178(m)(9)

An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.

1910.178(m)(10)

A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.

1910.178(m)(11)

Only approved industrial trucks shall be used in hazardous locations.

1910.178(m)(12)

[Removed and Reserved]

1910.178(m)(13)

[Reserved]

1910.178(m)(14)

Fire aisles, access to stairways, and fire equipment shall be kept clear.

1910.178(n)

Traveling.

1910.178(n)(1)

All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three truck lengths from the truck ahead, and the truck shall be kept under control at all times.

1910.178(n)(2)

The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations.

1910.178(n)(3)

Other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed.

1910.178(n)(4)

The driver shall be required to slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load

trailing.

1910.178(n)(5)

Railroad tracks shall be crossed diagonally wherever possible. Parking closer than 8 feet from the center of railroad tracks is prohibited.

1910.178(n)(6)

The driver shall be required to look in the direction of, and keep a clear view of the path of travel.

1910.178(n)(7)

Grades shall be ascended or descended slowly.

1910.178(n)(7)(i)

When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

1910.178(n)(7)(ii)

[Reserved]

1910.178(n)(7)(iii)

On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.

1910.178(n)(8)

Under all travel conditions the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner.

1910.178(n)(9)

Stunt driving and horseplay shall not be permitted.

1910.178(n)(10)

The driver shall be required to slow down for wet and slippery floors.

1910.178(n)(11)

Dockboard or bridgeplates, shall be properly secured before they are driven over. Dockboard or bridgeplates shall be driven over carefully and slowly and their rated capacity never exceeded.

1910.178(n)(12)

Elevators shall be approached slowly, and then entered squarely after the elevator car is properly leveled. Once on the elevator, the controls shall be

neutralized, power shut off, and the brakes set.

1910.178(n)(13)

Motorized hand trucks must enter elevator or other confined areas with load end forward.

..1910.178(n)(14)

1910.178(n)(14)

Running over loose objects on the roadway surface shall be avoided.

1910.178(n)(15)

While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

1910.178(o)

Loading.

1910.178(o)(1)

Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

1910.178(o)(2)

Only loads within the rated capacity of the truck shall be handled.

1910.178(o)(3)

The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.

1910.178(o)(4)

Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

1910.178(o)(5)

A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.

1910.178(o)(6)

Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or

stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

1910.178(p)

Operation of the truck.

1910.178(p)(1)

If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition.

1910.178(p)(2)

Fuel tanks shall not be filled while the engine is running. Spillage shall be avoided.

1910.178(p)(3)

Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.

1910.178(p)(4)

No truck shall be operated with a leak in the fuel system until the leak has been corrected.

1910.178(p)(5)

Open flames shall not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks.

1910.178(q)

Maintenance of industrial trucks.

1910.178(q)(1)

Any power-operated industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel.

1910.178(q)(2)

No repairs shall be made in Class I, II, and III locations.

1910.178(q)(3)

Those repairs to the fuel and ignition systems of industrial trucks which involve fire hazards shall be conducted only in locations designated for such repairs.

1910.178(q)(4)

Trucks in need of repairs to the electrical system shall have the battery disconnected prior to such repairs.

1910.178(q)(5)

All parts of any such industrial truck requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.

1910.178(q)(6)

Industrial trucks shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, except as provided in paragraph (q)(12) of this section. Additional counterweighting of fork trucks shall not be done unless approved by the truck manufacturer.

1910.178(q)(7)

Industrial trucks shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily. Where industrial trucks are used on a round-the-clock basis, they shall be examined after each shift. Defects when found shall be immediately reported and corrected.

1910.178(q)(8)

Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. Any vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.

1910.178(q)(9)

When the temperature of any part of any truck is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated.

1910.178(q)(10)

Industrial trucks shall be kept in a clean condition, free of lint, excess oil, and grease. Noncombustible agents should be used for cleaning trucks. Low flash point (below 100 deg. F.) solvents shall not be used. High flash point (at or above 100 deg. F.) solvents may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be consonant with the agent or solvent used.

1910.178(q)(11)

[Reserved]

1910.178(q)(12)

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

[39 FR 23502, June 27, 1974, as amended at 40 FR 23073, May 28, 1975; 43 FR 49749, Oct. 24, 1978; 49 FR 5322, Feb. 10, 1984; 53 FR 12122, Apr. 12, 1988; 55 FR 32015, Aug. 6, 1990; 61 FR 9227, March 7, 1996; 63 FR 66270, Dec. 1, 1998; 68 FR 32368, June 2, 2003]

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Appendix A -- Stability of Powered Industrial Trucks (Non-mandatory Appendix to Paragraph (I) 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.

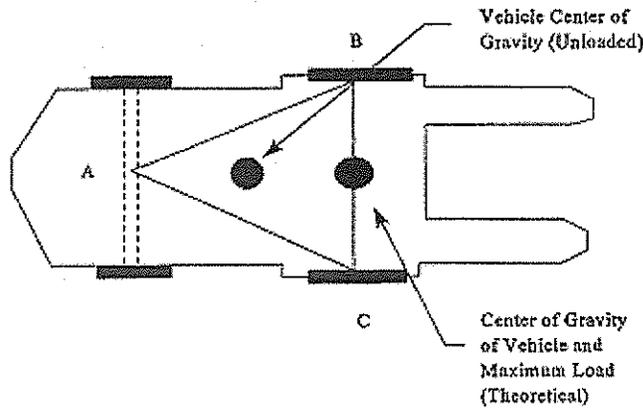
A-3.1. Whether an object is stable depends on the object's moment at one end of a system being greater than, equal to, or smaller than the object's moment at the system's other end. This principle can be seen in the way a see-saw or teeter-totter works: that is, if the product of the load and distance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

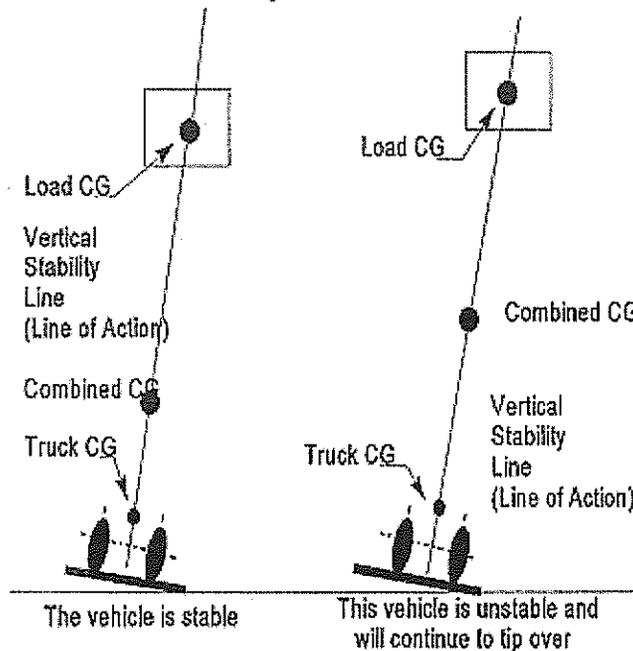


Notes:

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 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 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).

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.

[63 FR 66270, Dec. 1, 1998]

◀ [Next Standard \(1910.179\)](#)

◀ [Regulations \(Standards - 29 CFR\) - Table of Contents](#)

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OSHA Regulations (Standards - 29 CFR) Other working surfaces. - 1910.30

- **Standard Number:** 1910.30
 - **Standard Title:** Other working surfaces.
 - **SubPart Number:** D
 - **SubPart Title:** Walking-Working Surfaces
-

(a)

"Dockboards (bridge plates)."

(a)(1)

Portable and powered dockboards shall be strong enough to carry the load imposed on them.

(a)(2)

Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping.

(a)(3)

Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) "Industrial Lifts and Hinged Loading Ramps" published by the U.S. Department of Commerce, which is incorporated by reference as specified in Sec. 1910.6.

(a)(4)

Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.

(a)(5)

Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

(b)

"Forging machine area."

(b)(1)

Machines shall be so located as to give,

(b)(1)(i)

enough clearance between machines so that the movement of one operator will not interfere with the work of another,

(b)(1)(ii)

ample room for cleaning machines and handling the work, including material and scrap. The arrangement of machines shall be such that operators will not stand in aisles.

(b)(2)

Aisles shall be provided of sufficient width to permit the free movement of employees bringing and removing material. This aisle space is to be independent of working and storage space.

(b)(3)

Wood platforms used on the floor in front of machines shall be substantially constructed.

(c)

"Veneer machinery."

(c)(1)

Sides of steam vats shall extend to a height of not less than 36 inches above the floor, working platform, or ground.

(c)(2)

Large steam vats divided into sections shall be provided with substantial walkways between sections. Each walkway shall be provided with a standard handrail on each exposed side. These handrails may be removable, if necessary.

(c)(3)

Covers shall be removed only from that portion of steaming vats on which men are working and a portable railing shall be placed at this point to protect the operators.

(c)(4)

Workmen shall not ride or step on logs in steam vats.

[39 FR 23502, June 27, 1974, as amended at 49 FR 5322, Feb. 10, 1984; 61 FR 9227, March 7, 1996]

This document can be found at

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9722



OSHA Regulations (Standards - 29 CFR) Handling materials - general. - 1910.176

-
- **Standard Number:** 1910.176
 - **Standard Title:** Handling materials - general.
 - **SubPart Number:** N
 - **SubPart Title:** Materials Handling and Storage
-

- (a) Use of mechanical equipment. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked.
- (b) Secure storage. Storage of material shall not create a hazard. Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.
- (c) Housekeeping. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.
- (d) [Reserved]
- (e) Clearance limits. Clearance signs to warn of clearance limits shall be provided.
- (f) Rolling railroad cars. Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.
- (g) Guarding. Covers and/or guard- rails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc.

[39 FR 23052, June 27, 1974, as amended at 43 FR 49749, Oct. 24, 1978]

This document can be found at

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9824



OSHA Regulations (Standards - 29 CFR) Servicing multi-piece and single piece rim wheels. - 1910.177

-
- **Standard Number:** 1910.177
 - **Standard Title:** Servicing multi-piece and single piece rim wheels.
 - **SubPart Number:** N
 - **SubPart Title:** Materials Handling and Storage
-

(a)

Scope.

(a)(1)

This section applies to the servicing of multi-piece and single piece rim wheels used on large vehicles such as trucks, tractors, trailers, buses and off-road machines. It does not apply to the servicing of rim wheels used on automobiles, or on pickup trucks and vans utilizing automobile tires or truck tires designated "LT".

(a)(2)

This section does not apply to employers and places of employment regulated under the Construction Safety Standards, 29 CFR Part 1926; the Agriculture Standards, 29 CFR Part 1928; the Shipyard Standards, 29 CFR Part 1915; or the Longshoring Standards, 29 CFR Part 1918.

(a)(3)

All provisions of this section apply to the servicing of both single piece rim wheels and multi-piece rim wheels unless designated otherwise.

(b)

Definitions.

"Barrier" means a fence, wall or other structure or object placed between a single piece rim wheel and an employee during tire inflation, to contain the rim wheel components in the event of the sudden release of the contained air of the single piece rim wheel.

"Charts" means the U. S. Department of Labor, Occupational Safety and Health Administration publications entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-Piece Rim Wheel Matching Chart," the National Highway Traffic Safety Administration (NHTSA) publications entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-Piece Rim Wheel Matching Chart," or any other poster which contains at least the same instructions, safety precautions and other information contained in the charts that is applicable to the types of wheels being serviced.

"Installing a rim wheel" means the transfer and attachment of an assembled rim wheel onto a vehicle axle hub. "Removing" means the opposite of installing.

"Mounting a tire" means the assembly or putting together of the wheel and tire components to form a rim wheel, including inflation. "Demounting" means the opposite of mounting.

"Multi-piece rim wheel" means the assemblage of a multi-piece wheel with the tire tube and other components.

"Multi-piece wheel" means a vehicle wheel consisting of two or more parts, one of which is a side or locking ring designed to hold the tire on the wheel by interlocking components when the tire is inflated.

"Restraining device" means an apparatus such as a cage, rack, assemblage of bars and other components that will constrain all rim wheel components during an explosive separation of a multi-piece rim wheel, or during the sudden release of the contained air of a single piece rim wheel.

"Rim manual" means a publication containing instructions from the manufacturer or other qualified organization for correct mounting, demounting, maintenance, and safety precautions peculiar to the type of wheel being serviced.

"Rim wheel" means an assemblage of tire, tube and liner (where appropriate), and wheel components.

"Service" or "servicing" means the mounting and demounting of rim wheels, and related activities such as inflating, deflating, installing, removing, and handling.

"Service area" means that part of an employer's premises used for the servicing of rim wheels, or any other place where an employee services rim wheels.

"Single piece rim wheel" means the assemblage of single piece rim wheel with the tire and other components.

"Single piece wheel" means a vehicle wheel consisting of one part, designed to hold the tire on the wheel when the tire is inflated.

"Trajectory" means any potential path or route that a rim wheel component may travel during an explosive separation, or the sudden release of the pressurized air, or an area at which an airblast from a single piece rim wheel may be released. The trajectory may deviate from paths which are perpendicular to the assembled position of the rim wheel at the time of separation or explosion. (See Appendix A for examples of trajectories.)

"Wheel" means that portion of a rim wheel which provides the method of attachment of the assembly to the axle of a vehicle and also provides the means to contain the inflated portion of the assembly (i.e., the tire and/or tube).

(c)

Employee training.

(c)(1)

The employer shall provide a program to train all employees who service rim wheels in the hazards involved in servicing those rim wheels and the safety procedures to be followed.

- (c)(1)(i)

The employer shall assure that no employee services any rim wheel unless the employee has been trained and instructed in correct procedures of servicing the type of wheel being serviced, and in the safe operating procedures described in paragraphs (f) and (g) of this section.
 - (c)(1)(ii)

Information to be used in the training program shall include, at a minimum, the applicable data contained in the charts (rim manuals) and the contents of this standard.
 - (c)(1)(iii)

Where an employer knows or has reason to believe that any of his employees is unable to read and understand the charts or rim manual, the employer shall assure that the employee is instructed concerning the contents of the charts and rim manual in a manner which the employee is able to understand.
 - (c)(2)

The employer shall assure that each employee demonstrates and maintains the ability to service rim wheels safely, including performance of the following tasks:

 - (c)(2)(i)

Demounting of tires (including deflation);
 - (c)(2)(ii)

Inspection and identification of the rim wheel components;
 - (c)(2)(iii)

Mounting of tires (including inflation with a restraining device or other safeguard required by this section);
 - (c)(2)(iv)

Use of the restraining device or barrier, and other equipment required by this section;
 - (c)(2)(v)

Handling of rim wheels;
 - (c)(2)(vi)

Inflation of the tire when a single piece rim wheel is mounted on a vehicle;
 - (c)(2)(vii)

An understanding of the necessity of standing outside the trajectory both during inflation of the tire and during inspection of the rim wheel following inflation;
and
 - (c)(2)(viii)

Installation and removal of rim wheels.
 - (c)(3)
-

The employer shall evaluate each employee's ability to perform these tasks and to service rim wheels safely, and shall provide additional training as necessary to assure that each employee maintains his or her proficiency.

- (d) Tire servicing equipment.
 - (d)(1) The employer shall furnish a restraining device for inflating tires on multi-piece wheels.
 - (d)(2) The employer shall provide a restraining device or barrier for inflating tires on single piece wheels unless the rim wheel will be bolted onto a vehicle during inflation.
 - (d)(3) Restraining devices and barriers shall comply with the following requirements:
 - (d)(3)(i) Each restraining device or barrier shall have the capacity to withstand the maximum force that would be transferred to it during a rim wheel separation occurring at 150 percent of the maximum tire specification pressure for the type of rim wheel being serviced.
 - (d)(3)(ii) Restraining devices and barriers shall be capable of preventing the rim wheel components from being thrown outside or beyond the device or barrier for any rim wheel positioned within or behind the device;
 - (d)(3)(iii) Restraining devices and barriers shall be visually inspected prior to each day's use and after any separation of the rim wheel components or sudden release of contained air. Any restraining device or barrier exhibiting damage such as the following defects shall be immediately removed from service:
 - (d)(3)(iii)(A) Cracks at welds;
 - (d)(3)(iii)(B) Cracked or broken components;
 - (d)(3)(iii)(C) Bent or sprung components caused by mishandling, abuse, tire explosion or rim wheel separation;
 - (d)(3)(iii)(D) Pitting of components due to corrosion; or
 - (d)(3)(iii)(E) Other structural damage which would decrease its effectiveness.
-

- (d)(3)(iv) Restraining devices or barriers removed from service shall not be returned to service until they are repaired and reinspected. Restraining devices or barriers requiring structural repair such as component replacement or rewelding shall not be returned to service until they are certified by either the manufacturer or a Registered Professional Engineer as meeting the strength requirements of paragraph (d)(3)(i) of this section.
- (d)(4) The employer shall furnish and assure that an air line assembly consisting of the following components be used for inflating tires:
- (d)(4)(i) A clip-on chuck;
- (d)(4)(ii) An in-line valve with a pressure gauge or a presettable regulator; and
- (d)(4)(iii) A sufficient length of hose between the clip-on chuck and the in-line valve (if one is used) to allow the employee to stand outside the trajectory.
- (d)(5) Current charts or rim manuals containing instructions for the type of wheels being serviced shall be available in the service area.
- (d)(6) The employer shall furnish and assure that only tools recommended in the rim manual for the type of wheel being serviced are used to service rim wheels.
- (e) Wheel component acceptability.
- (e)(1) Multi-piece wheel components shall not be interchanged except as provided in the charts or in the applicable rim manual.
- (e)(2) Multi-piece wheel components and single piece wheels shall be inspected prior to assembly. Any wheel or wheel component which is bent out of shape, pitted from corrosion, broken, or cracked shall not be used and shall be marked or tagged unserviceable and removed from the service area. Damaged or leaky valves shall be replaced.
- (e)(3) Rim flanges, rim gutters, rings, bead seating surfaces and the bead areas of tires shall be free of any dirt, surface rust, scale or loose or flaked rubber build-up prior to mounting and inflation.
- (e)(4)
-

The size (bead diameter and tire/wheel widths) and type of both the tire and the wheel shall be checked for compatibility prior to assembly of the rim wheel.

- (f) Safe operating procedure - multi-piece rim wheels. The employer shall establish a safe operating procedure for servicing multi-piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:
 - (f)(1) Tires shall be completely deflated before demounting by removal of the valve core.
 - (f)(2) Tires shall be completely deflated by removing the valve core before a rim wheel is removed from the axle in either of the following situations:
 - (f)(2)(i) When the tire has been driven underinflated at 80% or less of its recommended pressure, or
 - (f)(2)(ii) When there is obvious or suspected damage to the tire or wheel components.
 - (f)(3) Rubber lubricant shall be applied to bead and rim mating surfaces during assembly of the wheel and inflation of the tire, unless the tire or wheel manufacturer recommends against it.
 - (f)(4) If a tire on a vehicle is underinflated but has more than 80% of the recommended pressure, the tire may be inflated while the rim wheel is on the vehicle provided remote control inflation equipment is used, and no employees remain in the trajectory during inflation.
 - (f)(5) Tires shall be inflated outside a restraining device only to a pressure sufficient to force the tire bead onto the rim ledge and create an airtight seal with the tire and bead.
 - (f)(6) Whenever a rim wheel is in a restraining device the employee shall not rest or lean any part of his body or equipment on or against the restraining device.
 - (f)(7) After tire inflation, the tire and wheel components shall be inspected while still within the restraining device to make sure that they are properly seated and locked. If further adjustment to the tire or wheel components is necessary, the tire shall be deflated by removal of the valve core before the adjustment is made.
-

- (f)(8) No attempt shall be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized.
 - (f)(9) Cracked, broken, bent or otherwise damaged rim components shall not be reworked, welded, brazed, or otherwise heated.
 - (f)(10) Whenever multi-piece rim wheels are being handled, employees shall stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary.
 - (f)(11) No heat shall be applied to a multi-piece wheel or wheel component.
 - (g) Safe operating procedure-single piece rim wheels. The employer shall establish a safe operating procedure for servicing single piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:
 - (g)(1) Tires shall be completely deflated by removal of the valve core before demounting.
 - (g)(2) Mounting and demounting of the tire shall be done only from the narrow ledge side of the wheel. Care shall be taken to avoid damaging the tire beads while mounting tires on wheels. Tires shall be mounted only on compatible wheels of matching bead diameter and width.
 - (g)(3) Nonflammable rubber lubricant shall be applied to bead and wheel mating surfaces before assembly of the rim wheel, unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.
 - (g)(4) If a tire changing machine is used, the tire shall be inflated only to the minimum pressure necessary to force the tire bead onto the rim ledge while on the tire changing machine.
 - (g)(5) If a bead expander is used, it shall be removed before the valve core is installed and as soon as the rim wheel becomes airtight (the tire bead slips onto the bead seat).
 - (g)(6) Tires may be inflated only when contained within a restraining device, positioned behind a barrier or bolted on the vehicle with the lug nuts fully tightened.
-

- (g)(7) Tires shall not be inflated when any flat, solid surface is in the trajectory and within one foot of the sidewall.
- (g)(8) Employees shall stay out of the trajectory when inflating a tire.
- (g)(9) Tires shall not be inflated to more than the inflation pressure stamped in the sidewall unless a higher pressure is recommended by the manufacturer.
- (g)(10) Tires shall not be inflated above the maximum pressure recommended by the manufacturer to seat the tire bead firmly against the rim flange.
- (g)(11) No heat shall be applied to a single piece wheel.
- (g)(12) Cracked, broken, bent, or otherwise damaged wheels shall not be reworked, welded, brazed, or otherwise heated.

[39 FR 23502, June 27, 1974, as amended at 52 FR 36026, Sept. 25, 1987; 53 FR 34736, Sept. 8, 1988]

This document can be found at:

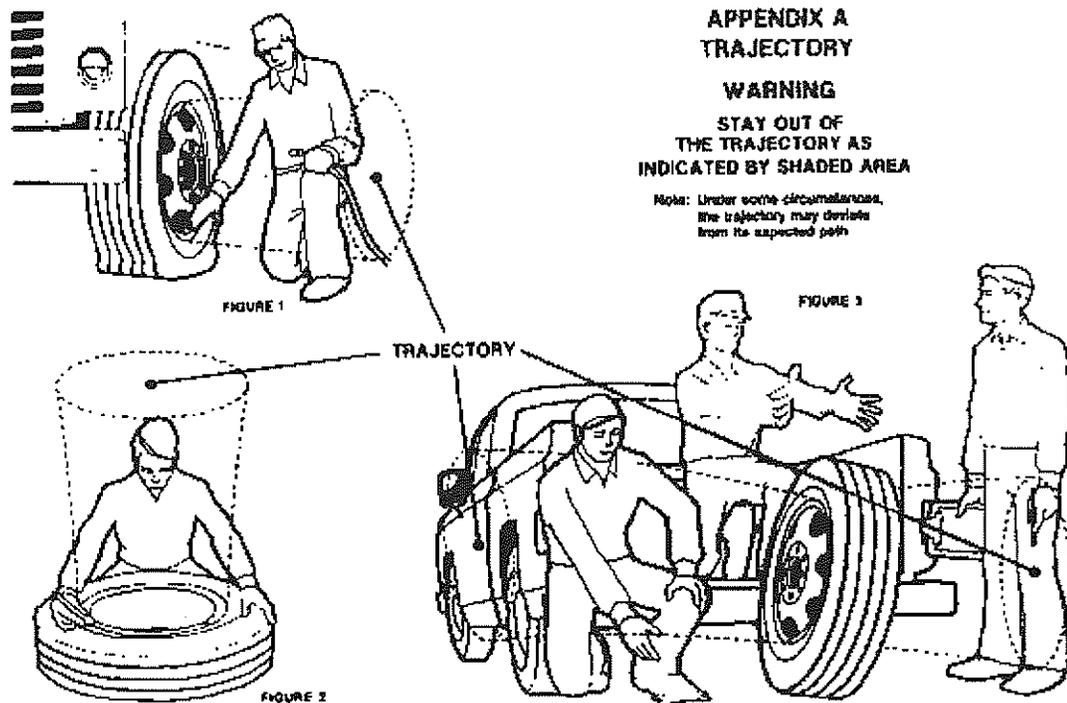
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9827



OSHA Regulations (Standards - 29 CFR) Trajectory - 1910.177 App A

- Standard Number: 1910.177 App A
- Standard Title: Trajectory
- SubPart Number: N
- SubPart Title: Materials Handling and Storage

FIGURES 1, 2, and 3 - WARNING
Stay out of the trajectory as indicated by shaded area



This document can be found at

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9826

OSHA Regulations (Standards - 29 CFR) Ordering information for NHTSA charts - 1910.177 App B

-
- **Standard Number:** 1910.177 App B
 - **Standard Title:** Ordering information for NHTSA charts
 - **SubPart Number:** N
 - **SubPart Title:** Materials Handling and Storage
-

OSHA has printed two charts entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-piece Rim Matching Chart" as a part of a continuing campaign to reduce accidents among employees who service large vehicle rim wheels.

Reprints of the charts are available through the Occupational Safety and Health Administration (OSHA) Area and Regional Offices. The address and telephone number of the nearest OSHA Area Office can be obtained by looking in the local telephone directory under U.S. Government, U.S. Department of Labor, Occupational Safety and Health Administration. Single copies are available without charge.

Individuals, establishments and other organizations desiring single or multiple copies of these charts may order them from the OSHA Publications Office, U.S. Department of Labor, Room N-3101, Washington, DC 20210, Telephone: (202) 219-4667.

[49 FR 4350, Feb. 3, 1984; as amended at 52 FR 36026, Sept. 25, 1987; 53 FR 34737, Sept. 8, 1988; 61 FR 9227, March 7, 1996]

This document can be found at

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9827



The American Society of
Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

SAFETY STANDARD FOR LOW LIFT AND HIGH LIFT TRUCKS

ASME B56.1-2000

(Revision of ASME B56.1-1993)

POWERED AND NONPOWERED INDUSTRIAL TRUCKS

PART II FOR THE USER

4 GENERAL SAFETY PRACTICES

4.1 Introduction

4.1.1 Part II contains requirements for the users of powered industrial trucks. Included are requirements for operator qualifications and training, operating safety rules, and maintenance practices.

4.1.2 Unusual operating conditions may require additional safety precautions and special operating instructions.

4.1.3 Supervision is an essential element in the safe operation of powered industrial trucks.

4.2 Modifications, Nameplates, Markings, and Capacity

4.2.1 Modifications and additions that affect capacity or safe operation shall not be performed without the manufacturer's prior written approval. Where such authorization is granted, capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

4.2.2 If the truck is equipped with a front-end attachment(s), including for extensions, the user shall see that the truck is marked to identify the attachment(s), show the approximate weight of the truck and attachment combination, and show the capacity of the truck with attachment(s) at maximum elevation with load laterally centered.

4.2.3 The user shall see that all nameplates and caution and instruction markings are in place and legible.

4.2.4 The user shall consider that changes in load dimension may affect truck capacity.

4.2.5 Fork extensions shall be designed for the application.

4.2.6 When modifications involve rebuild and repair of the basic unit, they shall be made in accordance with the manufacturer's established criteria and procedures (see para. 6.2).

4.2.7 Where steering must be accomplished with one hand using a steering handwheel, a steering knob(s) or equivalent shall be used to promote safe and effective operation. The steering handwheel and knob configuration shall be of a design that will minimize the hazard from a spinning handwheel due to a road reaction feedback, or the steering mechanism shall be of a type that prevents road reactions from causing the steering handwheel to spin. The steering knob(s) shall be within the periphery of the steering handwheel.

4.2.8 Where steering can be accomplished with either hand, and the steering mechanism is of a type that prevents road reactions from causing the handwheel to spin (power steering or equivalent), steering knobs may be used. When used, steering knobs shall be of a type that can be engaged by the operator's hand from the top, and shall be within the periphery of the steering handwheel.

4.2.9 Batteries used in electric trucks shall comply with the minimum/maximum battery weight range shown on the truck nameplate.

4.3 Stopping Distance (Descending Grades)

4.3.1 When descending a grade, stopping distance will be greater than on-level operation. Methods shall be provided to allow for this condition. Some methods are: reduce speed, limit loads, allow adequate clear space at the bottom of the grade, etc. (see para. 5.3.8).

4.3.2 Approximate theoretical stopping distance for a dry clean asphalt, brushed concrete, or equivalent surface may be determined from the following formula:

$$s = \frac{0.394v^2}{D - G}$$

or

$$s_1 = \frac{3.34v_1^2}{D - G}$$

where

- D = drawbar drag, as a percent, as determined from Fig. 2 (e.g., 25 for 25%)
 G = percent grade (e.g., 5 for 5%)
 s = distance to stop, m
 s_1 = distance to stop, ft
 v = velocity, km/h
 v_1 = velocity, mph

4.4 Stability

4.4.1 Experience has shown that high lift trucks that comply with the stability requirements stated in para. 7.6 are stable when properly operated. However, improper operation, faulty maintenance, or poor housekeeping may contribute to a condition of instability and defeat the purpose of the Standard.

4.4.2 Some of the conditions that may affect stability are: ground and floor conditions, grade, speed, loading (trucks equipped with attachments behave as partially loaded trucks even when operated without a load on the attachment), battery weight, dynamic and static forces, and the judgment exercised by the operator.

4.4.3 On electric trucks, use only a battery having a service weight within the minimum/maximum range specified on truck nameplate. See para. 7.5.8 for information on battery weight.

4.4.4 Users shall give consideration to special operating conditions. The amount of forward and rearward tilt to be used is governed by the application. The use of maximum rearward tilt is allowable under certain conditions such as traveling with the load lowered. The stability of a truck as determined by the tests outlined in para. 7.6 does not encompass consideration for excessive tilt at high elevations, or the operation of trucks with excessive off-center loads.

4.4.5 Some users may decide to establish, for their own use, stability requirements that will vary from those in para. 7.6. However, the requirements in para. 7.6 should serve as a guide for the user, working with the manufacturer, in establishing his own more stringent requirements.

4.5 Safety Guards

4.5.1 Overhead Guards

4.5.1.1 High lift rider trucks, including order picker trucks, shall be fitted with an overhead guard manufactured in accordance with para. 7.28.

SAFETY STANDARD FOR LOW LIFT AND HIGH LIFT TRUCKS

4.5.1.2 An overhead guard is intended to offer protection to the operator from falling objects but cannot protect against every possible impact. Therefore, it should not be considered a substitute for good judgment and care in loading, handling, storage, etc.

4.5.1.3 Under certain unusual operating conditions, a stronger guard, or one having openings of smaller size, may be specified by the user, working with the truck manufacturer.

4.5.1.4 Exceptions

(a) Where overhead obstructions limit the overall lowered height of the truck, normal overhead guard height and the vertical clearance under the guard may be reduced to permit operation with a guard.

(b) The user may operate the truck without the overhead guard, provided all of the following conditions are met:

(1) vertical movement of the lifting mechanism is restricted to 1,825 mm (72 in.) or less from the ground;

(2) the truck will operate only in an area where:

(a) the bottom of the top tiered load is not higher than 1,825 mm (72 in.) and the top is not more than 3,050 mm (120 in.) from the ground when tiered;

(b) only stable (preferably interlocked, unitized, or containerized) loads are handled;

(c) there is protection against falling objects from adjacent high stack areas.

4.5.2 Load Backrest Extension. If the type of load presents a hazard, the user shall equip forklift trucks with a vertical load backrest extension manufactured in accordance with para. 7.27.

4.5.3 Operator Compartment Guards. For stand up, end controlled, narrow aisle trucks, more or less guarding than specified by paras. 7.29 and 7.35 may be required to enhance safe operation. Changes shall be determined through cooperation between the user and manufacturer.

4.6 Fuel Handling and Storage

4.6.1 The storage and handling of liquid fuels (such as gasoline and diesel fuel) shall be in accordance with ANSI/NFPA 505 and ANSI/NFPA 30.

4.6.2 The storage and handling of liquefied petroleum gas fuel shall be in accordance with ANSI/NFPA 505 and ANSI/NFPA 58.

4.7 Changing and Charging Storage Batteries for Electric Trucks

4.7.1 Battery changing and charging facilities and procedures shall be in accordance with ANSI/NFPA 505.

4.7.2 The charger connector shall not be plugged into the truck connector under any circumstances.

4.7.3 To avoid damage to equipment or injury to personnel, consult manufacturer's procedures when replacing contacts in any battery connector.

4.7.4 Failure to comply with specified nameplate battery weight range could result in truck instability.

4.8 Hazardous Locations

4.8.1 It shall be the responsibility of the user to determine the hazard classification of any particular atmosphere or location according to ANSI/NFPA 505.

4.8.2 Powered industrial trucks operated in and batteries used in hazardous areas shall be approved and of the type required by ANSI/NFPA 505.

Dependent on the proposed type of truck and area, approved trucks shall be built in compliance with one of the following:

- (a) UL 558
- (b) UL 583

4.8.3 Trucks and areas of use shall be marked in accordance with ANSI/NFPA 505.

4.9 Aisles and Obstructions

4.9.1 Permanent aisles, roadways or passageways, floors, and ramps shall be defined in some fashion or marked to conform with ANSI Z535.2.

4.9.2 Permanent or temporary protrusions of loads, equipment, material, and construction facilities into the usual operating area shall be guarded, clearly and distinctively marked, or clearly visible.

4.10 Lighting for Operating Areas

4.10.1 Controlled lighting of adequate intensity should be provided in operating areas in conformance with ANSI/IES RP7.

4.10.2 Where operating conditions indicate, the user shall be responsible for having the truck equipped with lights.

4.11 Control of Noxious Gases and Fumes

4.11.1 Internal combustion engines deplete the oxygen supply within enclosed spaces and may create a hazard unless the oxygen is replaced.

4.11.2 Ventilation shall be provided in enclosed areas where internal combustion powered equipment is used, to maintain an atmosphere that shall not exceed the contamination levels specified by the American Conference of Governmental Industrial Hygienists "Threshold Limit Values of Airborne Contaminants." This includes the atmosphere within the truck cab when a cab is provided.

4.11.3 Questions concerning degree of concentration and methods of sampling to ascertain the conditions should be referred to a qualified person.

4.12 Sound

Powered industrial trucks can contribute to the ambient sound in the work area. Consideration should be given to the sound exposure of personnel in the work area.

4.13 Dockboards (Bridge Plates)¹

4.13.1 Portable and powered dockboards shall be marked conspicuously with their carrying capacity. The carrying capacity indicated shall not be exceeded.

4.13.2 Portable dockboards shall be secured in position, either by being anchored or by being equipped with devices that will prevent their slipping.

4.13.3 Handholds or other effective means shall be provided on portable dockboards to permit safe handling. Where possible, fork loops or lugs shall be provided for handling by fork trucks.

4.13.4 All types of dockboards shall have a high friction surface designed to reduce the possibility of employees or trucks slipping.

4.13.5 All types of dockboards shall be designed and maintained so that one end will have a substantial contact with the dock (or loading platform) and the other end with the transport vehicle to prevent the dockboard from rocking or sliding.

¹ Dockboard recommendations also apply to bridge plates.

4.14 Trucks and Railroad Cars

4.14.1 When powered industrial trucks are driven on and off highway trucks or trailers, the brakes on the highway trucks or trailers shall be applied and wheel chocks or other positive mechanical means shall be used to prevent unintentional movement of highway trucks and trailers.

4.14.2 Provision shall be made to prevent railroad cars from being moved during loading and unloading. Wheel stops, hand brakes, or other recognized positive means shall be used to prevent movement during loading and unloading.

4.14.3 Whenever powered industrial trucks are driven on and off semitrailers not coupled to a tractor, supports may be needed to prevent upending or corner dipping.

4.14.4 Maintain a safe distance from the edge of ramps, platforms, or other similar working surfaces.

4.14.5 Do not move railroad cars or trailers with a powered industrial truck unless the truck is properly designed and equipped for that operation.

4.15 Warning Device

4.15.1 Every truck shall be equipped with an operator-controlled horn, whistle, gong, or other sound-producing device(s).

4.15.2 The user shall determine if operating conditions require the truck to be equipped with additional sound-producing or visual (such as lights or blinkers) devices, and be responsible for providing and maintaining such devices.

4.16 Relocating Powered Industrial Trucks

When utilizing lifting equipment such as elevators, cranes, ship hoisting gear, etc., to relocate a powered industrial truck, the user shall ensure that the capacity of the hoisting equipment being used is not exceeded.

4.17 Elevating Personnel

4.17.1 Only operator-up high lift trucks have been designed to lift personnel. If a work platform is used on trucks designed and intended for handling materials,

the requirements of paras. 4.17.2 and 4.17.3 shall be met for the protection of personnel.

4.17.2 Whenever a truck is used to elevate personnel, the following precautions for the protection of personnel shall be taken:

(a) comply with the design requirements in para. 7.36 of this Standard;

(b) provide protection for personnel in their normal working position on the platform from moving parts of the truck that represent a hazard;

(c) be certain that required restraining means such as railings, chains, cable, body belt(s) with lanyard(s), or deceleration devices, etc., are in place and properly used;

(d) be certain that the lifting mechanism is operating smoothly throughout its entire lift height, both empty and loaded, and that all lift limiting devices and latches, if provided, are functional;

(e) provide overhead protection as indicated to be necessary by the operating conditions;

(f) replace any body belt, lanyard, or deceleration device that has sustained permanent deformation or is otherwise damaged.

4.17.3 Whenever a truck is equipped with a work platform (does not include operator-up high lift trucks), precautions specified in para. 4.17.2 shall be taken and the following additional precautions shall be taken for the protection of personnel:

(a) provide a platform that complies with the design requirements in para. 7.36.3;

(b) the platform attachment means are applied and the platform is securely attached to the lifting carriage or forks;

(c) when the lifting carriage and/or forks are supporting the platform used to elevate personnel, the lifting carriage and/or forks are secured to prevent them from pivoting upward;

(d) the mast is vertical — do not operate on a side slope;

(e) the platform is horizontal and centered and not tilted forward or rearward when elevated;

(f) the truck has a firm and level footing;

(g) place all travel controls in neutral and set parking brake;

(h) before elevating personnel, mark area with cones or other devices to warn of work by elevated personnel;

(i) lift and lower personnel smoothly, with caution, and only at their request;

(j) avoid overhead obstructions and electric wires;

(k) keep hands and feet clear of controls other than those in use;

(l) move truck and/or platform slowly, only for minor adjustments in horizontal positioning when personnel are on the platform, and only at their request;

(m) on trucks equipped with rotators, mechanically secure the rotator to prevent movement;

(n) have a trained operator in position to control the truck, or available to operate controls. When the operator is not in the operating position, engage the parking brake and block the wheels;

(o) the combined weight of the platform, load, and personnel not to exceed one-half of the capacity as indicated on the nameplate of the truck on which the platform is used;

(p) personnel are to remain on the platform floor. Use of railings, planks, ladders, etc., on the platform for purpose of achieving additional reach or height is prohibited;

(q) personnel and equipment on the platform not to exceed the available space;

(r) lower platform to floor level for personnel to enter and exit. Do not climb on any part of the truck in attempting to enter and exit.

4.18 Operator Qualifications

Only trained and authorized persons shall be permitted to operate a powered industrial truck. Operators of powered industrial trucks shall be qualified as to visual, auditory, physical, and mental ability to operate the equipment safely according to para. 4.19 and all other applicable parts of section 4.

4.19 Operator Training

4.19.1 Personnel who have not been trained to operate powered industrial trucks may operate a truck for the purposes of training only, and only under the direct supervision of the trainer. This training should be conducted in an area away from other trucks, obstacles, and pedestrians.

4.19.2 The operator training program should include the user's policies for the site where the trainee will operate the truck, the operating conditions for that location, and the specific truck the trainee will operate. The training program shall be presented to all new operators regardless of previous experience.

4.19.3 The training program shall inform the trainee that:

(a) The primary responsibility of the operator is to use the powered industrial truck safely following the instructions given in the training program.

(b) Unsafe or improper operation of a powered industrial truck can result in:

(1) death or serious injury to the operator or others;

(2) damage to the powered industrial truck or other property.

4.19.4 The training program shall emphasize safe and proper operation to avoid injury to the operator and others and prevent property damage, and shall cover the following areas:

(a) Fundamentals of the powered industrial truck(s) the trainee will operate, including:

(1) characteristics of the powered industrial truck(s), including variations between trucks in the workplace;

(2) similarities to and differences from automobiles;

(3) significance of nameplate data, including rated capacity, warnings, and instructions affixed to the truck;

(4) operating instructions and warnings in the operating manual for the truck, and instructions for inspection and maintenance to be performed by the operator;

(5) type of motive power and its characteristics;

(6) method of steering;

(7) braking method and characteristics, with and without load;

(8) visibility, with and without load, forward and reverse;

(9) load handling capacity, weight and load center;

(10) stability characteristics with and without load, with and without attachments;

(11) controls-location, function, method of operation, identification of symbols;

(12) load handling capabilities; forks, attachments;

(13) fueling and battery charging;

(14) guards and protective devices for the specific type of truck;

(15) other characteristics of the specific industrial truck.

(b) Operating environment and its effect on truck operation, including:

(1) floor or ground conditions including temporary conditions;

(2) ramps and inclines, with and without load;

(3) trailers, railcars, and dockboards (including the use of wheel chocks, jacks, and other securing devices);

(4) fueling and battery charging facilities;

(5) the use of “classified” trucks in areas classified as hazardous due to risk of fire or explosion, as defined in ANSI/NFPA 505;

(6) narrow aisles, doorways, overhead wires and piping, and other areas of limited clearance;

(7) areas where the truck may be operated near other powered industrial trucks, other vehicles, or pedestrians;

(8) use and capacity of elevators;

(9) operation near edge of dock or edge of improved surface;

(10) other special operating conditions and hazards that may be encountered.

(c) Operation of the powered industrial truck, including:

(1) proper preshift inspection and approved method for removing from service a truck that is in need of repair;

(2) load handling techniques: lifting, lowering, picking up, placing, tilting;

(3) traveling, with and without loads; turning corners;

(4) parking and shutdown procedures;

(5) other special operating conditions for the specific application.

(d) Operating safety rules and practices, including:

(1) provisions of this Standard in paras. 5.1 to 5.4 address operating safety rules and practices;

(2) provisions of this Standard in para. 5.5 address care of the truck.

(3) other rules, regulations, or practices specified by the employer at the location where the powered industrial truck will be used;

(e) Operational training practice, including:

(1) if feasible, practice in the operation of powered industrial trucks shall be conducted in an area separate from other workplace activities and personnel;

(2) training practice shall be conducted under the supervision of the trainer;

(3) training practice shall include the actual operation or simulated performance of all operating tasks such as load handling, maneuvering, traveling, stopping, starting, and other activities under the conditions that will be encountered in the use of the truck.

4.19.5 Testing, Retraining, and Enforcement

(a) During training, performance and oral and/or written tests shall be given by the employer to measure the skill and knowledge of the operator in meeting the requirements of the Standard. Employers shall establish a pass/fail requirement for such tests. Employers may

delegate such testing to others but shall remain responsible for the testing. Appropriate records shall be kept.

(b) Operators shall be retrained when new equipment is introduced, existing equipment is modified, operating conditions are changed, or an operator’s performance is unsatisfactory.

(c) The user shall be responsible for enforcing the safe use of the powered industrial truck according to the provisions of this Standard.

NOTE: Information on operator training is available from such sources as powered industrial truck manufacturers, government agencies dealing with employee safety, trade organizations of users of powered industrial trucks, public and private organizations, and safety consultants.

5 OPERATING SAFETY RULES AND PRACTICES

5.1 Operator Responsibility

5.1.1 Safe operation is the responsibility of the operator.

5.1.2 The operator shall develop safe working habits and also be aware of hazardous conditions in order to protect himself, other personnel, the truck, and other material.

5.1.3 The operator shall be familiar with the operation and function of all controls and instruments before undertaking to operate the truck.

5.1.4 Before operating any truck, truck operators shall have read and be familiar with the operator’s manual for the particular truck being operated and they shall also abide by the safety rules and practices in paras. 5.2 through 5.5.

5.1.5 Before operating any truck, the operator shall be familiar with unusual operating conditions that may require additional safety precautions or special operating instructions.

5.2 General

5.2.1 Before starting to operate the truck:

(a) be in operating position;

(b) place directional controls in neutral;

(c) disengage clutch on manual transmission-equipped trucks, or apply brake on power shift or automatic transmission-equipped trucks and electric trucks;

(d) start engine or turn switch of electric truck to "ON" position.

5.2.2 Do not start or operate the truck, any of its functions or attachments, from any place other than from the designated operator's position.

5.2.3 Keep hands and feet inside the operator's designated area or compartment. Do not put any part of the body outside the operator compartment of the truck.

5.2.4 Never put any part of the body into the mast structure or between the mast and the truck.

5.2.5 Never put any part of the body within the reach mechanism of the truck or other attachments.

5.2.6 Understand truck limitations and operate the truck in a safe manner so as not to cause injury to personnel. Safeguard pedestrians at all times.

(a) Do not drive a truck up to anyone standing in front of an object.

(b) Ensure that personnel stand clear of the rear swing area before conducting turning maneuvers.

(c) Exercise particular care at cross aisles, doorways, and other locations where pedestrians may step into the path of travel of the truck.

5.2.7 Do not allow anyone to stand or pass under the elevated portion of any truck, whether empty or loaded.

5.2.8 Do not permit passengers to ride on powered industrial trucks unless a safe place to ride has been provided by the manufacturer.

5.2.9 A powered industrial truck is attended when the operator is less than 8 m (25 ft) from the truck, which remains in his view.

5.2.10 A powered industrial truck is unattended when the operator is more than 8 m (25 ft) from the truck, which remains in his view, or whenever the operator leaves the truck and it is not in his view.

5.2.11

(a) Before leaving the operator's position:

(1) bring truck to a complete stop;

(2) place directional controls in neutral;

(3) apply the parking brake;

(4) lower load-engaging means fully, unless supporting an elevated platform;

(b) When leaving the truck unattended:

(1) stop the engine or turn off the controls;

(2) if the truck must be left on an incline, block the wheels;

(3) fully lower the load-engaging means.

5.2.12 Maintain a safe distance from the edge of ramps, platforms, and other similar working surfaces. Do not move railroad cars with a powered industrial truck.

5.2.13 Do not use a truck for operating or closing railroad car doors, unless the truck utilizes a device specifically designed for opening and closing railroad car doors and the operator is trained in its use.

The design of the door-opening device shall require the truck to travel parallel to the railroad car, with the force applied in a direction parallel with the door travel. Care should be exercised when engaging the door opening device with the railroad car door, in order to prevent damage to the doors and/or fork truck by heavy impact forces. The entire door opening operation shall be in full view of the operator. The fork truck shall always be positioned to safeguard the dock attendant while removing the door lock pin. Whenever a railroad car door requires an abnormal force to open, the truck operator shall report the condition to his supervisor or as instructed.

5.2.14 When powered industrial trucks are driven on and off highway trucks or trailers, the brakes on the highway trucks or trailers shall be applied and wheel chocks or other positive mechanical means shall be used to prevent unintentional movement of highway trucks and trailers.

Whenever powered industrial trucks are driven on and off semitrailers that are not coupled to a tractor, supports may be needed to prevent upending or corner dipping.

5.2.15 Provision shall be made to prevent railroad cars from being moved during loading and unloading. Wheel stops, hand brakes, or other recognized positive means shall be used to prevent movement of railroad cars during loading and unloading.

5.2.16 Care shall be taken not to contact overhead installations such as lights, wiring, pipes, sprinkler systems, etc.

5.2.17 An overhead guard shall be used on all high lift rider trucks as protection against falling objects, unless all of the following conditions are met:

(a) vertical movement of the lifting mechanism is restricted to 1,825 mm (72 in.) or less from the ground.

(b) the truck will be operated only in an area where:

(1) the bottom of the top tiered load is not higher than 1,825 mm (72 in.) and the top is not more than 3,050 mm (120 in.) from the ground when tiered;

(2) only stable, and preferably interlocked, unitized, or containerized, loads are handled;

(3) there is protection against falling objects from adjacent, high stack areas. An overhead guard is intended to offer protection from falling objects but cannot protect against every possible impact. It should not be considered a substitute for good judgment and care in load handling.

(c) The truck is marked to identify where it can be operated.

5.2.18 A load backrest extension shall be used when necessary to guard against a load, or part of it, from falling toward the operator.

5.2.19 In areas classified as hazardous, use only trucks approved for use in those areas.

5.2.20 Report all accidents involving personnel, building structures, and equipment to the supervisor or as directed.

5.2.21 Do not add to, or modify, the truck.

5.2.22 Do not block access to fire aisles, stairways, or fire equipment.

5.2.23 Motorized hand trucks shall not be ridden unless they are of the hand/rider design.

5.2.24 Whenever a truck without controls that are elevatable with the lifting carriage or forks is used to elevate personnel:

(a) the platform attachment means are applied and the platform is securely attached to the lifting carriage or forks;

(b) be certain that the lifting mechanism is operating smoothly throughout its entire lift height, both empty and loaded, and that all lift limiting devices and latches, if provided, are functional;

(c) the mast is vertical — do not operate on a side slope;

(d) the platform is horizontal and centered and not tilted forward or rearward when elevated;

(e) the truck has a firm and level footing;

(f) place all travel controls in neutral and set parking brake;

(g) before elevating personnel, mark area with cones or other devices to warn of work by elevated personnel;

(h) lift and lower personnel smoothly, with caution, and only at their request;

(i) avoid overhead obstructions and electric wires;

(j) keep hands and feet clear of controls other than those in use;

(k) move truck and/or platform slowly, only for minor adjustments in horizontal positioning when personnel are on the platform, and only at their request;

(l) on trucks equipped with rotators, assure that the rotator is mechanically secured to prevent movement;

(m) when not in the operating position, engage the parking brake and block the wheels;

(n) the combined weight of the platform, load, and personnel not to exceed one-half of the capacity as indicated on the nameplate of the truck on which the platform is used;

(o) personnel are to remain on the platform floor. Use of railings, planks, ladders, etc., on the platform for the purpose of achieving additional reach or height is prohibited;

(p) personnel and equipment on the platform not to exceed the available space;

(q) lower platform to floor level for personnel to enter and exit. Do not climb on any part of the truck in attempting to enter and exit.

5.3 Traveling

5.3.1 Observe all traffic regulations including authorized plant speed limits. Under normal traffic conditions, keep to the right. Maintain a safe distance, based on speed of travel, from the truck ahead; and keep the truck under control at all times.

5.3.2 Yield the right of way to pedestrians and emergency vehicles such as ambulances and fire trucks.

5.3.3 Do not pass another truck traveling in the same direction at intersections, blind spots, or at other dangerous locations.

5.3.4 Slow down and sound the audible warning device(s) at cross aisles and other locations where vision is obstructed.

5.3.5 Cross railroad tracks at an angle wherever possible. Do not park closer than 2 m (6 ft) to the nearest rail of a railroad track.

5.3.6 Keep a clear view of the path of travel and observe for other traffic, personnel, and safe clearances.

5.3.7 If the load being carried obstructs forward view, travel with the load trailing.

5.3.8 Ascend or descend grades slowly, and with caution.²

(a) When ascending or descending grades in excess of 5%, loading rider trucks shall be driven with the load upgrade.

(b) Unloaded trucks should be operated on all grades with the load-engaging means downgrade.²

(c) On all grades the load and load-engaging means shall be tilted back, if applicable, and raised only as far as necessary to clear the road surface.

(d) Avoid turning, if possible, and use extreme caution on grades, ramps, or inclines; normally travel straight up and down.

5.3.9 Under all travel conditions, operate the truck at a speed that will permit it to be brought to a stop in a safe manner.

5.3.10 Travel with load-engaging means or load low and, where possible, tilted back. Do not elevate the load except during stacking. This does not apply to trucks that are intended normally to be operated with the load or load-engaging means elevated.

5.3.11 Make starts, stops, turns, or direction reversals in a smooth manner so as not to shift load and/or overturn the truck.

5.3.12 Do not indulge in stunt driving or horseplay.

5.3.13 Slow down for wet and slippery floors.

5.3.14 Before driving over a dockboard or bridge plate, be sure that it is properly secured. Drive carefully and slowly across the dockboard or bridge plate, and never exceed its rated capacity.

5.3.15 Do not drive trucks onto any elevator unless specifically authorized to do so. Do not exceed the capacity of the elevator. Approach elevators slowly, and then enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off power, and set brakes. It is advisable that all other personnel leave the elevator before truck is allowed to enter or leave.

² High lift order picker trucks are not normally intended for operation on a grade. Consult manufacturer's operating instructions for recommended operating procedures.

5.3.16 Avoid running over loose objects on the roadway surface.

5.3.17 When negotiating turns, reduce speed to a safe level consistent with the operating environment. Make the turns smoothly. Except when maneuvering at a very low speed, turn the steering control at a moderate, even rate.

5.3.18 The operation of a counterbalanced, center control, high lift truck with a sit-down, nonelevating operator requires special safety considerations, as follows:

(a) An industrial truck, loaded or unloaded, may tip over if an operator fails to slow down to a safe speed before making turns. Indications that a truck is being driven at an excessive speed during turning maneuvers include:

- (1) tire skidding;
- (2) truck side sway;
- (3) wheel lift; and
- (4) the need to grip the steering wheel tightly to keep from sliding out of the seat.

(b) The likelihood of lateral tipover is increased under any of the following conditions, or combinations of them:

- (1) overloading;
- (2) traveling with the load elevated;
- (3) braking or accelerating sharply while turning;
- (4) rearward tilt or off-center positioning of the load;
- (5) traveling on an uneven surface;
- (6) traveling at excessive speed.

(c) Tipping forward can occur and its likelihood is increased under the following conditions, or combination of them:

- (1) overloading;
- (2) traveling with the load tilted forward and/or elevated;
- (3) hard braking while traveling forward;
- (4) suddenly accelerating while traveling in reverse.

(d) The operator should stay with the truck if lateral or longitudinal tipover occurs. The operator should hold on firmly and lean away from the point of impact.

(e) The operator should stay with the truck if it falls off a loading dock or ramp. The operator should hold on firmly and lean away from the point of impact.

(f) Where the environment presents a severe hazard, or there are other unusual operating conditions, the user may need to establish different and/or additional

safety precautions and special operating instructions appropriate for the conditions.

5.3.19 An active operator protection device or system, when provided, shall be used. Operator protection in the event of tipover is intended to reduce the risk of entrapment of the head and torso between the truck and the ground but may not protect the operator against all possible injury (see para. 7.2.2). However, steps indicated in paras. 5.3.18(d) and (e) should still be adhered to.

5.3.20 Motorized hand truck operation requires special safety considerations as follows:

- (a) never operate with greasy hands;
- (b) foot protection is recommended;
- (c) do not ride on the truck;
- (d) keep feet clear of truck frame while operating;
- (e) always keep hands and fingers inside the protected area of the control handle;
- (f) be cautious when traveling in reverse (load end leading) due to steering characteristics;
- (g) be careful of drive end swing when turning while operating with load end leading;
- (h) use caution when turning into an aisle. The load wheels tend to cut the corner.
- (i) never travel at a speed greater than normal walking speed [approximately 5.6 km/h (3.5 mph)];
- (j) always place both hands on the control handle when operating with the load end leading;
- (k) always operate with one hand on controls, and when possible, walk ahead and to the side of the tongue when traveling forward (load end trailing);
- (l) enter elevator or other confined areas with the load end leading.
- (m) operate on grades with the load end down grade. If the load restricts visibility, or requires the load back rest to retain the load, travel down the grade with the load end up grade, with the operator positioned off to one side per para. 5.3.20(k).

5.3.21 When operating a low lift order picker truck with a coasting system feature (see para. 7.22.5) engaged, the operator shall take the following precautions.

- (a) The coasting system shall be used only on a level surface free of debris.
- (b) The coasting system shall not be used to permit the truck to coast into a cross aisle.
- (c) The coasting system shall not be used in pedestrian walkways.
- (d) Care shall be taken to walk along the side of the lift truck and not into the path of the coasting truck.

5.4 Loading

5.4.1 Handle only stable or safely arranged loads.

- (a) When handling off-center loads that cannot be centered, operate with extra caution.
- (b) Handle only loads within the capacity of the truck.
- (c) Handle loads exceeding the dimensions used to establish truck capacity with extra caution. Stability and maneuverability may be adversely affected.
- (d) Handle loads only with the load engaging means and do not transport loads or miscellaneous items within the operator's compartment or other areas of the truck, unless a secure area has been provided and designated by the user.

5.4.2 When attachments are used, extra care shall be taken in securing, manipulating, positioning, and transporting the load. Operate trucks equipped with attachments as partially loaded trucks when not handling a load.

5.4.3 Completely engage the load with the load-engaging means. Fork length should be at least two-thirds of load length. Where tilt is provided, carefully tilt the load backward to stabilize the load. Caution should be used in tilting backward with high or segmented loads (see paras. 5.2.17 and 5.2.18).

5.4.4 Use extreme care when tilting load forward or backward, particularly when high tiering. Do not tilt forward with load-engaging means elevated except to pick up or deposit a load over a rack or stack. When stacking or tiering, use only enough backward tilt to stabilize the load.

5.4.5 The handling of suspended loads by means of a crane arm (boom) or other device can introduce dynamic forces affecting the stability of a truck that are not considered in the stability criteria of para. 7.6. Grades and sudden starts, stops, and turns can cause the load to swing and create a hazard.

When handling suspended loads:

- (a) do not exceed the truck manufacturer's capacity of the trucks as equipped for handling suspended loads;
- (b) only lift the load vertically and never drag it horizontally;
- (c) transport the load with the bottom of the load and the mast as low as possible;
- (d) with load elevated, maneuver the truck slowly and cautiously, and only to the extent necessary to permit lowering to the transport position;
- (e) use guy lines to restrain load swing whenever possible.

5.5 Operator Care of the Truck

5.5.1 At the beginning of each shift and before operating the truck, check its condition, giving special attention to the following:

- (a) condition of tires
- (b) if pneumatic tires, check inflation pressures
- (c) warning and safety devices
- (d) lights
- (e) battery
- (f) controls
- (g) lift and tilt systems
- (h) load-engaging means
- (i) chains and cables
- (j) limit switches
- (k) brakes
- (l) steering mechanism
- (m) fuel system(s)
- (n) additional items or special equipment as specified by the user and/or manufacturer

If the truck is found to be in need of repair or in any way unsafe, or contributes to an unsafe condition, the matter shall be reported immediately to the user's designated authority, and the truck shall not be operated until it has been restored to safe operating condition.

5.5.2 If during operation the truck becomes unsafe in any way, the matter shall be reported immediately to the user's designated authority, and the truck shall not be operated until it has been restored to safe operating condition.

5.5.3 Do not make repairs or adjustments unless specifically authorized to do so.

5.5.4 The engine shall be stopped, and the operator shall not be on the truck while refueling.

5.5.5 Spillage of oil or fuel shall be carefully and completely absorbed or evaporated and fuel tank cap replaced before restarting engine.

5.5.6 Do not use open flames when checking electrolyte level in storage batteries, liquid level in fuel tanks, or the condition of LPG fuel lines and connectors.

6 MAINTENANCE AND REBUILD PRACTICES

6.1 Operation

Operation of powered industrial trucks may be hazardous if maintenance is neglected or repairs, rebuilds, or adjustments are not performed in accordance with the

manufacturer's design criteria. Therefore, maintenance facilities (on or off premises), trained personnel, and detailed procedures shall be provided.

6.1.1 Parts manuals and maintenance manuals may be obtained from the truck manufacturer.

6.1.2 In unusual cases not covered by the manuals referred to in para. 6.1.1, consult the truck manufacturer.

6.2 Maintenance and Inspection

Maintenance and inspection of all powered industrial trucks shall be performed in conformance with the following practices.

(a) A scheduled planned maintenance, lubrication, and inspection system shall be followed; consult the manufacturer's recommendations.

(b) Only trained and authorized personnel shall be permitted to maintain, repair, adjust, and inspect industrial trucks, and in accordance with manufacturer's specifications.

6.2.1 When lifting trucks for repair or inspection, trucks shall be lifted in a safe, secure, stable manner. Removal of components such as counterweights or uprights will change the center of gravity and may create an unstable condition.

6.2.2 Before starting inspection and repair of truck:

(a) raise drive wheels free of floor or disconnect battery and use chocks or other positive truck-positioning devices;

(b) block load-engaging means, innermast(s), or chassis before working on them;

(c) before disconnecting any part of the engine fuel system of gasoline-powered trucks with gravity feed fuel systems, take precaution to eliminate any possibility of unintentional fuel escape;

(d) before disconnecting any part of the engine fuel system of LP gas-powered trucks, close LP tank valve and run engine until fuel in system is depleted and engine stops. If the engine will not run, close LP tank valve and vent fuel slowly in a nonhazardous area.

(e) disconnect battery before working on the electrical system;

(f) the charger connector shall be plugged only into the battery connector and never into the truck connector.

6.2.3 Operation of the truck to check performance shall be conducted in an authorized area where safe clearance exists.

(a) Before starting to operate the truck:

- (1) be in operating position;
- (2) disengage clutch on manual transmission-equipped trucks, or apply brake on power shift or automatic transmission-equipped trucks and electric trucks;
- (3) place directional controls in neutral;
- (4) start engine or turn switch of electric trucks to "ON" position;
- (5) check functioning of lift and tilt systems, load-engaging means, steering, warning devices, and brakes.

(b) Before leaving the truck:

- (1) stop truck;
- (2) fully lower the load-engaging means;
- (3) place directional controls in neutral;
- (4) apply the parking brake;
- (5) stop the engine or turn off power;
- (6) turn off the control or ignition circuit;
- (7) if the truck must be left on an incline, block the wheels.

6.2.4 Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check the level or to check for leakage of any fluid, especially fuel and battery electrolyte. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.

6.2.5 Properly ventilate work area, vent exhaust fumes, and keep shop clean and dry.

6.2.6 Handle LP gas cylinders with care. Physical damage such as dents, scrapes, or gouges may dangerously weaken the tank and make it unsafe for use.

6.2.7 Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices, lift and tilt mechanisms, articulating axle stops, and frame members shall be carefully and regularly inspected and maintained in safe operating condition.

6.2.8 Inspection and Repair of Forks in Service on Fork Lift Trucks

(a) Forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

(b) *Individual Load Rating of Forks.* When forks are used in pairs (the normal arrangement), the rated capacity of each fork shall be at least half of the manufacturer's rated capacity of the truck, and at the

rated load center distance shown on the lift truck nameplate.

6.2.8.1 Inspection. Fork inspection shall be carried out carefully by trained personnel with the aim of detecting any damage, failure, deformation, etc., which might impair safe use. Any fork that shows such a defect shall be withdrawn from service, and shall not be returned to service unless it has been satisfactorily repaired in accordance with para. 6.2.8.2.

(a) *Surface Cracks.* The fork shall be thoroughly examined visually for cracks and if considered necessary, subjected to a nondestructive crack detection process, special attention being paid to the heel and welds attaching all mounting components to the fork blank. This inspection for cracks must also include any special mounting mechanisms of the fork blank to the fork carrier including bolt-type mountings and forged upper mounting arrangements for hook or shaft-type carriages. The forks shall not be returned to service if surface cracks are detected.

(b) *Straightness of Blade and Shank.* The straightness of the upper face of the blade and the front face of the shank shall be checked. If the deviation from straightness exceeds 0.5% of the length of the blade and/or the height of the shank, respectively, the fork shall not be returned to service until it has been repaired in accordance with para. 6.2.8.2.

(c) *Fork Angle (Upper Face of Blade to Load Face of the Shank).* Any fork that has a deviation of greater than 3 deg from the original specification shall not be returned to service. The rejected fork shall be reset and tested in accordance with para. 6.2.8.2.

(d) *Difference in Height of Fork Tips.* The difference in height of one set of forks when mounted on the fork carrier shall be checked. If the difference in tip heights exceeds 3% of the length of the blade, the set of forks shall not be returned to service until repaired in accordance with para. 6.2.8.2.

(e) *Positioning Lock (When Originally Provided).* It shall be confirmed that the positioning lock is in good repair and correct working order. If any fault is found, the fork shall be withdrawn from service until satisfactory repairs have been effected.

(f) *Wear*

(1) *Fork Blade and Shank.* The fork blade and shank shall be thoroughly checked for wear, special attention being paid to the vicinity of the heel. If the thickness is reduced to 90% of the original thickness, the fork shall not be returned to service.

(2) *Fork Hooks (When Originally Provided).* The support face of the top hook and the retaining faces

of both hooks shall be checked for wear, crushing, and other local deformations. If these are apparent to such an extent that the clearance between the fork and the fork carrier becomes excessive, the fork shall not be returned to service until repaired in accordance with para. 6.2.8.2.

(g) *Legibility of Marking (When Originally Provided)*. If the fork marking in accordance with para. 7.26.2 is not clearly legible, it shall be renewed. Marking shall be renewed per instructions from original supplier.

6.2.8.2 Repair and Testing

(a) *Repair*. Only the manufacturer of the fork or an expert of equal competence shall decide if a fork may be repaired for continued use, and the repairs shall only be carried out by such parties.

It is not recommended that surface cracks or wear be repaired by welding. When repairs necessitating resetting are required, the fork shall subsequently be subjected to an appropriate heat treatment, as necessary.

(b) *Test Loading*. A fork that has undergone repairs other than repair or replacement of the positioning lock and/or the marking, shall only be returned to service after being submitted to, and passing, the tests described in para. 7.26.3, except that the test load shall correspond to 2.5 times the rated capacity marked on the fork.

6.2.9 Special trucks or devices designed and approved for hazardous area operation shall receive special attention to ensure that maintenance preserves the original, approved safe operating features.

6.2.10 Fuel systems shall be checked for leaks and condition of parts. Extra special consideration shall be given in the case of a leak in the fuel system. Action shall be taken to prevent the use of the truck until the leak has been corrected.

6.2.11 All hydraulic systems shall be regularly inspected and maintained in conformance with good practice. Hydraulic cylinders, valves, hoses, fittings, and other hydraulic components shall be checked to

ensure that *drift* or leakage has not developed to the extent that it would create a hazard.

6.2.12 The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals shall be maintained in legible condition.

6.2.13 Batteries, motors, controllers, limit switches, protective devices, electrical conductors, and connections shall be inspected and maintained in conformance with good practice. Special attention shall be paid to the condition of electrical insulation.

6.2.14 To avoid injury to personnel or damage to equipment, follow the connector manufacturer's procedures when replacing the contacts in any battery connector.

6.2.15 Trucks shall be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.

6.2.16 Modifications and additions that affect capacity and safe truck operation shall not be performed without manufacturer's prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

6.2.17 Care shall be taken to ensure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires, are to be installed per manufacturer's procedures.

6.2.18 When removing tires, follow industry safety practices. Most importantly, deflate pneumatic tires completely prior to removal. Following assembly of tires and rims, use a safety cage or restraining device while inflating.

6.2.19 When changing batteries on battery-electric trucks, replacement batteries shall be of the service weight that falls within the minimum/maximum range specified on the truck nameplate by the truck manufacturer.

Classroom Exercise

CLASSROOM EXERCISE POWERED INDUSTRIAL TRUCK SITE SPECIFIC CONTROLS & INSTRUMENTS LIST

Make: _____
Model: _____
Identification Number : _____
Vehicle Classification: _____

Control / Instrument	Location	Effect or Function
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		

CLASSROOM EXERCISE POWERED INDUSTRIAL TRUCK SITE SPECIFIC CONTROLS & INSTRUMENTS LIST

(Example)

Make: Hyster
 Model: 56 E S50XL
 Identification Number:
 Vehicle Classification: ee, Sit Down Rider

Control / Instrument	Location	Effect or Function
1. Fuel Gauge	Immediately to the right of the steering wheel on the console	Indicates the amount of fuel in the fuel tank
2. Warning Light for Engine Oil Pressure	Directly under and slightly to the right of the fuel gauge	The red light is ON, when the key switch is ON and the engine is not running
3. Warning light Oil Temperature for Power Shift Transmission		
4. Warning light for Alternator		
5. Coolant Temperature Gauge		
6. Cold Start Aid		
7. Key Switch		
8. Hour Meter		
9. Engine Stop Control		
10. Horn		
11. Parking Brake Pedal		
12. Directional Control Lever		
13. Upright Control Lever		
14. Auxiliary Control Lever		
15. Accelerator Pedal		
16. Monotrol Pedal		
17. Brake Pedal		
18. Clutch Pedal		
19. Inching Brake Pedal		

Controls and Instruments :

Before attempting to drive the truck, you should become familiar with all the controls and instruments, their functions, how they operate, if and how the operations will effect the safe working capacity.

(NOTE) the controls and instruments listed in the script , may or may not be installed on each of your powered industrial trucks.

It is the designated trainers responsibility to match up each element to each powered industrial truck during your training program.

Reference source: Hyster Operating Manual

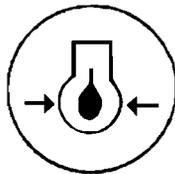
(NOTE) : The specific location of instruments and controls may vary if you have several different models or types of powered industrial trucks in your facility, It is the designated trainers responsibility to confirm the exact location of controls and instruments before training. Then update the documented information contained in this script.

Fuel Gauge



1. **Fuel Gauge** : Located to the right of the steering wheel, on the consul.
(Indicates the amount of fuel (gasoline or diesel) in the fuel tank..)

Warning Lights for Oil Temperature for Powershift Transmission



2. **Warning Light for Engine Oil Pressure**: Located directly under and slightly to the left of the fuel gauge.

(The red light is **ON** when the key switch is **ON** and the engine is not running)

CAUTION - Stop the engine if the red warning light is ON when the engine is running

Warning Light for Oil Temperature for Powershift Transmission

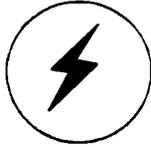


3. **Warning Light for Oil Temperature for Powershift Transmission**: Located directly below and slightly to the right of the fuel gauge on the consul.

(The red light is **ON** when the key switch is in the **START** position.)

CAUTION - Do not continue to operate the lift truck if the light is ON during operation

Warning Light for Alternator

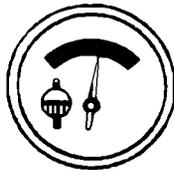


4. **Warning Light for Alternator:** Located directly below and slightly to the right of the Coolant Temperature Gauge on the consul.

(The light will be **ON** when the key switch is **ON** and the engine is not running.)

CAUTION - Do not continue to operate the lift truck if the red light is ON at engine speeds above idle.

Coolant Temperature Gauge

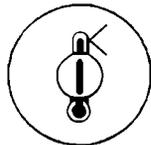


5. **Coolant Temperature Gauge:** Located to the far right of the consul.

(Indicates engine coolant temperature when the key is ON. During normal operation, the needle will indicate in the green zone of the gauge.)

CAUTION - Do not operate the engine when the gauge indicates that the engine is too hot. (Needle in the red zone)

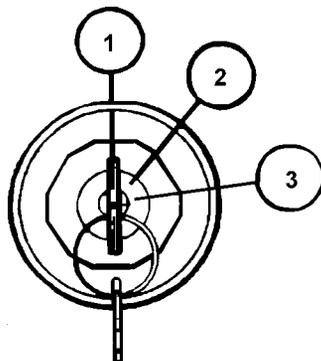
Cold Start Aid



6. **Cold Start Aid:** Located to the immediate left of the directional controls to the upper area of the consul.

(The cold start aid is used on lift trucks with a diesel engine. With the key in the ON position, push and hold the "HEAT" button to energize the cold start aid.)

Key Switch



7. **Key Switch:** Located on the right side of the steering column.

The key switch has three positions:

No. 1 Position: **OFF** position. Deenergizes all electric circuit's except for the horn and headlights.

No. 2 Position: **ON** position. Energizes all electric circuits except the starter circuit. The key will be in this position during normal operation.

No. 3 Position: **START** position. Energizes the starter motor for starting the engine. A spring returns the key to position No. 2 (ON position) when the key is released.

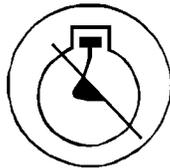
Hour Meter



8. **Hour Meter:** Located immediately to the right of the steering wheel column on the console.

(The hour meter shows the total operating hours of the engine when the key switch is **ON**. Periodic Maintenance recommendations are based on these engine hours.

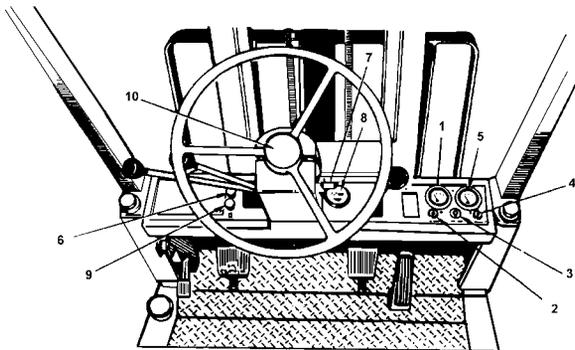
Engine Stop Control



9. **Engine Stop Control :** Located immediately to the

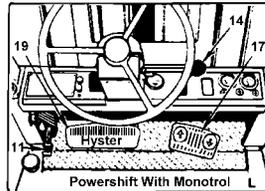
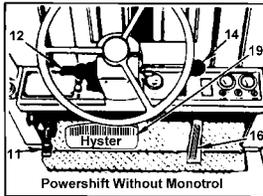
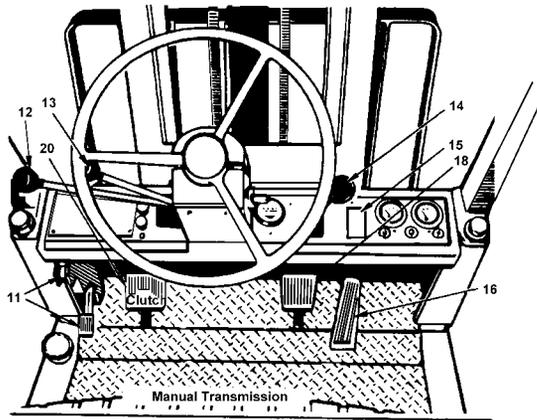
left of the directional controls on the lower area of the console, below the Cold Start Aid (if equipped).

(The engine stop control is used on lift trucks with a diesel engine. Pull the stop control until the engine stops, then turn the key to the OFF position. Push the stop control all the way toward the instrument panel after the engine stops running.



10. **Horn :** Located in the middle of the steering wheel.

(The horn button controls the operation of the horn) Depress it to sound the horn.



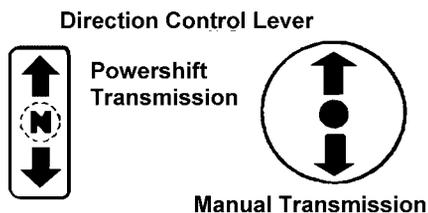
11. **Parking Brake Pedal** : Located on the far left of the operators compartment at floor level.

(The lift truck is equipped with a foot-applied and hand-released parking brake pedal assembly. On lift trucks with a powershift transmission and a Monotrol pedal, applying the parking brake also puts the transmission in NEUTRAL.)

NOTE: On lift trucks with a Monotrol pedal, the parking brake or the inching/brake pedal must be applied before the engine can be started.

WARNING - Correct adjustment is necessary to provide adequate braking and to keep the parking brake lever in the engaged position. Refer to the maintenance section for adjustment procedures.

Always apply the parking brake when leaving the lift truck.



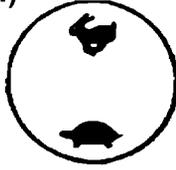
12. **Directional Control Lever** :
Powershift Transmission
Manual Transmission

Located immediately to the left of the steering column, the directional control is the far left knob.

(The directional control lever for the transmission is on the left side of the steering column. the directional control lever is used on units with a manual transmission and those with a powershift transmission without a Monotrol pedal. The lever has three positions: FORWARD, NEUTRAL, and REVERSE. Move the lever to one of the direction positions for travel.)

NOTE : The directional control lever must be in the NEUTRAL (N) position before the engine can be started.

**Range Lever
(Manual Transmission)**



13. Range Lever (Manual Transmission) :

(The range lever is located on the left-hand side of the steering column. The lever controls the two speed ranges of the transmission.)

Upright Control Lever



14. Upright Control Lever : Located immediately to the right side of the steering column.

(The upright control lever is the first lever to the right of the steering wheel. Pull back on the lever to raise the carriage and the forks. Push the lever forward to lower the carriage and forks. Push the lever to the right and pull back on the lever to tilt the upright and forks backward. Push the lever to the right, then push the lever forward to tilt the upright and forks forward.)

15. Auxiliary Control Lever : (If equipped) Located directly to the right of the upright control.

(If the lift truck is equipped with an attachment, such as a side shift carriage, and additional lever for the control of this attachment will be installed to the right of the upright control lever) If your lift is equipped with this device insert the information and describe the actions and motions it will make.

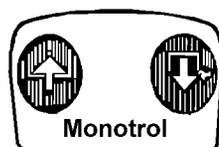
Accelerator Pedal



16. Accelerator Pedal : Located on the far right of the floor area of the operator compartment.

(This pedal controls the engine speed and is operated by the operator's right foot. It is used on units that have a column mounted directions control lever.)

Monotrol Pedal



17. Monotrol Pedal :

(The Monotrol pedal controls the speed and direction of the lift truck. Pushing on the right side of the pedal causes the lift truck to move in REVERSE. Pushing on the left side of the pedal causes the lift truck to move in FORWARD. the speed of the engine increases as the pedal is depressed.)

**Brake Pedal
(Manual Transmission)**



18. Brake Pedal (Manual Transmission) :

(This pedal, controlled by the operator's right foot, controls the application of the service brakes.)

**Inching / Brake Pedal
(Powershift Transmission)**



19. Inching / Brake Pedal (Power Transmission) :

(This pedal is operated by the operator's left foot. By varying the position of the pedal, the operator can move the lift truck slowly while a high engine speed is used for lifting loads. Completely depressing the pedal disengages the transmission and applies the service brakes.)

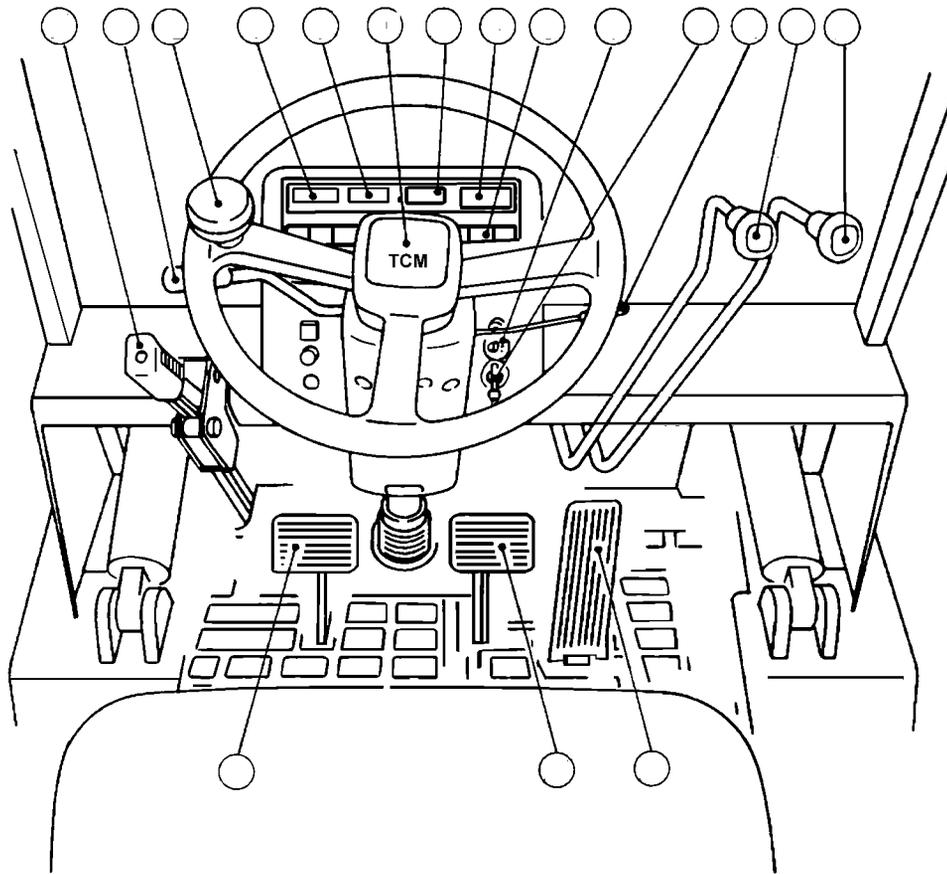
**Clutch Pedal
(Manual Transmission)**



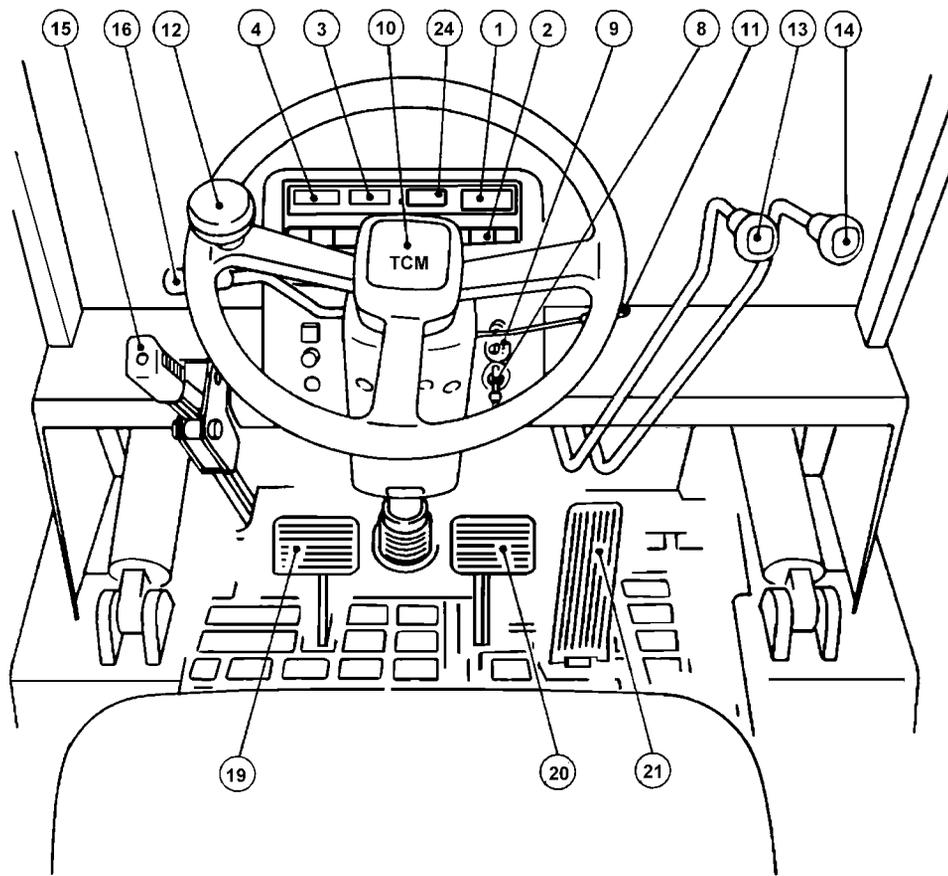
20. Clutch Pedal (Manual Transmission) “

(The clutch pedal is located to the left of the brake pedal. This pedal, controlled by the operator's left foot, controls clutch engagement for shifting and inching.

SITE SPECIFIC TCM CONTROLS EXAMPLE QUIZ



1. Hour Meter
2. Monitor
3. Coolant Temp. Gauge
8. Ignition Switch
9. Light Switch
10. Horn Button
11. Turn Signal Lever
12. Steering Handwheel
13. Lift Lever
14. Tilt Lever
15. Parking Brake Lever
16. Forward – Reverse Lever
19. Inching and Brake Pedal
20. Brake Pedal
21. Accelerator Pedal
24. Powershift Transmission
- Oil Temp. Gauge
25. Ammeter

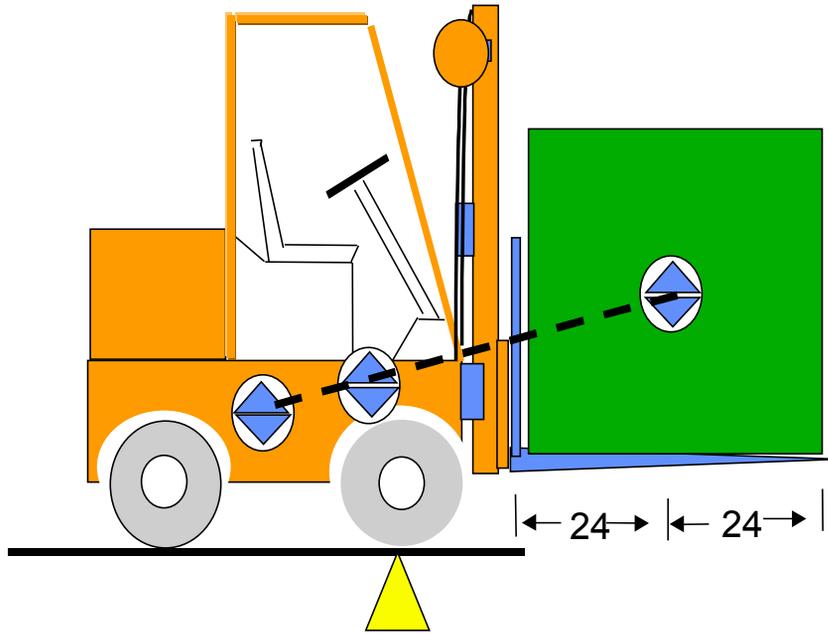


Pre-Operation Checklist

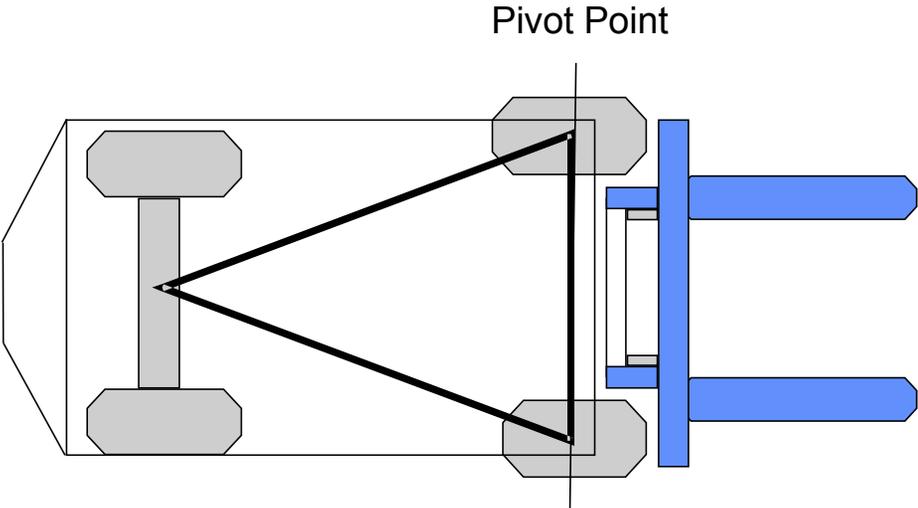
Pre- Operation Check:

Name : _____	Date: _____	
	Needs Attention	
	Operating Fine	
1. Crankcase Oil Level	<input type="checkbox"/>	<input type="checkbox"/>
2. Engine Belts	<input type="checkbox"/>	<input type="checkbox"/>
3. Plug Wires	<input type="checkbox"/>	<input type="checkbox"/>
4. Brake Fluid Level	<input type="checkbox"/>	<input type="checkbox"/>
5. Hydraulic Fluid Level	<input type="checkbox"/>	<input type="checkbox"/>
6. Fuel Tank Level	<input type="checkbox"/>	<input type="checkbox"/>
7. Tire / Wheel Rim Condition	<input type="checkbox"/>	<input type="checkbox"/>
8. Head lights / Tail lights	<input type="checkbox"/>	<input type="checkbox"/>
9. Turn Signals	<input type="checkbox"/>	<input type="checkbox"/>
10. Warning Lights	<input type="checkbox"/>	<input type="checkbox"/>
11. Hour Meter	<input type="checkbox"/>	<input type="checkbox"/>
12. Other Gauges	<input type="checkbox"/>	<input type="checkbox"/>
13. Forks for Damage	<input type="checkbox"/>	<input type="checkbox"/>
14. Mast, Chains, Hydraulic Lines	<input type="checkbox"/>	<input type="checkbox"/>
15. LPG Tank Clamps	<input type="checkbox"/>	<input type="checkbox"/>
16. Safety Belts, Lanyards	<input type="checkbox"/>	<input type="checkbox"/>
17. Fire Extinguisher	<input type="checkbox"/>	<input type="checkbox"/>
18. Overhead Cage Condition	<input type="checkbox"/>	<input type="checkbox"/>
19. Safe Operating Capacity	<input type="checkbox"/>	<input type="checkbox"/>
20. Attachment condition & capacity	<input type="checkbox"/>	<input type="checkbox"/>
21. Horn	<input type="checkbox"/>	<input type="checkbox"/>
22. Back-up lights / warning buzzer	<input type="checkbox"/>	<input type="checkbox"/>
23. Steering	<input type="checkbox"/>	<input type="checkbox"/>
24. Service Brake	<input type="checkbox"/>	<input type="checkbox"/>
25. Parking Brake	<input type="checkbox"/>	<input type="checkbox"/>
26. Mon-o-trol Pedal	<input type="checkbox"/>	<input type="checkbox"/>
27. Transmission / Forward - Reverse	<input type="checkbox"/>	<input type="checkbox"/>
28. Seat Brake / Seat Safety Switch	<input type="checkbox"/>	<input type="checkbox"/>
29. Hydraulic Controls / ID - Sticking	<input type="checkbox"/>	<input type="checkbox"/>
30. Mast Lift	<input type="checkbox"/>	<input type="checkbox"/>
31. Mast Tilt	<input type="checkbox"/>	<input type="checkbox"/>
32. Auxiliary (Side Shift) (Squeeze)	<input type="checkbox"/>	<input type="checkbox"/>
33. Hydraulic Leaks	<input type="checkbox"/>	<input type="checkbox"/>
34. Battery Charge	<input type="checkbox"/>	<input type="checkbox"/>

CENTER OF GRAVITY

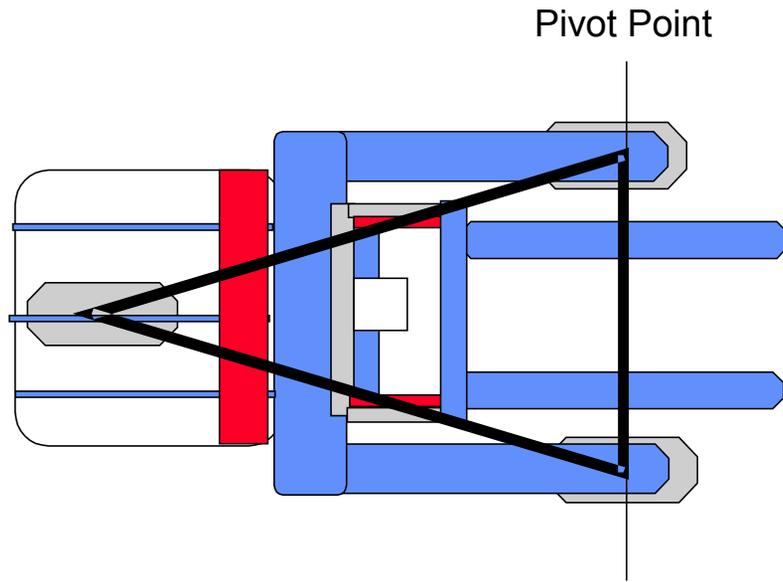


STABILITY TRIANGLE



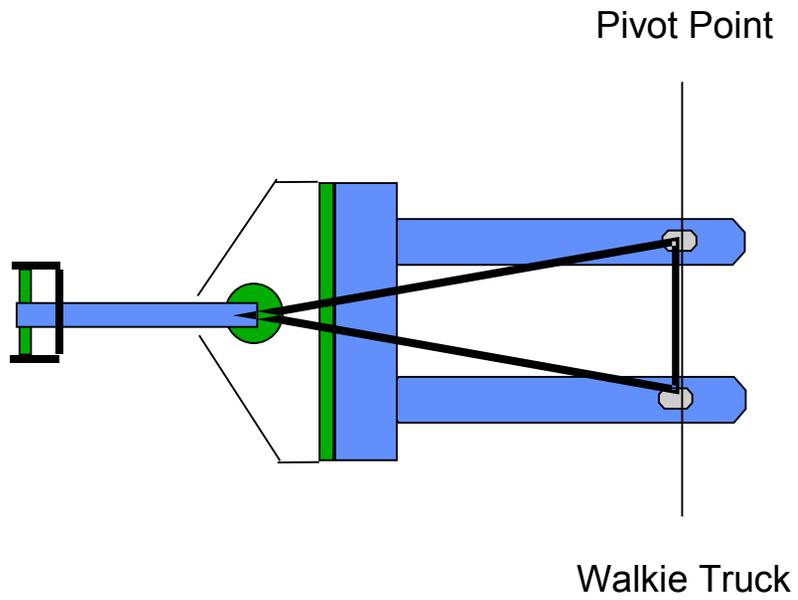
Sit-Down Rider Truck

STABILITY TRIANGLE



Stand-Up Rider Truck

STABILITY TRIANGLE



**CLASSROOM EXERCISE
POWERED INDUSTRIAL TRUCK
SITE SPECIFIC LOAD INFORMATION**

Load Identification	Approx: Weight, Size	Special Handling Techniques, or Attachment utilized:
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
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20.		
21.		
22.		
23.		
24.		

POWERED INDUSTRIAL TRUCK SITE SPECIFIC LOAD INFORMATION

Load Identification	Approx: Weight, Size	Special Handling Techniques, or Attachment utilized:
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
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22.		
23.		
24.		

POWERED INDUSTRIAL TRUCK (FORKLIFT) SAFETY RULES

- I. OPERATORS - Only trained and authorized employees shall be permitted to operate a powered industrial truck. Training shall consist of basic classroom type coverage of general safety rules by the Safety Director and on-the-job operating instruction, on each type of unit, by production supervision.
- II. TRUCK OPERATION - IF AT ANY TIME A POWERED INDUSTRIAL TRUCK IS FOUND TO BE IN NEED OF REPAIR, DEFECTIVE, OR IN ANY WAY UNSAFE, THE TRUCK SHALL BE TAKEN OUT OF SERVICE UNTIL IT HAS BEEN RESTORED TO SAFE OPERATING CONDITION.
 1. Trucks shall not be driven up to anyone standing in front of a bench or other fixed objects.
 2. No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.
 3. Unauthorized personnel shall not be permitted to ride on powered industrial trucks.
 4. Hands, arms, feet, legs, and head shall at no time be placed between the upright of the mast or outside the running line of the truck.
 5. Unattended trucks -
 - a) When a powered industrial truck is left unattended, load means shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set. Wheels shall be blocked if the truck is parked on an incline.
 - b) A powered industrial truck is unattended when the operator is 25 feet or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view.
 - c) When the operator of an industrial truck is dismounted and within 25 feet of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement.

6. A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Trucks shall not be used for opening or closing freight doors.
7. Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.
8. There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler systems, etc.
9. An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.
10. A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.
11. Only approved industrial trucks shall be used in hazardous locations.
12. Fire aisles, access to stairways, and fire equipment shall be kept clear.

III. TRAVELING

1. All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three trucks lengths from the truck ahead, and the truck shall be kept under control at all times.
 2. The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations.
 3. Other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed.
 4. The driver shall slow down and sound the horn at cross isles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall travel with the load trailing.
 5. Railroad tracks shall be crossed diagonally wherever possible. Parking closer than 8 feet from the center of railroad tracks is prohibited.
-

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

IV. LOADING

1. Only stable of safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

2. Only loads within the rated capacity of the truck shall be handled.
3. The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.
4. When attachments are used, particular care should be taken in securing, manipulating, positioning, and transporting the load. Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.
5. A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.
6. Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough back ward tilt to stabilize the load shall be used.

V. MAINTENANCE OF INDUSTRIAL TRUCKS - The Maintenance Department shall routinely inspect each industrial truck and ensure the vehicle is in good repair suitable for employee use. A log shall be maintained of inspections and any repair work performed.

1. Any power-operated industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel.
 2. No repairs shall be made in Class I, II, and III locations.
 3. Those repairs to the fuel and ignition systems of industrial trucks which involve fire hazards shall be conducted only in locations designated for such repairs.
 4. Trucks in need of repairs to the electrical system shall have the battery disconnected prior to such repairs.
 5. All parts of any such industrial truck requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.
 6. Industrial trucks shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any
-

parts, except as provided in 29CFR 1910.178. Additional counter-weighting of fork trucks shall not be done unless approved by the truck manufacturer.

7. Industrial trucks shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily.

Where industrial trucks are used on a round-the-clock basis, they shall be examined after each shift. Defects when found shall be immediately reported and corrected.

8. Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent for the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. Any vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.
9. When the temperature of any part of any truck is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated.
10. Industrial trucks shall be kept in a clean condition, free of lint, excess oil, and grease. Noncombustible agents should be used for cleaning trucks. Low flash point (below 100 degrees F) solvents shall not be used. High flash point (at or above 100 degrees F) solvents may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be consonant with the agent of solvent used.

Standard Number	1910.178
Subject	Clarification of whether the OSHA general industry powered industrial truck standard requires forklift operators to wear seat belts.
Information Date	October 09, 1996

October 9, 1996

Mr. George R. Salem, P.C.
Akin, Gump, Strauss, Hauer & Feld, L.L.P.
1333 New Hampshire Avenue, N.W.
Suite 400
Washington, D.C. 20036

Dear Mr. Salem:

Thank you for your letter dated September 5, requesting clarification of whether the Occupational Safety and Health Administration (OSHA) general industry powered industrial truck standard, 29 CFR 1910.178, require forklift operators to wear seat belts while operating forklifts.

American National Standards Institute (ANSI) B56.1-1969 Safety Standard for Powered Industrial Trucks, was adopted by OSHA under the procedures described in section 6(a) of the Occupational Safety and Health Act (OSH Act). OSHA's general industry standard for powered industrial trucks does not contain any provision which requires the use of seat belts. However, Section 5(a)(1) of the OSH Act requires employers to protect employees from serious and recognized hazards. Recognition of the hazard of powered industrial truck tipper and the need for the use of an operator restraint system is evidenced by certain requirements in the more current versions of ANSI B56.1 consensus standards for powered industrial trucks; ASME/ANSI B56.1a-1989 Addenda to ASME/ANSI B56.1-1988, and ASME B56.1-1993 - Safety Standard for Low Lift and High Lift Trucks. These consensus standards require the use of an active operator protection device or system when provided on a powered industrial truck. In addition, seat belts have been supplied by many manufacturers of counterbalanced, center control, high lift trucks which have a sit-down nonelevating operator position. Also, some manufacturers have instituted retrofit programs for the installation of operator restraint systems to older trucks.

OSHA's position in regard to the use of seat belts on powered industrial trucks is that employers are obligated to require operators of powered industrial trucks which are equipped with operator restraint devices or seat belts to use the devices. OSHA can enforce the use of such devices under Section 5(a)(1) of the OSH Act. OSHA may also cite Section 5(a)(1) of the OSH Act if an employer has not taken advantage of a manufacturer operator restraint system or seat belt retrofit program.

With regard to your comments concerning 1910.178(a)(2), ANSI B56.1-1969 contains three parts: Part I - Introduction; Part II - For the Manufacturer; and Part III - For the User. 1910.178(a)(2) require powered industrial trucks to meet the design and construction requirements established in Part II, ANSI B56.1-1969. Part III of ANSI B56.1-1969, which covers general safety practices, operating safety rules and practices, and maintenance for powered industrial trucks, was adopted by OSHA.

Thank you for your interest in occupational safety and health. If we can be of any further assistance, please contact Mr. Wil Epps of my staff at (202)219-8041.

Sincerely,

John B. Miles, Jr.,
Director
Directorate of Compliance Programs

RISKS, CAUSES, & PREVENTIVE SOLUTIONS

JOB ELEMENTS	HAZARDS	HAZARDS ELIMINATED, REDUCED OR CONTROLLED	SPECIFIC TRAINING
1. Authorized operator obtains a vehicle	1. Unauthorized use a) improper vehicle for lift b) improper lifting mechanism for lift c) use of damaged vehicle d) overload of vehicle e) accidents/injuries	1. Only trained and authorized individuals operate lift trucks	1. a) Operators receive and pass specific safe operation classroom and hand-on training and periodic refresher training. b) passing operators are authorized by the company and issued a license c) operators are required to carry this license
2. Pre-operational safety inspection	2. a) not performing due to defective equipment b) performing i) burns (surfaces and steam) ii) fluid in eyes iii) electric shock	2. Inspection of vehicle- Withdraw from use and tag if any safety defects are found and provide and instruct employees to use PPE a) tires b) steering c) service brakes d) parking brake (seat brake) e) hydraulic system f) controls g) warning devices h) chains i) mast and carriage forks and adjusting latches j) nameplate fluid levels (coolant oil hydraulic) k) light leaks (flue, oil, coolant, hydraulic) l) battery m) guarding of moving parts n) overhead protection o) clutch p) gauges q) any other appropriate items	2. Train operators on items they should inspect, how to inspect. Recognition of malfunctions and the protective equipment they are required to wear. They should know what they are responsible for inspecting and what maintenance will inspect

JOB ELEMENTS

HAZARDS

HAZARDS ELIMINATED, REDUCED OR CONTROLLED

SPECIFIC TRAINING

Travel (Continued)

o) confined areas - use caution, don't block escape route, possible CO buildup—ventilation may be necessary. Stay between load and exit

- p) know floor load limit
- q) keep equipment properly maintained
- r) provide headlights
- s) clean up or barricade wet areas

5. Picking up a load and traveling with it

- a) overload - damage to vehicle, loss of steering
- b) unstable loads
- c) off-center loads(awkward)
- d) high vertical loads
- e) passing under a load
- f) deep loads (long loads)
- g) obstructed view
- h) if hazardous or flammable falling loads
- i) collision with rack bldg. structures and the material
- j) All the items in #4 above

- 5. a) know maximum load limit
- b) understand center of gravity effects on the load limit - reduces truck capacity
- c) obstructed view - drive in reverse center load
- d) secure loads with banding, shrink wrap, interlock bagged material
- e) use fork extensions
- f) use backrest extension
- g) lift from broad side
- h) set forks at greatest width pallet allows
- i) insert forks level and then tilt back
- j) don't raise or lower while traveling
- k) block or tie off awkward loads to the mast
- l) overhead protection
- m) no one passes underneath
- n) keep load as close to the mast as possible
- o) lift and lower slowly, stop gradually

- 5. a) Same training as item #4 above
- b) Train operators to know the capacities and capabilities of the specific type of vehicle they operate (use mfg.'s operator's manual)

RISK, CAUSES, & PREVENTIVE SOLUTIONS

Job Element	Hazard	Hazards Eliminated, Reduced or Controlled	Specific Training

LIFT TRUCK TRAINING PROGRAM

(Lift truck equipment includes walk-a-long,
walking/riding stackers and tow motors)

Department Manager Responsibilities:

1. Review material handling equipment needs.
2. Be familiar with the requirements governing proper use of such equipment.
3. Assure operators are trained and qualified prior to being allowed to operate equipment. (Includes loan-ins, transfers, new hires and etc.)
4. Provide study material to operators seeking to be authorized to operate equipment.
 - a) Handbook for Hourly Employees (page 9, "Safety Rules for Operators of Powered Industrial Trucks")
 - b) Industrial Commission of Ohio Handbook
5. Administer the written test, check for accuracy and review with employees.
6. Schedule practice time for operators to get "hands on experience" in an open area. Review requirements per "Hands on Wheel" form.
7. Schedule a practical driving test with the in house trainer.

For consistency, the Storerooms Supervisor on their respective shifts will assume the responsibility of administering the "Hands on Wheel" practical driving test and make recommendations for authorization to operate equipment. This test must be administered in the environment the user will be working in. Storeroom Supervisor will complete "Hands on Wheel" form and give to appropriate Department Manager.

8. Schedule additional driving if in house trainer does not recommend authorization to operate equipment.
9. Upon successful completion of the written and driving tests, submit all approved forms to the Loss Control supervisor with recommendations for authorization to operate equipment.

10. Insure the appropriate authorization is given to the operator, assuring any restrictions are properly noted (walk-a-long only, all except tow motor and etc.)

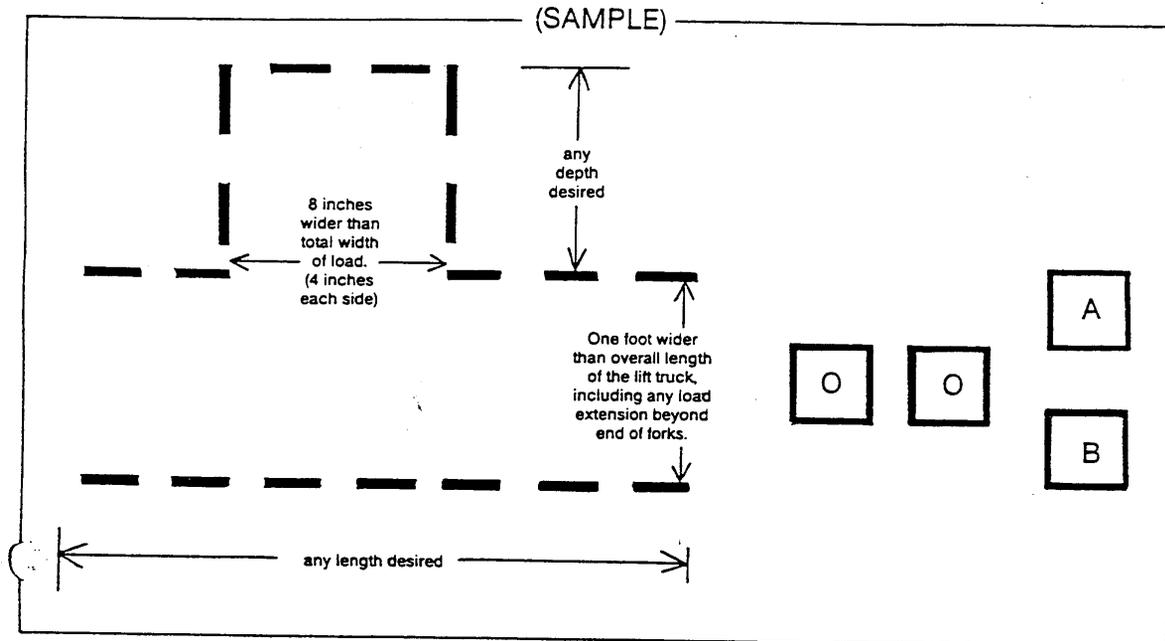
11. Insure the operator sign the authorization.

12. Submit changes to Loss Control office to keep list of operators data base current.

Each January, the Loss Control Supervisor will publish a current list of operators with authorization and noted restrictions for the department managers review.

LW/gc
10/19/87

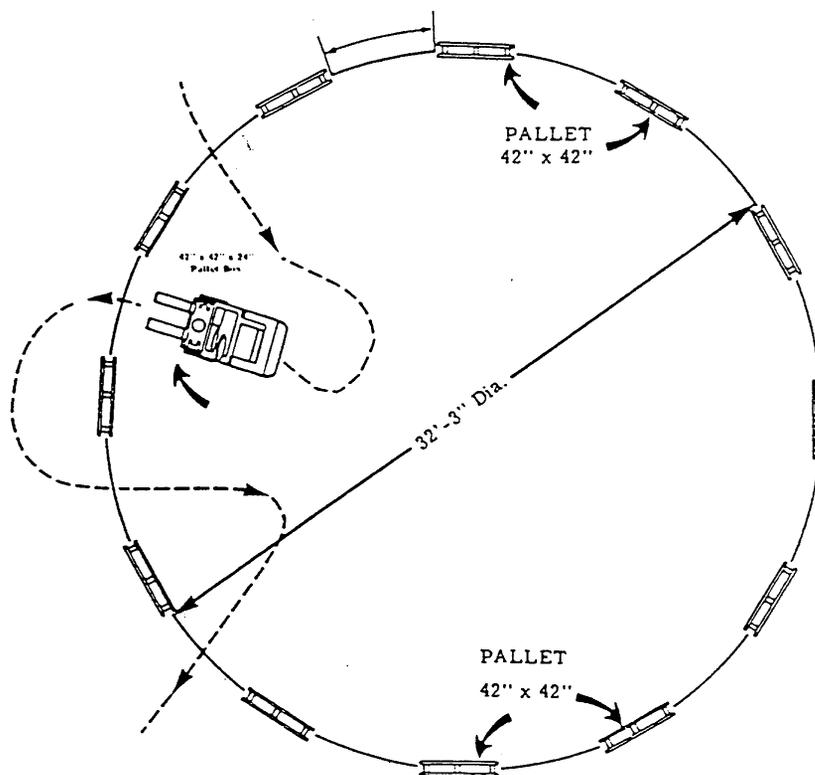
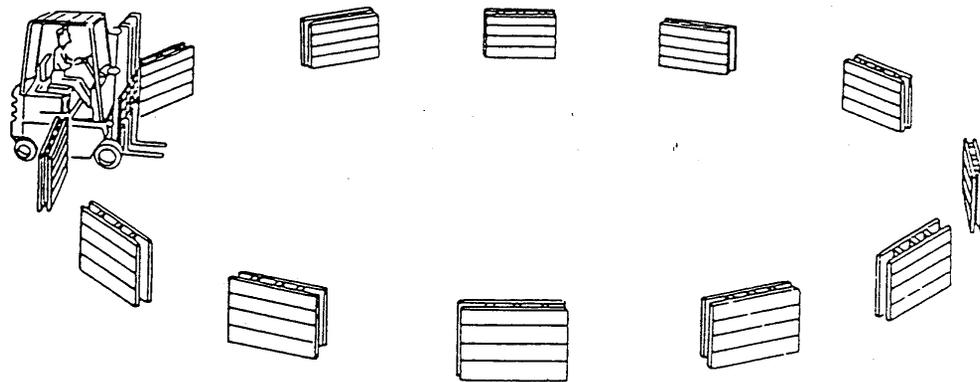
OPERATORS TEST COURSE



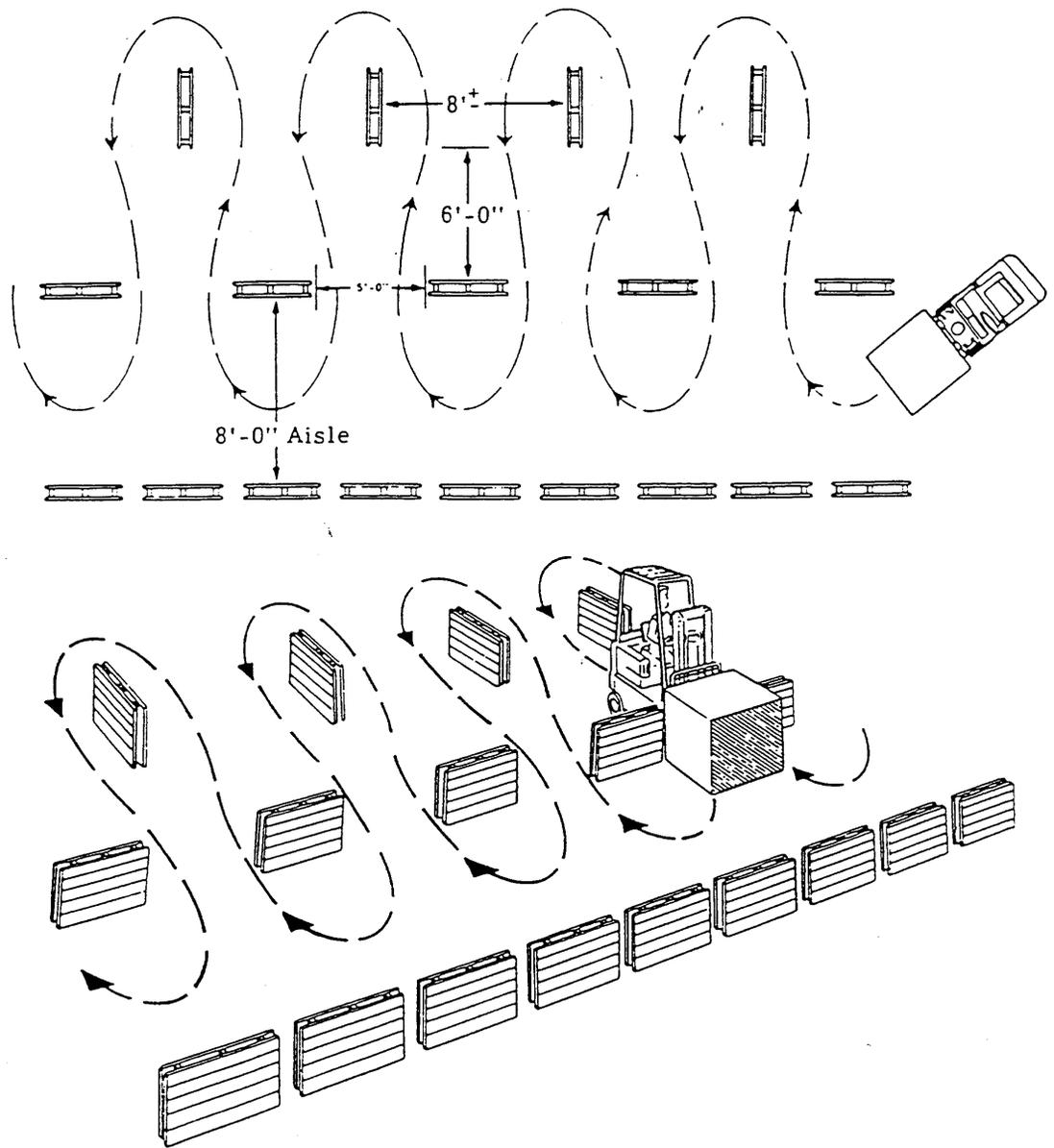
1. Pick up load A and back through obstacles into large access aisle. Without touching upright pallets outlining small aisle, enter and deposit load at closed end.
2. Return and pick up load B, then drive forward through obstacles and stack load on top of first load.
3. Pick up the entire stack and return it to the starting position, separating stack into loads A and B.

Notes:

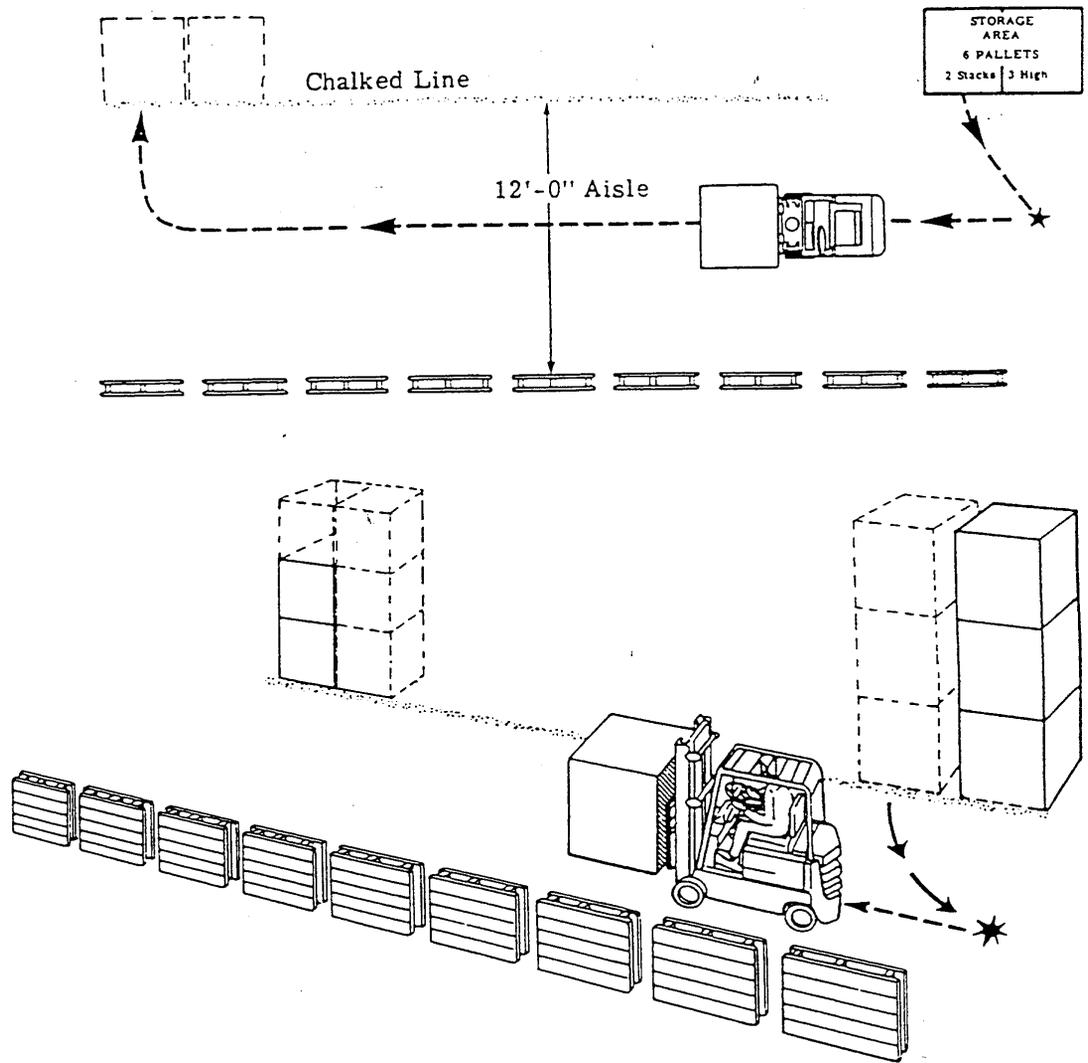
The driving course is outlined by placing pallets on end, and the obstacles (O) and loads (A & B) also consist of two or more pallets each.



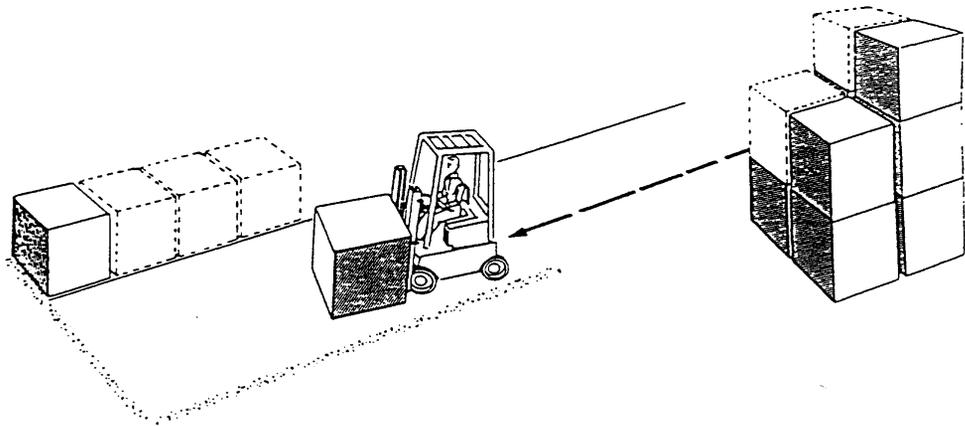
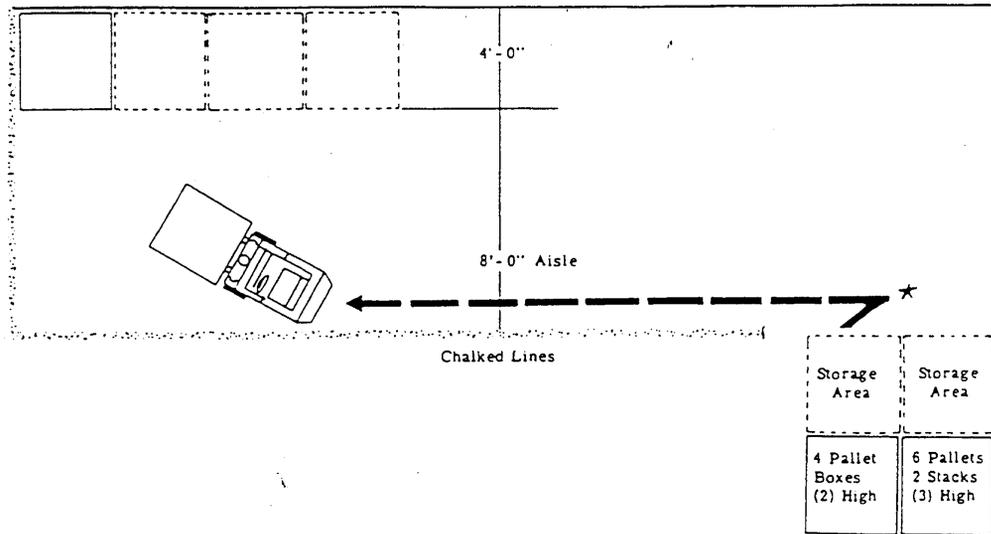
The trainee travels around the circle twice with lowered, empty forks. One trip is made forward and the other in reverse. He is not permitted to go through one opening forward and the next in reverse.



A loaded pallet is picked up at the storage area. The course is then traversed forward with the loaded pallet on the forks. The trainee then retraces his path in reverse. Finally, the pallet is returned to the storage area.

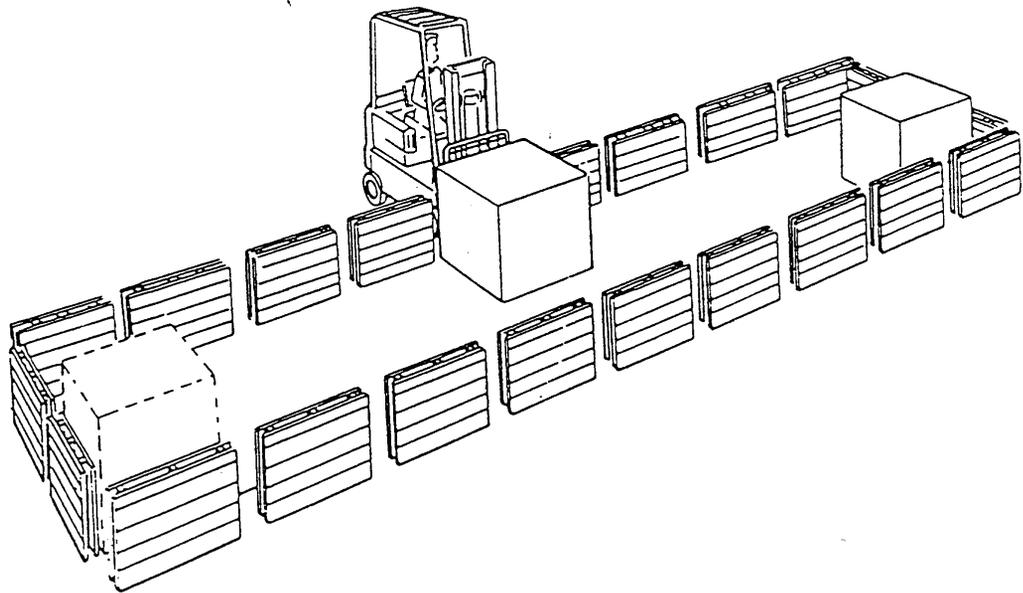
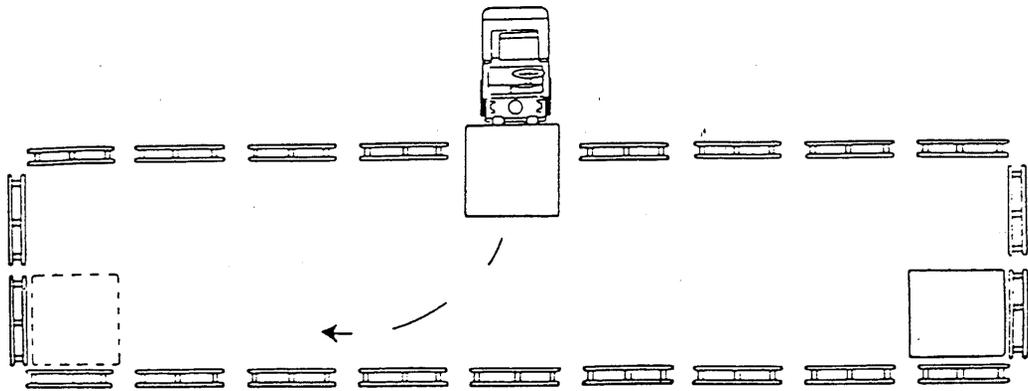


This test involves the stacking of six pallets in two tiers three high. The trainee removes the pallets one at a time from the storage area and approaches the stacking area from the end of a 12-foot wide aisle. He makes two stacks, side by side, three high. The trainee is simply told where and how he is to stack the pallets. No instructions are given during the test as to technique, maneuvering, approaching, etc. The pallets are then returned to the supply area.

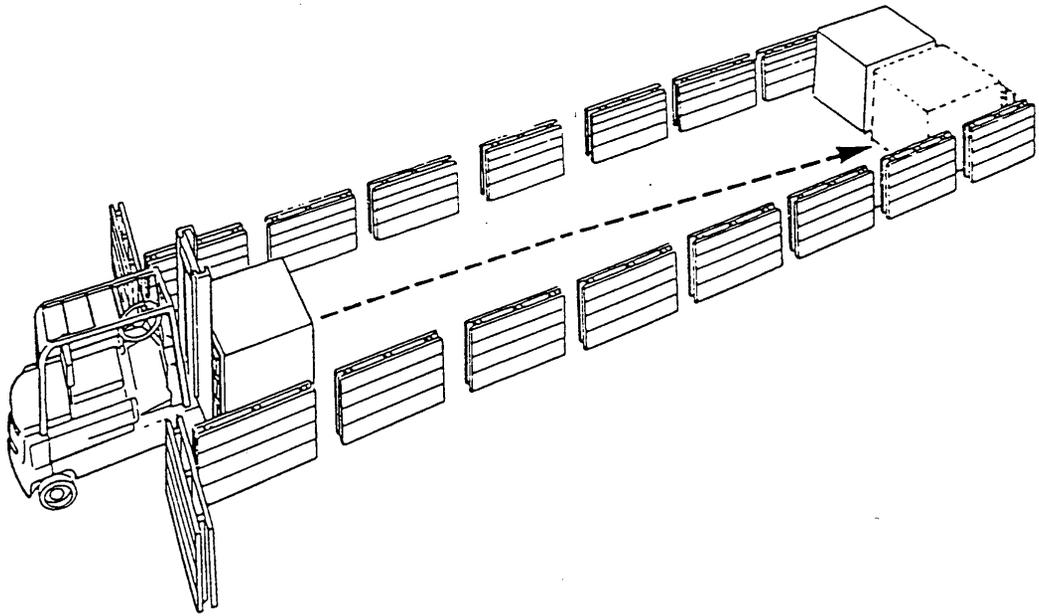
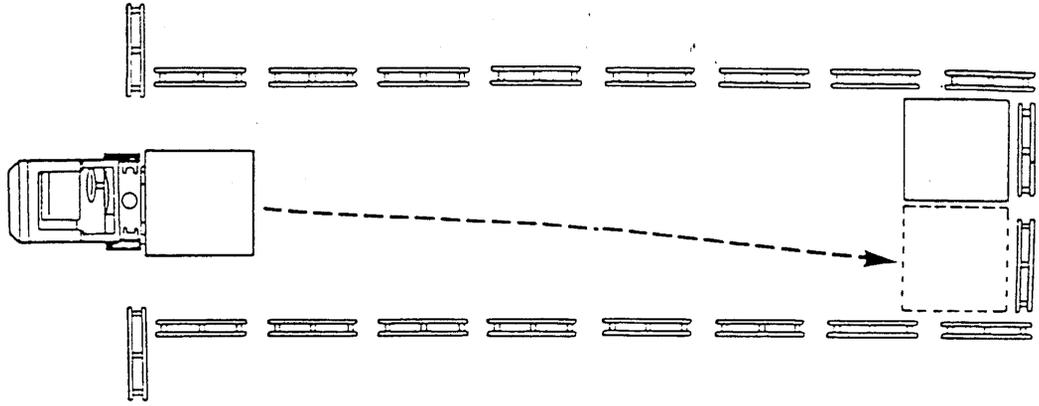


Exercise No. 4 – Storing (Max. 10 Points)

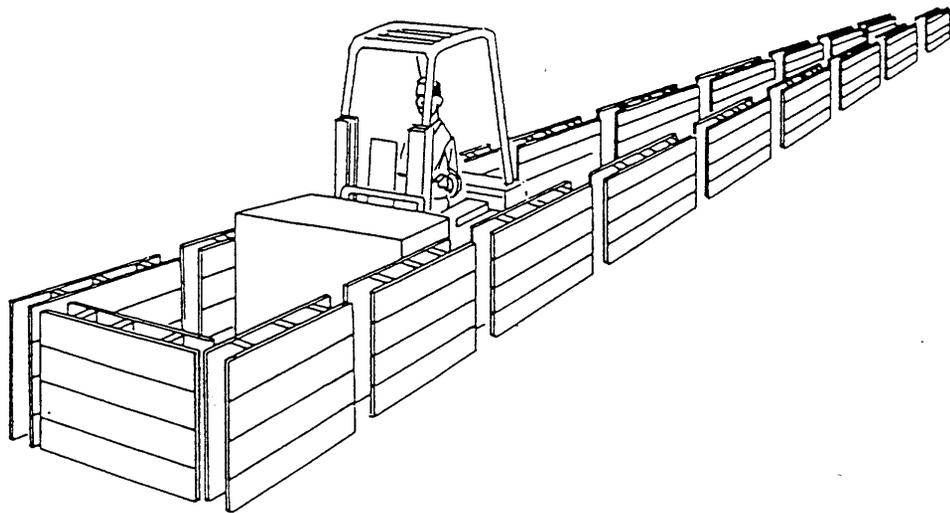
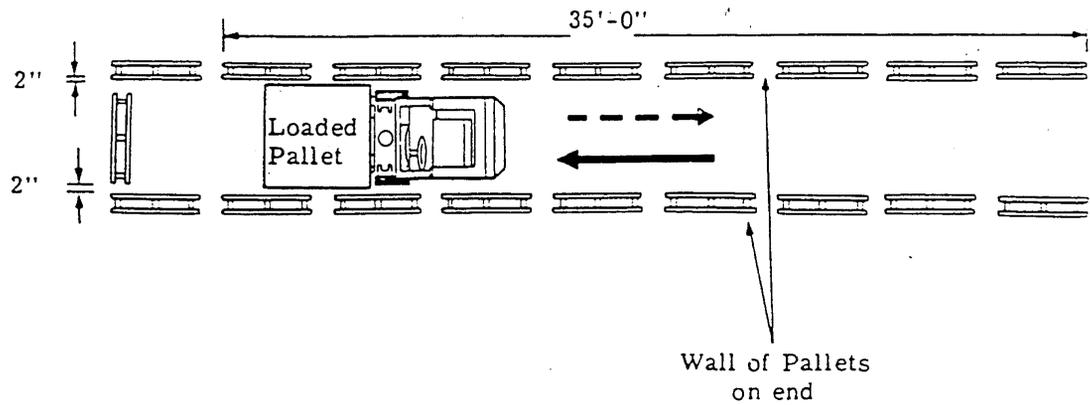
This test involves the placing of two pallets and two pallet boxes within a 4' x 16' rectangle. This area represents a storage area in a warehouse. All pallets are actually loaded. They are to be placed as close together as possible. The trainee is not permitted to back up to re-position a pallet. All pallets must be removed and returned to the storage area in the reverse order in which they were picked up.



Two pallets, each having a top-heavy, wirebound box, approximately 42" x 22" x 18", placed on end, are loaded into the simulated boxcar. Each trainee places two pallets into the boxcar as shown. After loading two pallets, each trainee practices unloading the same pallets. The trainee must be careful not to lose the load at any time.



Each man loads two pallets side by side in the simulated trailer until each trainee has had a turn loading. Then each trainee unloads two pallets in turn and returns them to the storage area.



With a loaded pallet on the forks, the trainee enters the end of the aisle and proceeds to the extreme end. The pallet is positioned at the end of the aisle. The driver backs up half of the length of the aisle, then re-approaches and picks up the pallet. He then backs out of the aisle and returns the pallet to the storage area.

POWERED INDUSTRIAL TRUCK QUIZ

Name: _____ Shift: _____ Date: _____
Clock Number: _____ Department: _____

TRUE OR FALSE *Please check the appropriate box.*

1. T F It is all right to park on an incline without wheel blocks or chocks.
2. T F The key should be removed when leaving the forklift truck.
3. T F The forks can be used to lift up another forklift truck.
4. T F It is all right to push another vehicle to start it.
5. T F If you stop your vehicle, you may back up immediately without looking.
6. T F It is dangerous to operate through an oil or water puddle.
7. T F The operator should inspect the truck at the beginning of each shift each day.
8. T F You may park or stack materials in front of fire doors or emergency equipment.
9. T F The operator of a lift truck is responsible for knowing the load capacity and weight of the vehicle.
10. T F The safe lifting capacity of our Hyster Model 56 E - is 4650 lbs at a 24" load center.
11. T F Freight car brakes should be set, wheels blocked, and warning signals given before entering the freight car.
12. T F It is necessary to report slippery conditions around your operating area.
13. T F You can refuel a gasoline powered lift truck while inside the building.
14. T F Steering wheel knobs may spin and break fingers.
15. T F It is dangerous to have sparks or flames near batteries.
16. T F You can lift as much weight with the ends of the forks as you can with the forks all the way under the load.

17. T F When backing out from under a load, the forks may be caught in the load if they are not level and clear of the load.
18. T F Safety shoes are recommended for fork truck operators.
19. T F Fork truck operators are responsible for the general cleanliness of their vehicles.
20. T F Pedestrians share the responsibility for keeping clear of your vehicle in fork truck working areas.
21. T F The Engine Oil Pressure Warning Red Light remains ON when the engine is running.
22. T F Powered industrial trucks should not be left alone with the motor running.
23. T F Operators should try to repair any mechanical trouble that develops.
24. T F You may have people sit on or add weight to the back of the lift in order to lift more weight.
25. T F The forks may be used to bump a loaded pallet into position.
26. T F Bent or damaged dock boards must never be used.
27. T F The operator must face the direction in which the vehicle is moving.
28. T F It is not recommended that you start, turn, or stop a truck suddenly.
29. T F When crossing railroad tracks, the steering wheel should be held firmly.
30. T F When employees are removing material from the pallet which is on your forks, the forks should be raised high enough to make lifting easier.
31. T F When a heavy load is being lifted from or onto your forks by a crane or hoist, it is important that the forks be lowered to the floor.
32. T F One other person may ride on your truck.

MULTIPLE CHOICE : *Please check the appropriate box.*

33. When overtaking a pedestrian from the rear, you should :
- A. Continue on as long as he or she is not in front of you.
 - B. Go around them.
 - C. Sound your horn and stay clear of them.

34. Railroad tracks should be crossed :
- A. On a slant
 - B. Straight ahead
 - C. By turning and backing across
35. When entering or leaving a building , you should :
- A. Slow down and blow your horn
 - B. Stop, sound your horn and proceed slowly
 - C. Stop, then drive in or out
36. When picking up or putting down a load, the mast should be :
- A. Tilted back
 - B. Vertical
 - C. Tilted forward
37. If mechanical trouble develops while working, the operator should :
- A. Report it to the supervisor
 - B. Fix it
 - C. Report it to maintenance
38. Forks on an empty parked truck must always be :
- A. Two inches from the floor
 - B. Flat on the floor
 - C. Four inches from the floor
39. Forks on a moving truck must always be :
- A. Two inches from the floor
 - B. Reasonably low to miss any floor obstructions
 - C. Ten inches from the floor
40. Forks on a loaded moving truck may be raised high:
- A. Only if necessary to pass an obstructed spot
 - B. Never
 - C. At any time
41. A person may ride the bare forks of a truck:
- A. Never
 - B. If absolutely necessary
 - C. If the operator approves
42. In case of an accident damaging the truck or property you should:
- A. Keep your mouth shut and get out of the area
 - B. Report it to your supervisor
 - C. Repair it yourself

Forklift Operators PIT Quiz Answer Key

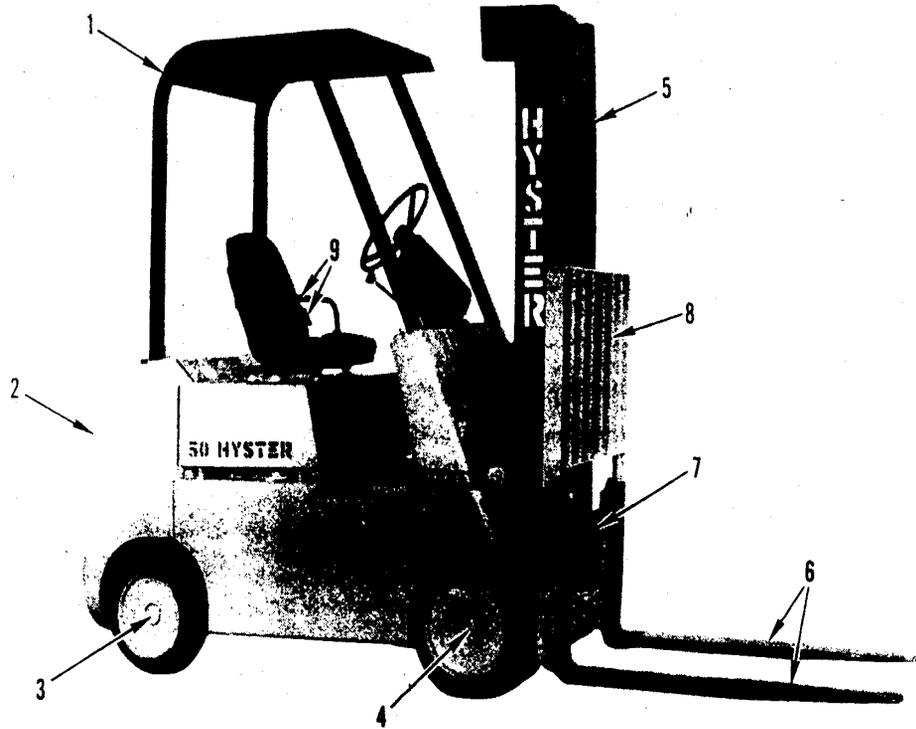
Page 11

TRUE or FALSE

- | | |
|--|-------|
| 1. F | 17. T |
| 2. T | 18. T |
| 3. F | 19. T |
| 4. F | 20. T |
| 5. F | 21. F |
| 6. T | 22. T |
| 7. T | 23. F |
| 8. F | 24. F |
| 9. T | 25. F |
| 10. (this question should be specific to your equipment) | 26. T |
| 11. T | 27. T |
| 12. T | 28. T |
| 13. F | 29. T |
| 14. T | 30. F |
| 15. T | 31. T |
| 16. F | 32. F |

Page 12-13 Multiple Choice

- | | |
|-------|-------|
| 33. C | 38. B |
| 34. A | 39. B |
| 35. B | 40. A |
| 36. B | 41. A |
| 37. A | 42. B |



Match the identifying numbers shown above to the correct corresponding name.

1. _____

A. Carrage

2. _____

B. Seat Belt & Hip Restraint Bracket

3. _____

C. Steering Axle

4. _____

D. Counterweight

5. _____

E. Load Backrest Extension

6. _____

F. Overhead Guard

7. _____

G. Upright

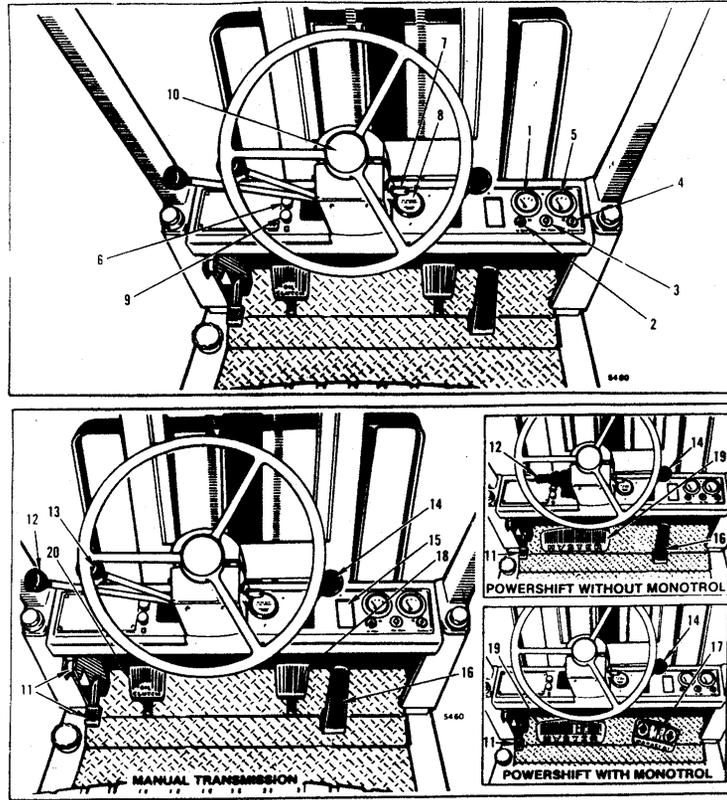
8. _____

H. Drive Axle

9. _____

I. Forks

40.



Match the identifying numbers shown above with the correct corresponding name.

- | | |
|-----------|--|
| 1. _____ | A. Horn |
| 2. _____ | B. Parking Brake / Pedal |
| 3. _____ | C. Coolant Temperature Gauge |
| 4. _____ | D. Warning Light for Engine Oil Pressure |
| 5. _____ | E. Cold Start Aid |
| 6. _____ | F. Fuel Gauge |
| 7. _____ | G. Warning Light for Oil Temperature for Powershift Trans. |
| 8. _____ | H. Warning Light for Alternator |
| 9. _____ | I. Key Switch |
| 10. _____ | J. Engine Stop Control |
| 11. _____ | K. Hour Meter |
| 12. _____ | L. Monitrol Pedal |
| 13. _____ | M. Range Lever (Manual Trans) |
| 14. _____ | N. Clutch Pedal (Manual Trans) |
| 15. _____ | O. Brake Pedal (Manual Trans) |
| 16. _____ | P. Auxiliary Control Lever |
| 17. _____ | Q. Directional Control Lever |
| 18. _____ | S. Inching / Brake Pedal (Powershift Trans) |
| 19. _____ | T. Accelerator Pedal |
| 20. _____ | R. Upright Control Lever |

FORKLIFT HANDS-ON TESTING

Name: _____ Shift: _____ Date: _____
Clock Number : _____ Department: _____

PART 1: PRE-OPERATIONAL CHECK

A. VISUAL CHECK

- _____ 1. Crankcase oil level
- _____ 2. Engine belts
- _____ 3. Plug Wires
- _____ 4. Brake fluid level
- _____ 5. Hydraulic fluid level
- _____ 6. Fuel tank level
- _____ 7. Tire/Wheel rim condition
- _____ 8. Head light / tail lights
- _____ 9. Turn Signals
- _____ 10. Warning Lights
- _____ 11. Hour Meter
- _____ 12. Other gauges
- _____ 13. Forks (for damage)
- _____ 14. Mast chains, hydraulic lines
- _____ 15. LPG tank clamps
- _____ 16. Safety belts, lines
- _____ 17. Fire extinguisher
- _____ 18. Overhead cage condition
- _____ 19. Safe operating capacity of forklift or attachments
- _____ 20. Over all condition of the body of the lift

B. OPERATIONAL CHECK

- _____ 1. Horn
- _____ 2. Back up light, alarm
- _____ 3. Steering
- _____ 4. Service brake
- _____ 5. Parking brake
- _____ 6. Monotrol pedal (forward / reverse)
- _____ 7. Transmission (forward / reverse)
- _____ 8. Seat Brake
- _____ 9. Seat Safety switch
- _____ 10. Hydraulic controls for sticking and proper marking
- _____ 11. Mast lift operation (up / down)
- _____ 12. Mast tilt operation
- _____ 13. Side shift / squeeze
- _____ 14. Hydraulic leaks
- _____ 15. Battery charge

PART 2: OPERATION

A. LOAD "A"

FORWARD / REVERSE OR RETURN

- _____ 1. Did not raise fork before moving vehicle
- _____ 2. Incorrect positioning for insertion
- _____ 3. Incorrect positioning for pickup of load
- _____ 4. Skidded load on insertion of fork or placement of load
- _____ 5. Did not raise load before moving vehicle
- _____ 6. Did not tilt load against backrest before moving vehicle
- _____ 7. Did not look in the direction of travel
- _____ 8. Did not look over both shoulders before backing
- _____ 9. Did not drive smoothly to destination
- _____ 10. Nudged one or more barriers or structures with vehicle or load
- _____ 11. Required excess maneuvering when entering aisle, placing load, or stacking
- _____ 12. Fork lowered (dragging) while vehicle in motion; or fork raised while vehicle in motion
- _____ 13. Used horn - before backing, at aisle crossing, at blind corners, to warn pedestrians
- _____ 14. Load not deposited smoothly or properly
- _____ 15. Did not use proper safety equipment: shoes, hard hat, etc.

B. LOAD "B"

FORWARD / REVERSE OR RETURN

- _____ 1. Incorrect positioning for insertion
- _____ 2. Incorrect positioning for pickup of load
- _____ 3. Skidded load on insertion of fork or placement of load
- _____ 4. Did not raise load before moving vehicle
- _____ 5. Did not tilt load against backrest before moving vehicle
- _____ 6. Did not look in the direction of travel
- _____ 7. Did not look over both shoulders before backing
- _____ 8. Did not operate smoothly to destination
- _____ 9. Nudged one or more barriers or structures with vehicle or load
- _____ 10. Required excess maneuvering when entering aisle, placing load, or stacking
- _____ 11. Fork lowered (dragging) while vehicle in motion; or fork raised while vehicle in motion
- _____ 12. Used horn - before backing, at aisle crossing, at blind corners, to warn pedestrians
- _____ 13. Load not deposited smoothly or properly
- _____ 14. Vehicle not properly secured before leaving seat

Comments:

Total Part 1 _____
Subtotal Part 2 _____
Total _____

Has the operator had eyes examined within the last six months? Yes ____ No ____

Test Administered By: _____

THREE STAGES IN DESIGNING TRAINING

Step 1: Planning

A. Content: What are you going to train?

B. Audience: Who are you going to train?

C. Resources: What do you need?

1. Time
2. Space
3. Money
4. Staff
5. Equipment/materials
6. Management support

D. Evaluation: What kind of feedback do you want from your audience?

Step 2: Conducting

Step 3: Evaluating

HOW ADULTS LEARN BEST

Attitude

- Adults like to know why something is important for them to learn; including the rationale for their attending the class, facts/statistics to indicate the severity of a problem, and/or examples of what can go wrong if the class topic is ignored.
- Provide a relaxed, comfortable atmosphere where adults can safely explore new ideas; encourage and reward their comments and questions; give immediate recognition of achievement. These contribute to a positive learning environment, which is a prerequisite for participants to have an open, receptive attitude.

Active Participation

- Adults bring a lot of work and life experience to the learning table, on which the trainer can draw for content knowledge and real-life examples.
- The more adults participate in the learning process, the more they will remember the content and apply it. Participation in the learning process may involve asking questions, being part of a discussion group, applying a theory to a practical situation, practicing a skill, describing a process, writing procedures or programs, evaluating products and solving problems.
- Adults need to hear it, see it and practice it for maximum retention of the content. If adults only hear something (lecture mode), they remember 20% of the content; if adults hear it and see it (lecture plus visuals), they remember 50% of the content; if adults hear it, see it, and practice (apply) it, they remember 80% of the content.
- If the topic/content is new to an audience, the trainer needs to provide a context for the content that is meaningful to the audience; that is, it is somehow linked to previous knowledge. Also, new content takes longer to learn and requires more examples and/or more practice.
- The average adult attention span for a lecture in a classroom is 20 minutes.

Repetition for new or difficult concepts

- If the content is new or complex, it needs to be repeated and/or practiced for learning to occur.
- Emphasize main points frequently, using a wide variety of examples.
- Be sure that new or complex material is understood by asking questions of the students or administering a test.
- Ask students to explain a concept in their own words and/or give their own examples. Ask them to explain why their responses are correct or incorrect.
- Even if the concepts are not new or difficult, introductions and summaries should be used to repeat important concepts.

Practical application

- If an idea has immediate usefulness to an adult, it is more likely to be adopted.
- Focus on “real-world” problems.
- Focus on how the learning can be applied.
- Relate the learning to the learners’ goals.
- Can the concepts you teach be applied immediately?
- Are there suggestions you can give to make them more easily applied?

Visuals

- Similar to children, most adults learn best from visuals (charts, diagrams, photos, drawings, flowcharts, props, pictures). Use them as often as possible.
- People learn at different rates and in different ways. About 85% of adults are visual learners. That is, they learn best when there is a visual image connected to the learning. There is a small percentage of auditory learners who learn best by hearing words or sounds. There is also a small percentage of kinesthetic learners who need to physically involve themselves in the learning task; that is, physical movement or patterning is essential to their understanding, involving their arms/hands, legs/feet, whole body or any single body part.

Variety

- Variety in the presentation helps maintain adults’ interest and attention. Variety stimulates the brain and keeps it engaged.
- Variety can be added by changing teaching methods, changing visual aids, changing instructors, changing lighting or location, or even the use of color. Instructors can vary their voice tone, body position (from standing still to walking around to sitting), gestures, facial expressions, and so forth.
- Having fun is a welcome addition, but not a necessity.

Examples

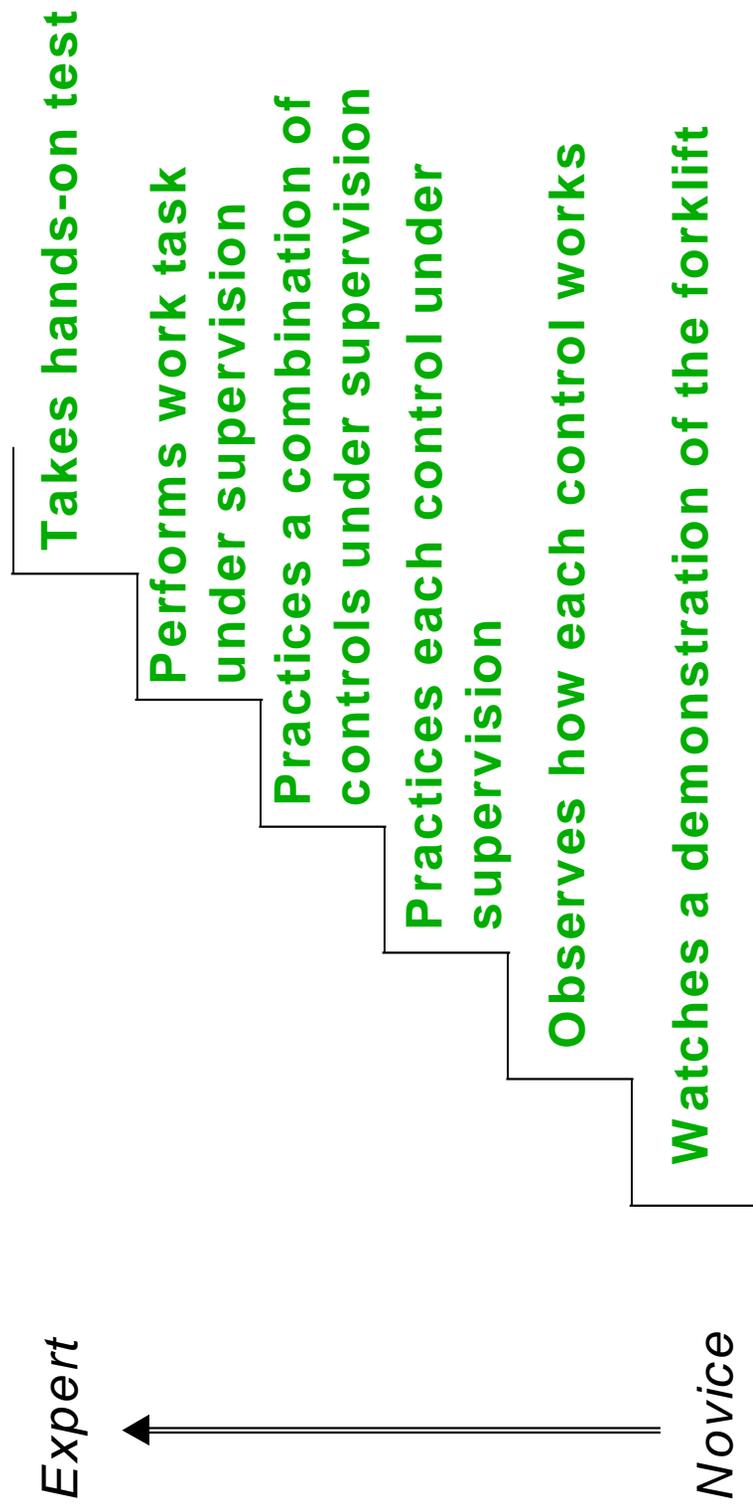
- Give sufficient and varied examples to explain the concept thoroughly.
- Both theory (big picture) and application (specifics) are usually needed for learning to occur. Adults need examples that drive the point home, along with the main point.
- If the trainer does not have examples, s/he might ask the audience for examples.
- Non-examples can also be given to show the limits/boundaries of the concept.
- Examples should be:
 - ⇒ realistic (not necessarily real)
 - ⇒ relevant
 - ⇒ current (if appropriate)
 - ⇒ sufficiently complex to engage the learner,
 - ⇒ thought-provoking

TEACHING TIPS FOR INSTRUCTORS

TECHNIQUES FOR ASKING BETTER QUESTIONS

1. Avoid a "pattern" of calling on students in turn.
2. Usually state the question before naming the student.
3. Draw out answers rather than tell them.
4. Avoid questions with "YES" or "NO" answers.
5. Word questions so clearly that students need not ask to have them rephrased.
6. Echo the answers to important questions but avoid the practice of confirming every answer.
7. Raise questions which reach beyond the textbook materials.
8. Use a different questioning approach from the one used in the preceding meeting of the same group.
9. Avoid questions so phrased that they give away the answers.
10. Precede each question by a situation thoroughly understood as the basis for the problem involved.
11. Allow questions to point up the important aspects of the lesson.
12. Plan the general outline of questions in advance.
13. Adapt questions clearly to the ability and experience of the pupil or pupils for whom intended.
14. Give confidence building questions to timid students.
15. Give students time to think before requiring answers.
16. Allow students time to answer without interruption.
17. Generally, commend students for good answers.
18. Make it possible for students to raise questions.
19. Make sure questions teach rather than test.

Steps in PIT Training



POWERED INDUSTRIAL TRUCKS REFRESHER/REMEDIAL TRAINING

A. Why refresher training is important:

1. to review important safety points
2. to periodically re-evaluate knowledge and/or skills
3. to impart new information
4. to get feedback
5. can be part of disciplinary process for safety rule violations or as result of unsatisfactory performance

B. Things to Consider/Decisions to Make

1. How often and/or under what circumstances will you conduct refresher training? (policy decision)
2. What will be the content and format of the training? (create another outline)
3. How often will the training be revised? (keep it current and interesting)
4. Be sure to document who has had the training (the paperwork)

C. What are the recommendations?

1. OSHA 29 CFR 1910.178 - does not address refresher training
2. ANSI B56.1 - 4.19.5(b): *Operators shall be retrained when new equipment is introduced, existing equipment is modified, operating conditions change, or an operator's performance is unsatisfactory.*
3. NIOSH Outline, p.5: *Some employers have a program of training, licensing, refresher training, and relicensing at regular intervals of two to three years. This is an excellent way to reinforce the learning process. In any case, employees with poor accident records or work practices should be required to take refresher courses. Also, when operators are assigned to trucks that are significantly different from the vehicles they are experienced on, they should be trained on the new trucks before assuming these new duties.*
4. OSHA proposed rule change: 1910.178(l)(4): *Evaluation and refresher or remedial training.*
 - (i) *Sufficient evaluation and remedial training shall be conducted so that the employee retains and uses the knowledge, skills and ability needed to operate the powered industrial truck safely.*
 - (ii) *An evaluation of the performance of each powered industrial truck operator shall be conducted at least annually by a designated person.*
 - (iii) *Refresher or remedial training shall be provided when there is reason to believe that there has been unsafe operation, when an accident or a near-miss occurs or when an evaluation indicates that the operator is not capable of performing the assigned duties.*

4. Continued

Appendix A-6. - suggested topics for refresher or remedial training

- (1) *Common unsafe situations encountered in the workplace;*
- (2) *Unsafe methods of operating 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.*

Details about the above subject areas need to be expanded upon so that the operator receives all the information which is necessary for the safe operation of the vehicle. Insight into some the specifics of the above subject areas may be obtained from the vehicle manufacturers' literature, the national consensus standards and this OSHA standard.

D. The Process *(see worksheet)*

1. Develop a policy for retraining. Specify the conditions under which retraining will be required, and/or how often it will occur. If you cannot develop this policy, give your recommendations for the policy to the appropriate people. Make sure that all operators, supervisors, and managers are aware of the policy. Include it as part of your initial training.
2. Create an outline for retraining. Consider what your goals and objectives are for the retraining. You can incorporate parts of the initial training. You can include sections on any of the following: updates, discussion of recent incidents, problems, feedback.
3. In view of your retraining policy and the content of the retraining, consider how often you will need to revise the retraining content and format to keep it fresh.
4. Establish procedures to document retraining.

REFRESHER TRAINING WORKSHEET

I. Policy Statement (your ideas or recommendations)

When or why will refresher training occur?

- A.
- B.
- C.
- D.

II. Refresher Training Outline

A. Goals and Objectives:

- 1.
- 2.
- 3.

B. Sections from the Initial Training to be included

- | | |
|----|----|
| 1. | 4. |
| 2. | 5. |
| 3. | 6. |

C. Unique information

- | | |
|----|----|
| 1. | 3. |
| 2. | 4. |

III. Administrative Details:

- A. Everyone concerned knows policy on refresher training policy. (operators, supervisors, and managers)
- B. Schedule for evaluating refresher training and for making revisions.

IV. Procedure to document refresher training.

FLAMMABLE LIQUIDS

XYZ Metal Industries has recently made the decision to paint the metal furniture it manufactures, instead of contracting out that part of the process. They have installed a state-of-the-art, enclosed automatic electrostatic spray-painting operation in a part of the plant that formerly housed the administrative offices. They found that they could use the same number of forklift operators and lift trucks as before by scheduling more effectively.

The operators pick up 55-gallon drums of the paint ingredients (solvents and other chemicals) from the storage area and deliver them to the pumping area located just outside the enclosed spray paint operation. These drums are palletized three or four to a pallet, unsecured. The lift truck operators unload the drums from the pallet at the pumping area, remove the lids from the drums, and load up the empty drums for the return trip to the storage area. The pumping area does not have a local exhaust system.

The lift trucks they use are type ES units (electrically powered units that, in addition to all of the requirements for the E units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be considered suitable.) The plant manager thought that these would be suitable since the spray operation is completely automated and enclosed.

LOADING DOCK OPERATION

The work area consists of an outside four bay loading dock area located on the west side of Building #1. This loading dock area is accessed from the building through a garage door. This door is located between the middle two loading bays.

The dock is not protected from the weather. There are no mechanical dock plates and only two approved portable dock plates. If there are more than two trucks at the dock, steel plates are used to bridge the gap. There are no dock lights and the head lights on the lift trucks usually don't work.

The dock is only 15 ft. wide from the building to the edge of the dock. It is also occasionally used for storage when the usual storage is full. There are steps on one end of the dock that are used as a shortcut for employees from Building #1 to Building #2. They (the employees) say it takes too long to walk in the marked passageways. Truck drivers also like to hang around the dock area and talk to the dock workers.

The truck trailers that are loaded and unloaded are not the company's vehicles so supervisors feel there is no need to inspect the flooring. They also feel it is the truck driver's responsibility to chock the wheels of the trailer.

REFUELING & RECHARGING

Your plant has three types of powered industrial trucks. They include gasoline, LP (propane), and electric. Your refueling and recharging operations are the following:

1. The plant has an outside gasoline pump located near the loading dock where lift trucks and highway vehicles are refueled. On occasion, lift trucks inside the plant run out of gas and need to be refueled.
2. The LP gas is stored in an unprotected area outside the plant and in two locations inside the plant. One storage location of the tanks is located against the spray booth wall and the other is in the corner by the rear emergency exit. The operators are responsible for exchanging the tank on their truck when it is empty.
3. The electric batteries for lift trucks are charged, serviced and handled in one battery charging area. This area is located in the Maintenance Shop between the welding booths and the grinding equipment.

WAREHOUSE

Mayfield's Department Stores are located in a major metropolitan area in Ohio. Mayfield's has been in business since 1910, and the warehouse where big-ticket items like appliances, electronic equipment, furniture, and carpets are stored is almost that old. Most of these items are stacked in large boxes. Recently, new electric counterbalanced rider trucks and stand-up rider trucks were purchased after it was found that the LP-fueled trucks were causing too much pollution during the winter months when the warehouse doors were shut most of the time.

There are twelve full-time permanent lift truck operators. During the busy season (right before the holidays), extra operators are hired as temporaries. these people must be experienced operators as there is just not time to train them fully, nor would it be economical due to their six-week employment, according to the warehouse manager.

Because the warehouse is old, working conditions are not the most up-to-date. The warehouse is three stories tall, with wood floors. Appliances are stored on the first floor only, where high stacking is permissible. The ceilings are low enough that the operators have to watch for the sprinkler system and other pipes when that are stacking the boxes. The electronic equipment, furniture, and carpets are on the upper two floors. Freight elevators are used to travel from floor to floor. Operators have complained about the inadequate lighting and also about the flow of workers from the adjacent office area through the warehouse to the lunchroom on the other side.

Within the last two years, two collisions have occurred between lift trucks and pedestrians, resulting in a foot injury and a broken hip. There have been thirty-six property damage accidents, thirty-five involving product and one involving the structure of the building. In addition, one of the temporary operators injured his hand while operating a lift truck.

Articles, Resources, and Bibliography

ARTICLES

The following articles are included with the permission of the publishers. Each article has its original page numbers.

Gene F. Schwind, "Total Operator Training = Equipment + Environment", Material Handling Engineering, October 1994, pp. 41-44.

"Avoiding Rollover/Tipover", Material Handling Engineering, June 1997, pp. 71-75.

George Swartz, "Forklift Safety Training", Professional Safety, January 1993, pp. 16-21.

George Swartz, "The Industrial Pedestrian: DANGER Is Just Around the Corner", Professional Safety, March 1999, pp. 33-36.

BIBLIOGRAPHY

All of the materials in the bibliography are available from the Division of Safety & Hygiene Library, 614/466-7388.

TOTAL OPERATOR TRAINING = EQUIPMENT + ENVIRONMENT

Lift truck operator training is more than learning the functions and controls. Concern for people, products, equipment and environment protects both employee and employer.

by Gene F. Schwind, executive editor

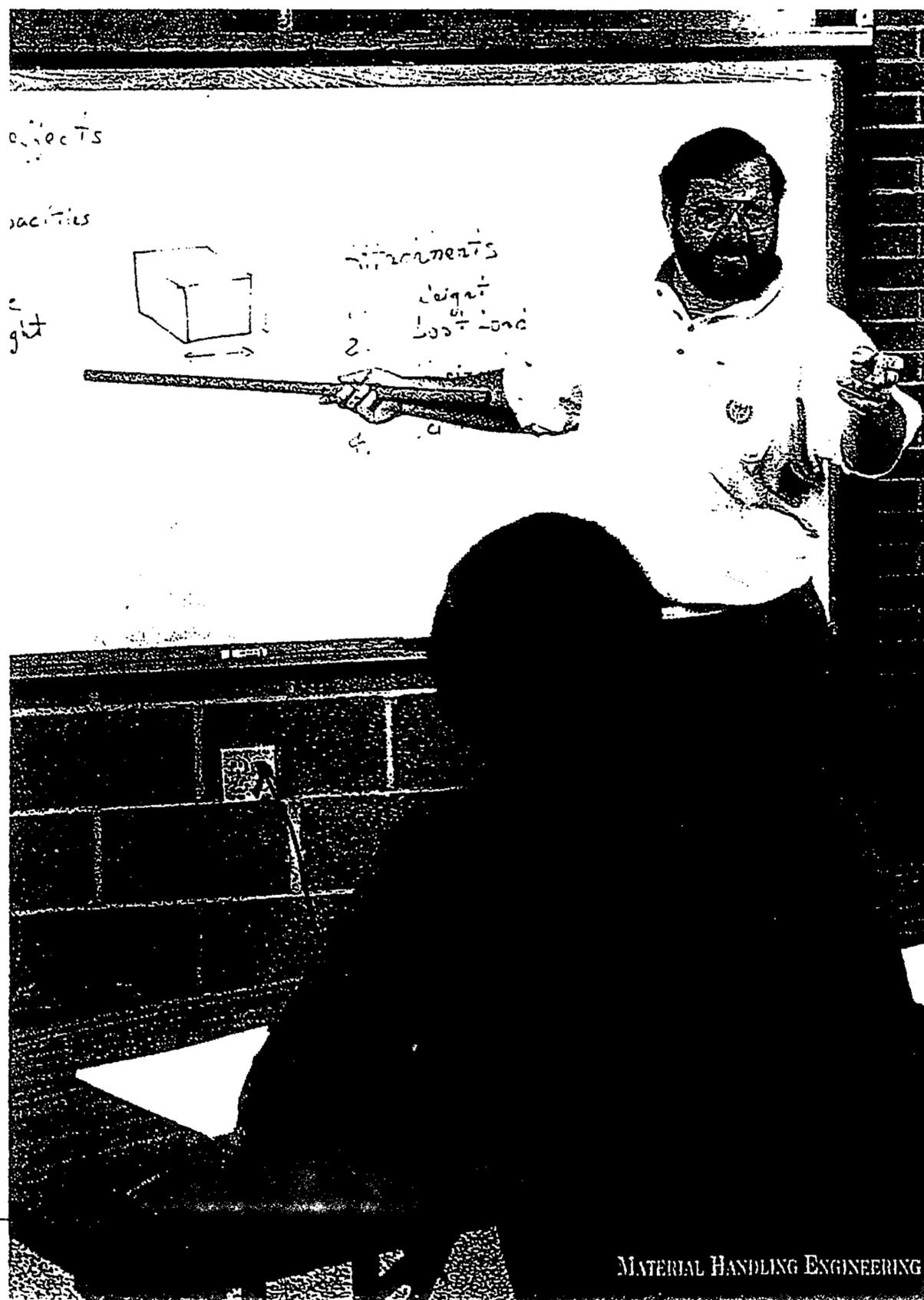
Anytime lift truck operator training takes place in an area that excludes the truck operating environment, you can bet that the operator is only half-trained. Changes in the OSHA operator training regulations coming in December will confirm this as they spell out training for the operating environment as well as for the equipment. (See page 47, OSHA Update: Lift Truck Operator Training.)

Perhaps you have no way of knowing if your training procedures are adequate or effective. Certainly your equipment and load damage should give you a clue.

Talking to providers of standard and custom training packages will give you some idea of what is available in training programs. Then you must pick one that covers all the key areas of training and evaluates the results.

Whether it is table saws, punch presses or lift trucks, operating the equipment is only a small part of the equation. The real thrust of training is teaching employees to work safely under day-to-day operating conditions. If this is accomplished, all of the benefits attributable to good training will follow naturally.

Four effects of a lift truck attachment on lift truck capacity are reinforced with the students. Here instructor Jim Shephard points out that attachment weight, lost load center, horizontal center of gravity and vertical center of gravity will alter operating safety.



A New Training Program To Protect You And Your Operators

The biggest difference between generic lift truck operator training programs and custom programs is that custom programs deal directly with your facility and how you operate. Programs that emphasize only vehicle operation plus general safety pointers will never detect or correct your improper operation.

Today, most customized training programs require that a program provider visit your site to observe how you operate. The designer then creates a tailored program suited to your operators and operations. Large, multi-site companies, with plant-wide diversity, usually approach training this way.

But now, even if yours is a small company, you can have a customized training program that not only satisfies OSHA regulations but also specifically addresses your company's safety aims and objectives. It will also reinforce your personnel policies relating to the workplace.

Shephard's Industrial Training Systems of Memphis offers such a program. It is a new, simpler approach to custom training.

Called Custom (Cooperative User-Specific Tailored Operating Methods), it is a way for smaller plants and warehouses to assist in developing their own programs that satisfy all areas of regulation and accountability.

The primary emphasis of the Custom program is safety as it relates to both a specific type of lift truck and the operating environment. The user gets a program that results in site-specific training texts, a trained trainer and tested, authorized and tracked lift truck operators.

Shephard's years of experience and core curriculum background development, plus their experience in safety and health surveys in hundreds of facilities, is incorporated into each training program without a site visit and at significant cost savings.

The steps you take to create such a program include:

- Completing an extensive survey;
- Taking rolls of 35mm slides or videotaping your site;
- Defining the equipment/operations that need training;
- Committing supervisors to training participation;
- Finding trainers among your employees;
- Designating a training place within your plant.

The survey will get company management, supervisors, safety and maintenance departments and other operations involved from the beginning and identify various goals.

Completing the survey form and taking

a gate-to-gate video or camera tour produce a candid view of your operation. Videos and slides you provide are incorporated in the multi-media training package used to instruct the trainer(s) and operators you select.

Defining equipment makes you recognize the exact types of lift trucks and attachments the program should address. You soon realize how many different varieties of equipment there are at your site.

Committing supervisors as well as employees to a training program gets everyone signed on to safety. Every person in the plant must know about safe practices, rules and regulations, and support enforcement. Everyone then understands how the operation of mobile equipment affects safety.

Designating trainers from among the employee ranks creates program continuity and provides other pairs of safety-critical eyes on the plant or warehouse floor. Trainers become leaders and often help improve employee morale.

The steps taken with your information, to create a Custom program, include:

- A review and critique of your plant as captured by the camera;
- Incorporation of the critique into the training program;
- A training manual dedicated to the operation of the equipment involved;

These benefits include:

- Lower risk to employees;
- Less damage to equipment;
- Less product damage;
- Lower truck maintenance costs;
- Increased safety awareness;
- Protection for your company.

I reviewed some packaged and custom training programs. The packaged ones were largely concerned with the operation and the dynamics of the lift trucks in lifting, transporting, stacking and storing loads.

The packaged programs — if presented in the operating environment by safety or supervisory personnel who recognized the hazards and point them out to the operator — could be effective. If just the operating manual, videos and texts are used, the training falls short of what is needed. Program instruction results such as auditing and testing should

also be developed to produce the necessary record trail.

There are a few custom programs written by individual companies for their own

If, as the result of an accident, you and your operator wind up in court, your training records should be able to show that the operator knew better.
— Shephard.

operations. They cover specific situations well, but their effectiveness cannot be judged unless the user's facility is also reviewed. It is unlikely that a program writ-

ten for one plant would apply completely to another plant — even within the same company. Some company-developed programs fail by trying to make one program universal.

A facility-by-facility customized training program seems to offer the most benefits as well as protection for the employer and employee. "If, as the result of an accident you and your operator wind up in court, your training records should be able to show that the operator knew better," says Jim Shephard of Shephard's Industrial Training Systems of Bartlett, Tennessee.

But be aware that if you develop and train from within, you may be perpetuating and endorsing poor practices. Outside safety audits are worth the time and money. They can pick up overlooked safety problems.

According to Shephard, "We have con-

- Training and certifying an in-plant trainer;
- Trainer instruction in teaching, testing, and authorizing operators by facility;
- Data-base-maintenance containing proof-of-training records;
- Trainer evaluation and conferred college credits.

Other multi-plant training programs are much more complex and involve a wide range of equipment from maintenance lifts to lift trucks, loaders and dozers. This program was developed to simplify the survey and review process so that small companies can afford a customized program that fully covers OSHA requirements for lift truck operator training and authorization.

A significant program benefit is the fact that an operator is not authorized unless he/she has passed the written test. This test verifies that each operator understands all regulations and procedures trained.

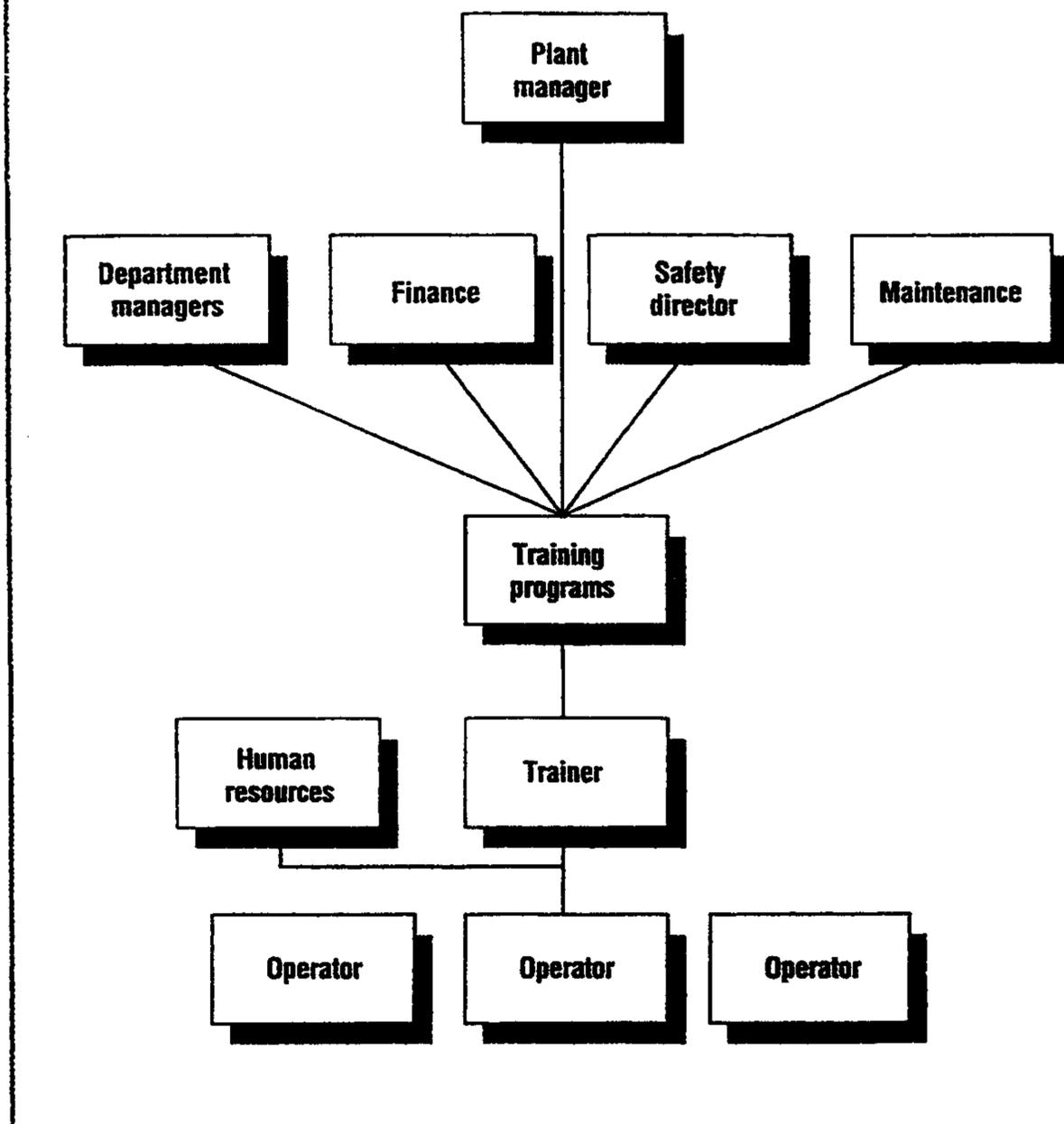
The operator is also evaluated by the trainer for hands-on performance in the work environment. This advantage is a significant benefit because it is specific to each individual operator. In the event of an accident, this thoroughness helps defend the company and its management against litigation.

ducted many generic training courses. Some in conjunction with Memphis State Technical College. On successful completion we can award a certificate that says the operator has successfully completed hands-on training on the equipment and has passed the safety knowledge tests. We do not authorize an operator to work anywhere in particular because we have no idea what his working environment will be like. When an operator is trained in a working facility, the operator's authorization is only for that facility in which he/she was trained and graded."

Some facilities are so large or so dangerous that an operator may be authorized to operate in only one or two departments.

A number of training programs offer authorization cards with make, model and capacity of the equipment on the back. The cards may also list restrictions.

Plant Involvement in Operator Training



The kickoff Custom training program is offered for sit-down internal combustion engine or battery-powered lift trucks and a choice of attachments. It includes a facility safety review as depicted in the film you take. It includes an customized

trainer training program and a customized operator training program. For more information from Shephard's Industrial Training Systems, Inc., circle 560 on the reader service card.

Glasses required, tunnel vision, poor depth perception, color blindness are some listed conditions, if not restrictions. These are found in lift truck operators in about the same proportion as the general population.

Guidelines for complete training

When you decide to opt for a training program, these are some of the key areas to cover.

Select a program that:

- Reflects the conditions where the truck will be used;
- Stresses lift truck dynamics;
- Emphasizes driver responsibility;
- Tests the operator after the training is completed;
- Tracks trainer effectiveness;
- Provides for site-by-site authorization;
- Offers a follow-up service.

Litigation: a potential problem

That's why proof of training is important. OSHA insists on accurate accident and injury records. Training and performance records can save you some headaches, too.

In the event of a lawsuit, you may be able to prove that the operator was trained and tests show he/she knew better. One lawsuit avoided can pay for the most expensive training program.

Accidents are preventable

With almost 70 percent of any good program dedicated to safety, you'll find that safety consciousness is the largest benefit of a good operator training program.

Videos can help. They can show, as in no other way, how accidents can happen and what went wrong. But videos by nature must be generic. They can explore,

A trainer demonstrates a common danger in stand-up truck operation. Operators often allow their left foot or leg outside of the confines of the operator's compartment. The result is that a leg could be crushed if the truck chassis comes too close to a rack or building column or other object.



Each operator is different

Some drivers are set in their ways. Special consideration must be taken in changing their thinking to a new training program.

Other operators have a greater tendency to "hot dog," operate foolishly or race vehicles. Company policies, reporting and rules enforcement can curb such conduct.

The trainer's attitude makes a difference

Trainers must be selected because they are serious, interested, and have the respect of their peers. Classroom training for such trainers must include conduct because if they are not dead serious, they can never get trainees to be serious about safety.

Truck type makes a difference

If an operator simply changes the battery, it requires one kind of training. If the battery is put on charge and the water is topped up after

charging, additional training is needed. There is a whole set of problems, precautions and hazards associated with motive power batteries that are not found with any other vehicles.

Safe refueling of gasoline, LP-gas and diesel trucks must be part of training. Each fuel has different properties and hazards associated with spills and leaks. The operator is usually the one on the scene when the spill occurs.

Training must teach operators to recognize and question unsafe conditions. Recognizing that exhaust fumes can cause drowsiness, for example. The fact that the truck or the operating environment has a problem will fall to the operator. The operator must report a hazardous condition and make certain it is corrected.

Training helps communication

One of the first benefits management gets is better communication. Employees will feel that management cares about their safety because they are being trained. With empowerment, employees feel that their opinion counts and operators will feed back information to management. Mutual concern can develop from this new shared responsibility. **MHE**

How not to change a battery. Besides the imbalance of the battery suspended from one hoist hook, the trainer is demonstrating the danger of using his foot to put the battery into the truck's

battery compartment. A proper battery spreader beam should be used to keep the battery under control at all times.

explain or amplify, but videos seldom cover exactly the lift truck in question and never the exact operating conditions found in your plant. Taking a test on the content of a video will only show if the operator got the point of the video.

Training as an opportunity

Operator training is a chance to teach and reinforce many lessons. A custom program is also a chance to reinforce your company policies on safety. You can empower employees to refuse to work under unsafe conditions.

You also get a chance to restate some personnel policies that are in the employee policy manual but may have been forgotten. Such subjects as horseplay, us-

ing equipment inappropriately, drinking on the job, work shoes, hard hats, operating in restricted areas, etc., can all be restated and even be made part of the final test.

Maintenance is key

Maintenance records can tell you a lot about your operators before and after training. Records can reveal the untrained or careless operators through things like frequency of breakdowns, brakes and tire wear. "After training, your short-term maintenance costs will go up," says Shephard. "This is because trained operators will spot deficiencies in their trucks and work environment and know that for their own safety these deficiencies should be corrected."

New study
from the University of Utah
stresses the need
for lift truck operator
training and seat belts.

Avoiding Rollover/Tipover

Table 1
Fatal Work-Related Injuries
Investigated by OSHA 1984-89
Involving Lift Truck Tipover or Rollover

	On same level	On ramp, incline or ditch	Total
Agriculture/Forestry/Fishing	0	2	2
Construction	5	8	13
Manufacturing	18	23	41
Mining/Oil & Gas	1	0	1
Services	2	2	4
Wholesale & Retail Trade	14	5	19
Transport/Utilities	4	6	10
Other	2	1	3
Total	46	47	93

The leading category of fatal injury involving lift truck accidents is tipover or rollover, according to the National Institute for Occupational Safety and Health (NIOSH) (22% of deaths) and the Bureau of Labor Statistics Census of Fatal Occupational Injuries (24% of deaths) (see references).

Our research group at the University of Utah chose investigation data from the Occupational Safety and Health Administration (OSHA) to study the need for training and the various mechanisms related to lift truck tipover and rollover. Thanks to the efforts of OSHA's Management Information Systems staff, a printout of all fatalities investigated by OSHA for 1984-89 that had been entered into the federal OSHA database was obtained, coded and analyzed. A limitation of using OSHA data, compared to other sources such as data used by the BLS or by NIOSH, is that three states (CA, MI, WA) were not in the database for 1984-89. In addition, the data contain fewer reports of deaths than the other sources, since OSHA does not learn of all work-related deaths and does not have jurisdiction over all deaths. Nevertheless, since in-

juries involving lift trucks are usually under OSHA jurisdiction, we anticipated that OSHA would investigate the majority of such fatal injuries.

These OSHA reports provide valuable information on some factors related to fatal lift truck tipover or rollover. We must stress that this study was done using summaries of OSHA investigations, typically a few sentences to a paragraph in length, that are entered into the federal database, rather than by reading the entire investigation file for each case, which is not available in electronic form. OSHA compliance officers tend to include in the summary report items pertinent to OSHA standards, and so may not mention factors such as seniority, type of worker training or human factors such as fatigue from overtime.

Investigation findings

For the six-year period there were 93 fatalities involving lift trucks that rolled or tipped over, or 27% of all lift-truck-related deaths investigated by OSHA. Industries in which the fatalities occurred and location of the tipover or rollover are shown in Table 1. There were 46 deaths where the tipover or

**Table 2 Fatal Work-Related Injuries Involving Lift Trucks Investigated by OSHA 1984-89
Characteristics of Victims of Tipover/Rollover Incidents**

	Nr.	Mean Age	Covered by Collective Bargaining Agreements	Employer cited under OSHA 1910.178	Employer cited under OSHA 1910.178 (1)
Victims of tipover or rollover incidents	93	31.7* yrs.	21.5%	51%	34%*
All other victims	254	40.1* yrs.	32%	45%	22%*
All victims	347	37.9 yrs.	29%	46%	25%

* = $p < .05$

**Table 3 Fatal Work-Related Injuries Involving Lift Trucks Investigated by OSHA 1984-89
Mechanism of Physical Injury from Tipover or Rollover**

Operator's head "slapped" against floor (not struck by lift truck)	3 deaths
Mast or overhead protection structure struck victim	48 deaths
Part of lift truck other than mast or OPS struck victim	12 deaths
No mention of what struck victim	30 deaths
Total	93

rollover occurred on a level surface, and 47 on ramps or other inclined surfaces. Almost all (97%) the victims were lift truck operators. Injuries resulting from falls of lift trucks from loading docks were considered to be a different type of incident than tipover and rollover and were not included in either category.

Employers were cited by OSHA for one or more violations of the 1910.178 standard in 47 (51%) deaths. Victims of tipover or rollover incidents differed from victims of other types of fatal lift-truck-related injuries in that they were younger and more likely to be at a non-union site. Also, their employers were significantly more likely to be cited by OSHA for violation of the 1910.178 (1) lift truck operator training requirement (Table 2). We suspect that the rather low overall rate for citing the 1910.178 (1) training requirement (25%) is due to its vagueness and lack of requiring a written record of compliance.

The mechanism of physical injury to the victim of the tipping or rolling lift truck was mentioned in most of the OSHA reports and is shown in Table 3. There were three deaths in which the operator's head struck

the floor surface with sufficient force to cause severe head injury. There were 48 incidents in which the victim was crushed by the mast or overhead protective structure, 12 in which another portion of the lift truck struck the victim, and 30 incidents in which the physical cause of injury was not specified in the report summary.

Other factors (Table 4) causing or contributing to the fatal incidents were speeding (13 deaths), traveling with the load elevated (9 deaths), and unauthorized operation (4 deaths). Because these factors were not noted in every OSHA report summary, they should be viewed as a minimum number.

Status of training

There is currently no requirement in the U.S. for licensing, certification or medical clearance of lift truck operators. There is a general requirement for training in the U.S. Occupational Safety and Health Administration (OSHA) standard CFR 1910.178 (1): "Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks."

In response to a petition from the Industrial Truck Association, OSHA has proposed more specific training requirements for lift truck operators, but the final rule has not been issued as this article goes to press. This proposal mentioned that when a lift truck tips over and the operator attempts to jump clear, he/she may be struck by the overhead guard of the tipping vehicle. OSHA noted, "Consequently, the operator of a rider truck should be trained to stay with the vehicle during a later tipover." (See Department of Labor references.) There was no mention of seat belts or other mechanisms for restraining the oper-

**Table 4 Fatal Work-Related Injuries Involving Lift Trucks Investigated by OSHA 1984-89
Other Factors Mentioned in Some Incidents**

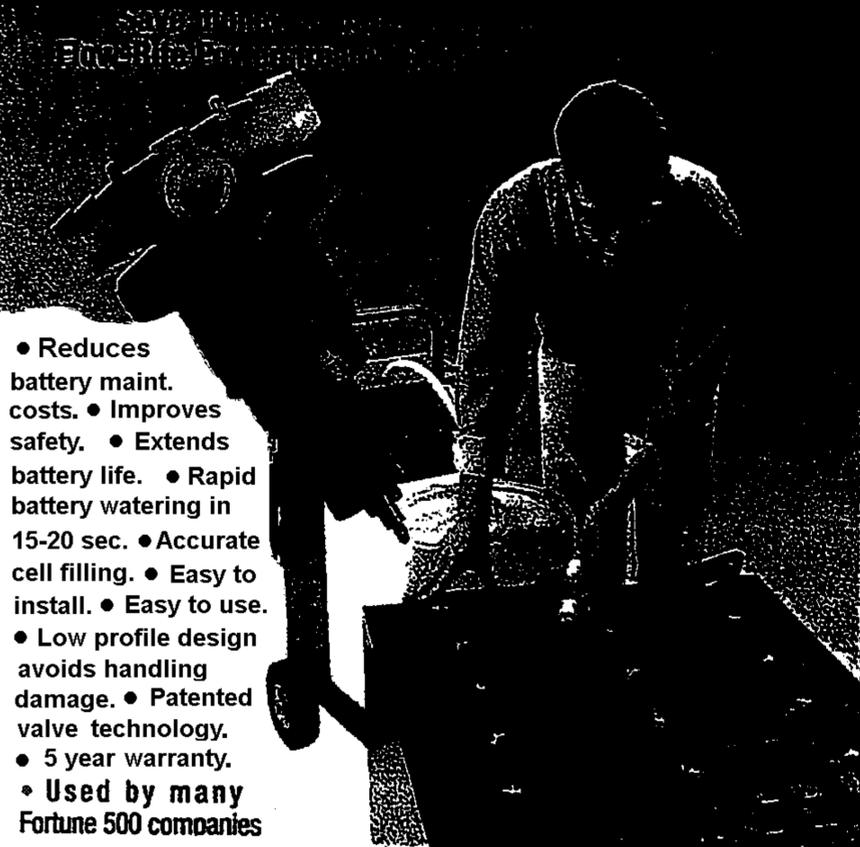
Speeding	13
Traveling with load elevated	9
Unauthorized operator	4

ator in the cab area of rider trucks in case of tipover or rollover. The recommendation to stay with the vehicle is similar to the recommendation in the American Society of Mechanical Engineers (ASME *Safety Standard for Low Lift and High Lift Trucks*: "The operator should stay with the truck if lateral or longitudinal tipover occurs." The ASME standard also notes, "An active operator protection device or system, when provided, shall be used. Operator protection in the event of tipover is intended to reduce the risk of entrapment of the head and torso between the truck and ground ..." but does not specifically mention seat belts.

There is no requirement for providing sit-down lift trucks with seat belts. We find OSHA's comment about training the operator to remain with the lift truck when it tips instead of jumping out to be questionable as to whether anyone could do so without hands-on practice, which is neither safe nor practical. Some passive means for restraining the operator of a sit-down lift truck within the cab could be desirable. Nine of the OSHA reports mentioned whether the lift truck was equipped with seat belts; in four incidents it was and they were not worn. At least one nationally used training video on lift truck operation fails to show any truck equipped with seat belts.

Requiring licensing or certification of lift truck operators could be a means for assuring that training has been given and could provide a record of such training. Whether operators of lift trucks should be required to meet the same medical requirements as commercial truck drivers is unknown: OSHA report summaries contain no medical information concerning the operator involved in fatal accidents. It seems reasonable that medical conditions such as untreated epilepsy, poorly controlled diabetes and

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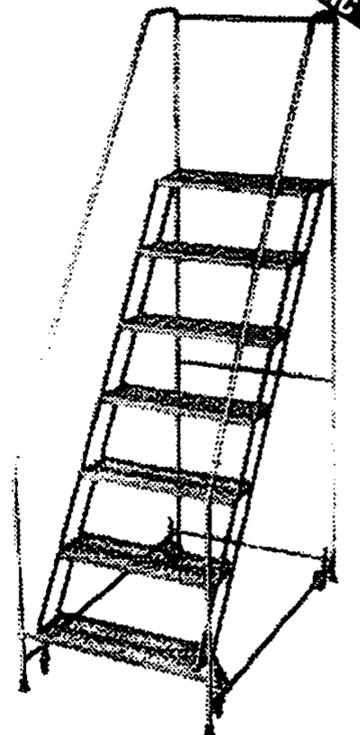
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other conditions affecting alertness would affect the performance of lift truck operators. Adequate vision and hearing should be necessary for operation of lift trucks and other industrial trucks. These and other issues might be the subject of future research. Additional funding for OSHA to include information concerning human factors and medical conditions in these investigation reports would make such research feasible.

The study team acknowledges the assistance of Bruce Beveridge, Joseph Dubois, Sanford Hamilton and Thomas Tyburski of the U.S. Occupational Safety & Health Administration in providing reports and answering queries.

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The Research Team

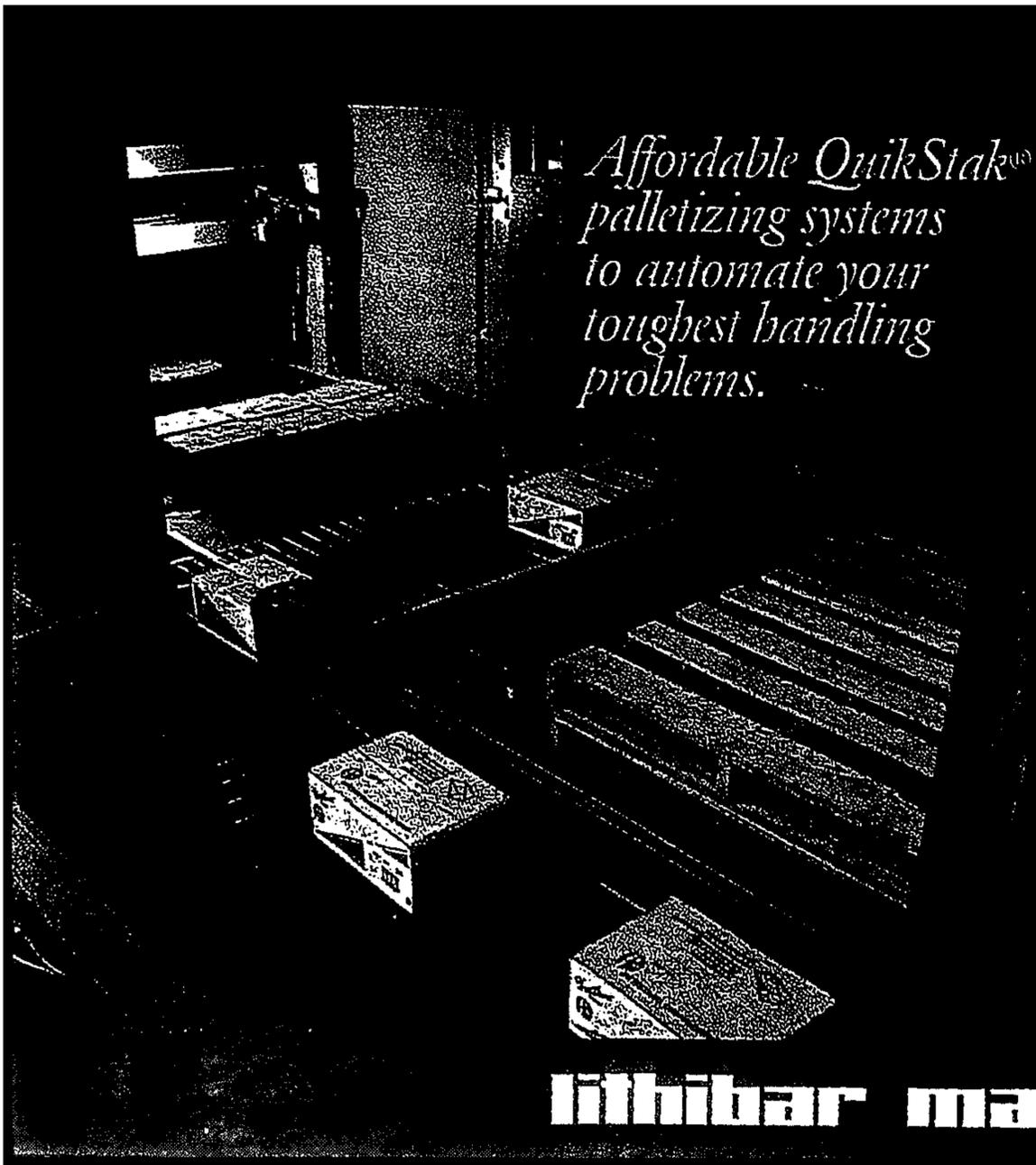
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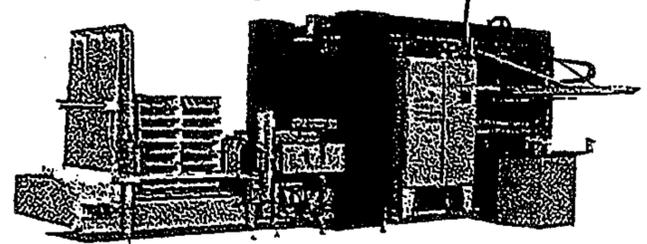
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Forklift Safety Training

*Tips for Improving
Your Program*

By GEORGE SWARTZ





Since the inception of the Occupational Safety and Health Act some 21 years ago, industry has relied on its own interpretation of the powered industrial truck/forklift training requirements spelled out in 1910.178. The standard reminds employers: "Operator training—only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks."

The what, when and how of industrial truck training is left to industry to determine. Some organizations provide no training to operators. Others may require operators to read lift truck safety rules and, perhaps, view a film. Only a small percentage of companies, however, require regular classroom sessions, testing of overall forklift knowledge and safety rules, driver skill evaluations and operator certification. This type of in-depth training not only exceeds current OSHA requirements, but will likely be in compliance with new training mandates being considered.

BOTTOM-LINE EFFECTS

No doubt, forklift training is essential throughout industry. The Industrial Truck Assn.'s 1989 position paper on training standards stated, "The [OSHA] regulation has been in force since 1970 with little, if any, observable effect to lift truck accident rates." Everyone who operates any powered equipment should be thoroughly trained.

Each year, it is estimated that more than 37,000 forklift-related injuries occur in the U.S. In addition, industry claims its share of workplace fatalities associated with forklift operations. As a result, millions of dollars are spent on medical bills, lost wages, rehabilitation costs and attorney fees. This figure does not include the cost of suffering experienced by injured employees and their families. It makes sense for OSHA to require more specific training.

Behind accident statistics and related direct costs are indirect and hidden costs. For each related injury, numerous incidents involving damage to racking, overhead sprinklers, pipes, walls, machinery, and various other equipment and property also occur. In addition, millions of dollars are lost in damaged and destroyed product or missed shipments.

Organizations often fail to include all of these costs because they accrue individually, not collectively. While easy to focus on a major loss, the familiar, almost invisible low-cost incidents sometimes fail to arouse concern. To prevent these losses and preserve company

Testing forklift operator knowledge and driving skills is essential to minimizing lift truck incidents and accidents.

assets, an organization must invest the time and expense to properly train its forklift operators.

AN OBVIOUS NEED

States require automobile operators to pass written and oral examinations and demonstrate highway driving skills. This license then must be renewed periodically. Unfortunately, this requirement for testing and validation of knowledge and driving skills is missing in many workplaces where powered industrial trucks are used.

Consider these key operating points: the typical forklift steers with its rear wheels, the opposite method of an automobile. This steering permits tighter maneuvering—and requires greater judgment and operating skills, as well as recognition of the ever-present danger to pedestrians. A lift truck can weigh two to three times more than an automobile; when fully loaded, the lift truck weighs hundreds or even thousands of pounds more. Couple this with rear wheel steering, loads being elevated, tight aisles, unstable loads, etc., and the need for operator training becomes more obvious.

It is not unusual to read an article in a local newspaper identifying a resident as a victim of a forklift accident. Common accidents involve individuals being struck by lift trucks, falls from a height while standing on a pallet, or falls from elevated forks. Many are injured while falling from a dock while operating the lift truck. The lift truck may drive off the dock or fall between the dock and an unchocked trailer, resulting in equipment damage, serious injury or death.

Empty or unmanned lift trucks can also cause harm. Employees trip over slightly elevated forks or walk into raised forks, striking knees, legs and, sometimes, faces. Many of these injuries and fatalities can be traced directly to insufficient or inadequate training and lack of safety rule enforcement.

QUALITY TRAINING: BEYOND OSHA

Many safety professionals feel that current OSHA lift truck training requirements do not go far enough. OSHA does identify many safe lift truck practices and operator requirements that training programs should follow. These training requirements are highly sub-

jective, however, and can be ineffective in providing quality training. Quality training: 1) involves operators of all powered equipment; 2) meets or exceeds OSHA's lift truck guidelines; 3) meets equipment manufacturers' recommendations and requirements; and 4) prevents incidents and accidents.

Lift truck training programs should not be pursued merely to satisfy OSHA requirements. As mentioned, serious monetary factors, which definitely impact an organization's bottom line, must be considered. Rising workers' compensation costs continue to be a major issue within industry. In addition, every organization has a moral obligation to protect the well-being of its people.

Many lift truck manufacturers and distributors offer various training programs, and they often are commendable. In many cases, these programs include audio-visual and written materials that demonstrate safe use of their products.

According to one of the world's largest lift truck manufacturers, however, no more than 25 percent of new lift truck purchasers take advantage of training programs offered. In contrast, the June 1990 issue of *Material Handling Engineering* reports that in England the purchase price of a lift truck includes primary operator training. A definite opportunity is available to employers who utilize distributor-provided training programs.

Many industrial settings are unique in product being handled. As a result, trainees observing a forklift training video that illustrates a strange lifting device may have a difficult time focusing on the special attachment because, in their plant, they handle cases of glass bottles, lumber, steel coils or pallets of boxed appliances. Employees sometimes comment that these "canned" programs are not applicable to their specific operations. Employees seem to draw greater benefit from training when it duplicates their daily processes. This article describes several effective training programs that can be produced "in-house."

IN-HOUSE TRAINING DEVELOPMENT

Training programs should be tailored to an employee's work situation when possible. Developing audio-visual and written programs is not as dif-

ficult as many think, especially with quality planning and preparation. This may require an allocation of program planning, which may take several months to complete. Since this process will progress in stages, proper time can be apportioned to the program.

Consider the following training program suggestions:

Slides and Photos

A 35-mm camera is one basic, yet effective, tool for in-house program development. The program developer should first prepare a list of forklift topics and real-life plant situations. These lists can be the result of meetings with safety teams or committee members. Involved personnel should recommend real workplace situations or incidents they feel would provide operators with quality slide material.

Shoot slides to match selected topics and sequence the material. Shooting many rolls of slides permits a more selective choice. Most slides can be narrated by the trainer (without a written script) while being shown. (However, one should always prepare a brief narrative for each slide so other trainers can properly identify and discuss the material.)

A 35-mm camera can be equally effective in developing a forklift safety photo book. Again, a list of situations or topics can be developed by safety teams or committees. Photos can illustrate correct and incorrect methods. Participating employees can serve as models to illustrate safe techniques. The quantity of illustrations and a brief narrative under each photo should be thorough enough to properly present the program.

Such a photo book involves many employees and is an excellent tool for training new employees. Photos are easily understood and help eliminate language barriers.

A photo book can also be used to illustrate a complete step-by-step job hazard analysis (JHA)/job safety analysis (JSA) while using a lift truck. For those tasks that require a JHA/JSA, a comprehensive step-by-step photo book would benefit all power equipment operators and promote error-free operations. Employees should always receive written safety guidelines to enhance training efforts.

Chart 1 Forklift Truck Operators Safety Skills Rating

Video Productions

Video is another common medium for developing in-house programs. Many company-developed programs are well done. Obviously, cost differences between producing an in-house video and contracting an outside vendor are substantial. Through trial and error, a respectable in-house forklift safety video can be created. Involving employees in its development (as in other in-house safety programs) creates ownership of the safety goals or program.

When audiovisuals are used for training, employees should be tested on the material. Quiz questions can be developed to match the audiovisuals. This process, in which the trainee views safe/unsafe situations and is asked to select the proper true-false or multiple-choice answer from written materials, can be very effective.

Several written tests can be developed to complement different parts of the material. Tests can be administered several weeks or months apart. Completed quizzes should be reviewed with all operators before moving to the next program phase. Where operators may experience difficulty with written material or quiz-taking, consider holding group discussions and giving oral tests.

To further enhance training programs, a facility could establish a competitive atmosphere among forklift operators. Test scores could be recorded on a large tally sheet, which would keep everyone informed of program progress. Those employees obtaining the most points or perfect scores could receive t-shirts or other promotional items.

Supervisors should not be excluded from formal classroom training programs; they should be encouraged to actively participate. If someone is to enforce safety rules, he/she should first know and understand the rules. By including supervisors, one enhances the overall safety training program.

SKILLS DRIVING EVALUATIONS

A key dimension of operator training is driver certification. Rather than taking one's word for his/her ability to safely operate a lift truck, actual skills testing and written evaluation must occur. Each operator should be required

Truck Type:	Powered by:
Sit Down <input type="checkbox"/>	Electric <input type="checkbox"/>
Stand Up <input type="checkbox"/>	Propane <input type="checkbox"/>
Rider Picker <input type="checkbox"/>	Gasoline <input type="checkbox"/>
Handjack <input type="checkbox"/>	

EMPLOYEE NAME: _____

FACILITY/LOCATION: _____

TESTING DATE: _____

LIFT TRUCK NUMBER/ID: _____

OBJECTIVE OF PAGE 1

The objective of this section of the rating sheet is to ensure that the employee has an understanding of the mechanics of the lift truck as well as all of those items that involve standard checking prior to driving the lift truck. (NOTE: This form can be used to evaluate a variety of powered equipment models.)

A PHYSICAL EXAMINATION OF LIFT TRUCK (TOUCH AND TELL)

The operator should be familiar with the features of the lift truck. The operator must demonstrate and describe the following:

(one point each)

	CORRECT	INCORRECT	DNA
1. Proper use of tilt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Proper use of raise/lower.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Sounded the horn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Checked for oil leaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Checked mast chains.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Checked the brakes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Checked the tires/wheels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Checked the hour meter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Checked the scissors reach.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Checked the warning light.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Checked the rear view mirror.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Checked battery retainer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Checked the discharge indicator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Checked the back up alarm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Checked hoses/hose reel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Checked the overhead guard's light.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Knows the capacity of the lift truck.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TOTAL POINTS THIS SECTION: _____

* = Does not apply

to demonstrate these skills. Charts 1, 2 and 3 show sample operator skills rating sheets.

The first rating sheet (Chart 1) requires that the operator know and understand the unit's functional features. Because OSHA requires daily, pre-use inspections of powered industrial trucks, the operator being tested should be familiar enough with these daily check lists to answer this section properly.

Supervisors and safety committee members can assist in each evaluation. Physical examination of the lift truck requires "touch and tell" by the operator and receives a rating of 17 points, depending on truck model and characteristics. (Point values and items listed can be modified to suit particular needs.)

Operators of powered industrial trucks must understand the functional features of the units they drive. A "touch and tell" test, as described above, is a good indicator of operator knowledge. Point values shown here can be adjusted to suit particular program needs.

Chart 2 Forklift Truck Operators Safety Skills Rating

B. KNOWLEDGE OF SAFEGUARDS WITHIN THE FACILITY

The operator is to be asked to identify as many safety items at the dock area, battery recharging area, and overall facility safety. (how many can the employee name, one point each)

DOCK AREA	BATTERY CHARGING	FIRE/SAFETY
Wheel Chocking <input type="checkbox"/>	Protective Equipment <input type="checkbox"/>	Location of Extinguishers <input type="checkbox"/>
Dock Plate <input type="checkbox"/>	Acid Neutralizing <input type="checkbox"/>	How to use Extinguisher <input type="checkbox"/>
Trailer Lighting <input type="checkbox"/>	MSDS <input type="checkbox"/>	Type of Extinguisher to use <input type="checkbox"/>
Condition of trailer floor <input type="checkbox"/>	No smoking <input type="checkbox"/>	Eye protection during banding <input type="checkbox"/>
Don't jump off dock <input type="checkbox"/>	Plug/Unplug Procedures <input type="checkbox"/>	PERSONAL SAFETY
Keep clear of others <input type="checkbox"/>	Clean-Up Procedures <input type="checkbox"/>	Use of Eye Protection During Banding Operations <input type="checkbox"/>
Be aware of signs <input type="checkbox"/>	Eye Wash Station <input type="checkbox"/>	Other: _____ <input type="checkbox"/>
Correct height of empty pallets <input type="checkbox"/>	Commercial Battery Rules <input type="checkbox"/>	

TOTAL POINTS THIS SECTION: _____

C. OPERATING SKILLS EVALUATION

Determine the operating skills of the employee by making a full evaluation while they are driving the lift truck in a rodeo or actual on the job operation. (One point each)

	CORRECT	INCORRECT	DNA
1. Did the operator pull forward toward designated section of racking without striking anyone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Did the operator place the forks under the pallet properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Did he raise or tilt the load properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Did any part of the container strike any section of racking while removing the pallet?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Did he lower the pallet before moving/backing out? (Don't drive + lower together.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Did he drive at a safe rate of speed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Did he slow down or stop at cross aisles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Did he sound his horn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In addition to knowing specific operating information about their units, forklift operators need to recognize safety factors present at the dock and battery recharge station, and be aware of the facility's general safety guidelines. Section B lists areas relevant to forklift activity.

Section B (Chart 2) of the skills testing requires that operators be familiar with specific department safety rules. This section permits the supervisor to ask the employee to identify important safety factors at a dock and battery recharge station, and/or general facility safety guidelines. For those items properly identified without coaching, a check is placed in the adjacent box. This indicates that the operator has identified those hazards related to daily lift truck operations.

Section C (Charts 2 & 3), the final rating section, requires an analysis of the operator's overall driving skills. This test can be administered during the actual job performance during the employee's work day. Determine what is needed for the employee's operational

rating, inform the employee of these testing requirements, and mark the sheet appropriately during observation.

This random rating, conducted at the supervisor's convenience, allows testing and evaluations to be scheduled as time permits. This scheduling spreads evaluations over a manageable period of time. Ratings must be uniform and consistent for each operator, as must the evaluations from the person(s) performing the rating and scoring.

FORKLIFT RODEO

Another useful skills test is a planned driving course with pallets and other physical markings and obstacles. Course layout should be specific to plant operations and should challenge each individual's driving ability. Floor tape to mark lanes, stop signs and pallet locations are essential. Measuring tapes can determine proper pallet or obstacle layout distances as well as turn radiuses of various lift trucks.

To become familiar with this "obstacle course" layout, each operator should receive a "free test" with an empty and a loaded lift truck before an actual test. Depending on the types of powered equipment used, the course layout should be flexible enough to accommodate various unit shapes, sizes and types. One should complete one particular style of truck testing before changing course dimensions for the next piece of equipment.

Employees respond positively to these types of forklift rallies or rodeos because of the competitive spirit involved. Although this form of skills driving rates each operator individually, a facility-wide competition can greatly benefit all operators. Employees respond well to a challenge, especially if prizes are involved. The pride and prestige of "being the best" cannot be overlooked.

Obviously, the course should be set up to evaluate specific skills and abilities, such as turning, lifting and stacking, as well as compliance with OSHA and plant safety rules. Course testing should equate to specific skills needed during the operator's daily job. Judging should be fair, yet demanding.

Notify the operator that task performance will be timed during the rodeo; however, operating time should only be used to separate any scoring

Chart 3 Forklift Truck Operators Safety Skills Rating

ties that occur. Obviously, industry is interested in employees performing jobs in a productive manner. Timing is not intended to require the operator to speed up, but rather to promote driving as safely and efficiently as possible when performing daily tasks. The saying, "Haste makes waste," becomes evident for those operators who use speed without exercising proper skills during testing. Employees with a high level of operating skills become clearly noticeable during testing.

The training coordinator should consider filming the rodeo so operators can later observe the action, review errors and reinforce positive driving skills.

The scoring sheet (Chart 3) allows for tallying point totals in all three sections. The employer should establish a point value for passing. In this example, 35 out of 56 points are required. This total can be adjusted, depending on program needs. The completed form should be kept in the employee's training file as program documentation.

Once the quiz and driving skills programs are complete, a ceremony should be held to acknowledge winners. Winners may be chosen on overall point totals, or for each specific piece of equipment driven.

CONCLUSION

Employers can greatly enhance lift truck programs by requiring ongoing operator training, skills evaluation and certification. Some form of operator's license should be issued to document training completion or certification. This license can also highlight enforcement of plant operating rules. If an operator violates a plant rule, a hole can be punched in the license as a reminder to improve operating ability. Producing a hole-free license at each renewal serves as a positive indicator of operator performance.

Estimates indicate that nearly 25 percent of all workplace injuries are related to material handling. Through proper forklift training programs, an organization can reduce and minimize lift truck incidents and accidents.

By developing these programs in-house, additional benefits can be realized. What better way to involve and motivate employees than to involve them in developing and using these programs. ■

(PART C - continued)

	CORRECT	INCORRECT	DNA
9. Did he pull into the area of racking properly to place the pallet back in the racking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Did he strike any racking on the way up or going into the rack?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Did he back out and lower his forks before moving?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Did he always look behind him before backing up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Was he wearing his protective equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Did he drive around the block of wood or obstacle on the floor or get off the lift and remove it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Did he set the load flat on the floor before getting off?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Did he put on a hardhat before getting off the lift truck?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Did the operator perform any moves that were potentially dangerous?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TOTAL POINTS THIS SECTION (C): _____

TOTAL POINTS SECTION A: _____

TOTAL POINTS SECTION B: _____

TOTAL ALL THREE SECTIONS: _____

An employee should score at least 35 total points from a potential grand total of 56 points.

NAME OF PERSONS CONDUCTING EVALUATION: _____ DATE: _____

_____ DATE: _____

FORKLIFT DRIVER'S SIGNATURE: _____ DATE: _____

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Operating skills evaluation can be conducted during actual job performance, or through a forklift rodeo. Such an event involves planned driving courses with pallets and other physical markings that mirror actual work conditions and challenge each operator's driving ability.

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**POWERED INDUSTRIAL TRUCKS - DEVELOPING A TRAINING PROGRAM
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Call (614) 466-7388.*

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ANSI/SIA A92.6 - Self-Propelled Elevating Work Platforms

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THE INDUSTRIAL PEDESTRIAN: *DANGER* Is Just Around the Corner

By **GEORGE SWARTZ**

Wherever powered industrial trucks are operating, the potential for injury to pedestrians exists. Many such injuries are life-threatening; they can involve severe eye and leg injuries, amputation, paralysis and permanent disability. In addition, industrial pedestrians experience thousands of less-serious injuries on a daily basis.

In addition to the potential loss of life or injury, business spends thousands of dollars on events that could have been prevented. This article reviews data on injury to industrial pedestrians; describes scenarios that create danger; provides examples of likely injuries; and suggests preventive measures.

INJURY STATISTICS

Many studies provide information on the number of individuals killed or injured each year by powered industrial trucks. Some 25 individuals are killed each year due to forklift tipover—statistically the leading cause of fatalities for operators. The second-highest loss of life involves pedestrians being struck by the lift truck or the load being carried, or from secondary causes of being struck by loads. In total, 100 employees lose their lives each year due to incidents involving powered industrial trucks.

In addition, 95,000 powered-industrial-truck-related injuries occur each year. In every study OSHA conducted during development of its operator training standard, the pedestrian ranked near the top of the "in danger of serious injury or death" list. The following discussion reviews six research sources that identify injuries suffered by pedestrians.

Table 1 summarizes a Bureau of Labor Statistics study of fatalities between 1991 and 1992. Note #2, #3 and #5. According to the study, victims were struck by material, struck by forklift or pinned between objects. These incidents, many which

involve pedestrians, represent 72 fatalities (42 percent) of the total. Combined, these three causes surpass the deaths associated with tipover (24 percent).

Data show that the truck operator can also be struck by a falling load or by falling objects such as racking, overhead lights and pallets. Openings at the top of the lift truck's overhead guard could allow product to penetrate through to the operator. In some cases, the operator exits the confines of the protective overhead guard only to be struck by falling objects.

Other OSHA studies identify causes of serious injuries or fatalities without (necessarily) mentioning the pedestrian. Terms such as operator inattention, obstructed view and vehicle left-in-gear accounted for some 75 of the 339 fatalities reviewed in one OSHA study.

This extensive research, also conducted during development of the new OSHA standard, examined 4,268 injury reports. The agency conducted a computer search using the keywords "industrial truck." Of the 4,268 total reports, 3,038 involved fatalities, 3,244 serious injuries and 1,413 non-serious injuries. Many reports involved multiple fatalities or injuries. It is reasonable to assume that pedestrians could have been struck by the same lift truck or load.

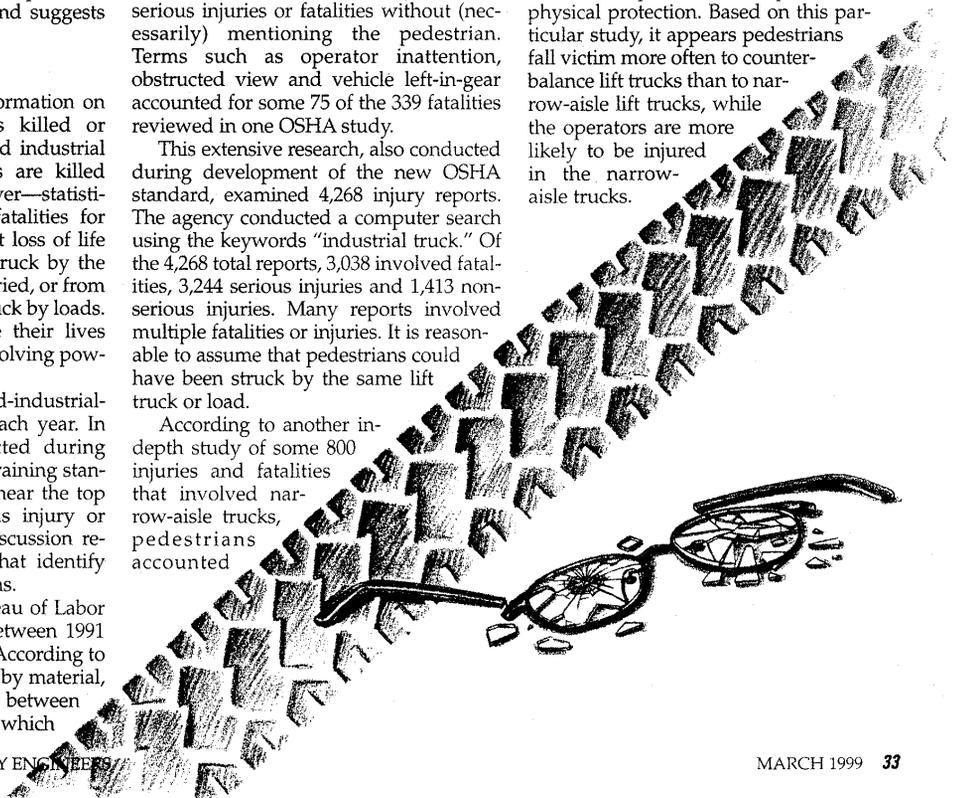
According to another in-depth study of some 800 injuries and fatalities that involved narrow-aisle trucks, pedestrians accounted

for eight percent of the total injury amount. This non-OSHA study was conducted between 1975 and 1993.

Narrow-aisle (stand-up) lift trucks are designed differently than counterbalanced (sit-down) lift trucks. In a narrow-aisle truck, the operator stands in an open compartment while operating the unit. Often, the operator may have a foot or leg (outside the compartment) that collides with a fixed object or other truck. In other cases, forks or other objects penetrate the operator compartment and inflict serious injury.

The pedestrian injuries identified are fewer in number than equivalent injury totals caused by sit-down lift trucks. A sit-down unit provides the operator more physical protection. Based on this particular study, it appears pedestrians fall victim more often to counterbalance lift trucks than to narrow-aisle lift trucks, while the operators are more likely to be injured in the narrow-aisle trucks.

ART ILLUSTRATION BY SALLY ONOPA



Many pedestrian injuries reported in this study were very serious. For example:

- run over by forklift; leg amputated;
- struck and killed by load inadvertently falling from forklift;
- standing at desk, struck by lift truck, major kidney damage;
- foot run over and crushed by forklift;
- foot run over by forklift; two toes crushed and amputated;
- leg broken after being struck by truck;
- fell into path of moving forklift; serious leg injury;
- fatally pinned by forklift;
- pushed through wall by forklift; severe internal injuries.

A 1987 report on forklift injuries published in California focused on 3,041 incidents. Thirty-one percent of the injuries occurred when forklifts ran over pedestrians. In another 23 percent of cases, workers were caught in, under or between a forklift and another object.

In a 1980 study conducted by the California Dept. of Industrial Relations, the most-common forklift injuries were:

- contusions and crushing injuries (31 percent);
- sprains and strains (21 percent);
- amputations (21 percent).

Neither of these studies distinguished between the types of powered equipment involved. It should be noted that injuries to pedestrians were a large part of these California studies.

Tables 2 and 3 highlight a comprehensive study of 3,322 forklift injuries that used three sources of data. Analysis of injury type indicates that pedestrians were involved in many incidents studied. This study identified 15 main injury categories and 46 separate injury types, as well as the activity in which the person injured was engaged. Other categories may have identified pedestrian injuries, but data could not be abstracted from this comparative analysis study. The percentages of pedestrian-related injuries identified in Table 3 represent those within that particular category, not the entire study.

MEANS BY WHICH FORKLIFTS INJURE PEDESTRIANS

When a moving lift truck—weighing four or five tons—strikes a pedestrian, the result will be serious. A lift truck moves about five to 10 mph—much faster than someone on foot; due to its weight and load (particularly if full), the truck is difficult to stop. Add to this mix operator reaction time, and it is possible that even the most-experienced operator could not stop in time should a pedestrian appear in the truck's path.

Truck design features also affect the ability to stop. The lift truck's small wheels, combined with only two braking wheels, do not always allow for a sudden stop. Furthermore, many models have no

backup system to stop the vehicle should these systems fail.

Poor lift truck maintenance could also allow the braking systems to fail when needed most. Or, the operator may fail to properly inspect the vehicle before the shift or fail to report defects. Some operators may disregard pre-shift checks, or the firm's inspection program may be weak (or non-existent).

Operators must be continuously on the alert while the lift truck is in motion. A load carried high may block the operator's vision. In such situations, the operator should drive in reverse. However, many injuries occur when a pedestrian is struck by the load being carried or by a load that moves due to a quick stop, or the pedestrian is speared by the forks.

In addition, loads are not always uniform or secure. Long or wide objects, such as pipes or lumber, can easily strike the industrial pedestrian—even one not walking near the lift truck. Employees working with their backs to an aisle can be struck by the load. Furthermore, since lift trucks have no springs or shock absorbers, hitting even a small bump may dislodge an improperly stacked load.

Often, unsecured loads are dumped onto pedestrians when a lift truck speeds around a corner or brakes hard to avoid striking them. Speed, coupled with the loose load, usually produces some kind of incident. Remember, a lift truck carries and hoists loads in the front. If a pedestrian rushes around a corner, s/he might come face to face with the load before being aware of the truck.

Employees (and facility visitors) can be struck by falling product as well. A load can fall on someone in the area where a lift truck is operating. Employees may also walk under raised forks, rather than stay clear of the load that is being raised or lowered. In such situations, operator error or vehicle failure can result in serious injury or death. In addition, an operator may inadvertently push a load off a high section of racking.

Even a parked forklift can pose a hazard. How? Although a non-operating lift truck should be parked out of the way, with key removed and forks flat on the floor, some operators simply shut off the machine and leave the forks (and sometimes the load) elevated. A pedestrian could easily walk into the forks.

For example, a timekeeper entered a plant to retrieve time cards. She walked into the raised forks of a parked lift truck and fractured a knee cap. In another case, an operator left a truck's forks elevated about five feet above the floor. A fellow employee walked around a corner and into the forks, puncturing his eye.

Non-employees are also at risk. According to a 1997 article in the *Chicago Tribune*, a woman was killed while cross-

ing a downtown street near a construction site. An eight-ton forklift ran over her. The forklift was carrying a load of mortar while making a right turn. The operator did not know he had struck the pedestrian.

Another design feature that can contribute to such incidents is the truck's counterweight. When a load is lifted with the forks, a heavy weight on the truck's backside allows for balance. To the unsuspecting, the truck's rear-end swing can be quick and unexpected. Consequently, many pedestrians have been pinned between the counterweight and a fixed object (i.e., steel beam or racking).

A large Midwest manufacturing company reported two serious injuries when employees were struck by the counterweight. In one location, an employee attempted to run behind a backing forklift. The operator did not see the employee, knocked him down and proceeded to run over his leg. The injury required extensive surgery and rehabilitation. Medical care costs surpassed \$175,000, and the total claim cost nearly \$235,000.

In another plant, an employee walking behind a backing forklift was knocked down. The operator did not see him. The leg and foot injuries involved extensive lost time, surgery and rehabilitation. The final cost of this claim exceeded \$250,000.

This firm trained its operators each year. Equipment was well-maintained and trucks featured flashing lights and backup alarms. With all this in the firm's favor, how could these costly, disabling injuries occur? The firm's powered industrial truck training program had no session on pedestrian safety.

TRAINING AND PERCEPTIONS

Each employee must receive some form of powered industrial truck training, as well as pedestrian safety training. Historically, training programs developed by equipment manufacturers have not included pedestrian safety information. Recently, however, these programs have been greatly improved.

How do employees (pedestrians) and powered equipment operators feel about the concept of pedestrian safety? Management at one steel fabricating plant surveyed 100 operators and employees. The results offered no surprises.

Operators felt employees acted dangerously when walking in aisles—did not heed horns, stepped into aisles or crossed in front of trucks. They believed employees failed to take the presence of lift trucks seriously and, therefore, were responsible if struck or injured.

Employees believed the opposite—operators drove too fast, did not use their horns to warn, and disregarded stop signs and blind corners. Some employees believed certain operators were "aiming for them."

TABLE 1

HOW FATALITY OCCURRED	NUMBER	PERCENTAGE
1) Forklift overturned	41	24
2) Worker struck by material	29	17
3) Workers struck by forklift*	24	14
3) Worker fell from forklift*	24	14
5) Worker pinned between two objects	19	11
6) Forklift struck something or ran off the dock	13	8
7) Worker died during forklift repair*	10	6
7) Other cause of fatality*	10	6
*Tie	170	100

TABLE 2

SOURCES	# OF REPORTS	TIME OF STUDY
MSHA	1,170	1978-1986
California Dept. of Industrial Relations/Div. of Labor Statistics and Research	701	January - March 1970
Clark Equipment Co.	1,451	1966-1985

Pedestrians have the right-of-way, but this does not mean they can disregard hazards. Operators cannot stop quickly and their field of vision may be limited by the load being carried or the mast design. Therefore, both parties must respect the other's position. Such awareness is developed via training and enforcement.

WORKPLACE SAFEGUARDS

Much can be done to protect pedestrians. Key safeguards include alarms, mirrors, signage, protective barriers, lighting and employee training.

Where feasible, counterbalance trucks should have backup alarms. Although no OSHA standard requires this equipment, alarms are a valuable in-plant safeguard. If a lift truck operates in a high-noise area, the alarm may blend in with the noise levels. Therefore, the alarm's decibel level should be adjusted so it can be heard. In addition, employees must not be allowed to modify or disengage these devices.

To warn operators that a pedestrian will be entering an aisle, the employer should install an alarm which activates when someone opens a door that leads into the traffic area. Operators near this area will hear the alarm and see the accompanying flashing light. To further enhance pedestrian safety, a floor-mounted alarm that activates when driven over by lift trucks can also be installed. Such an alarm might be placed near blind corners or in high-hazard areas. The alarm should always be accompanied by a flashing light.

It is the employer's responsibility to assess the need for pedestrian warning

devices. This assessment is a critical component of the facility's safety program.

No single combination of pedestrian warning equipment can provide the means to the safest environment in all applications. Therefore, management must consider high-noise levels, poor lighting and aisle layout. Since some conditions may be difficult to change, management must focus on the most-effective warning devices for overall safety.

The forklift horn is another key safeguard. One facility recently received an OSHA citation because a truck horn was not functional. The compliance officer felt the truck could turn a blind corner and strike someone—without warning. OSHA held that, "A violation is serious if it creates a substantial probability of death or serious physical harm." Therefore, horns must be tested during the daily documented lift truck inspection.

However, operators must use horns only when necessary—to warn, not to startle employees. Horns are most effective when used at appropriate times. Overuse can cause workers to ignore the warning.

Mirrors placed strategically throughout the plant can help operators and pedestrians. Blind corners and intersections are the most-common places to mount these safeguards. Mirrors should be convex or provide a panoramic view. Most should be mounted high to provide a better view of the working area.

A convex mirror on a lift truck is another safeguard. Some operators fail to look behind before backing up. Or, they may check only one side. Occasionally, time

TABLE 3

INJURY	MSHA	CDIR	CLARK
Run over or struck by moving lift truck	19%	11%	9%
Caught between lift truck and fixed object	8%	6%	7%
Struck by object set in motion by vehicle	5%	3%	2%
Struck by shifting load	3%	2%	3%

may pass between looking and actually backing up. During this time lag, a pedestrian may approach the lift truck.

Signs that warn, "Caution (or Danger): Forklift Trucks" should be placed on doors leading to the plant, as well as on barriers at crosswalks. This alerts all pedestrians to the risk before they enter the production area. A large, colorful forklift sign can be placed on the floor adjacent to doors or openings as well. Facility visitors must also be reminded to be alert for powered equipment movement and to stay behind barriers and use designated walkways.

Protective barriers must be installed as well. Hand rails or barriers must be able to absorb the impact of a lift truck. Yellow paint helps identify these safeguards. Barriers should be mounted near walkways, along aisles, at door openings, and in front of offices and assembly areas.

If an office door opens directly onto a traffic lane, a barrier must be installed to prevent anyone from stepping into the lane. The barrier causes the pedestrian to step left or right before entering. As noted earlier, a flashing light and alarm alert operators when the door is opened.

Walkways and paths of travel for industrial trucks must be well-lit. The docking department is a busy place. At times, employees must enter poorly lit trailers. Equipment or a load being moved could easily strike someone. To prevent such incidents, management should consider installing lights on powered equipment. Fixed lighting at the dock can also be adjusted to illuminate trailers.

Parking lots and other outside areas of travel require special lighting as well. Pedestrians often use the same walking and driving areas. Therefore, appropriate signs are needed, as is proper lighting. In addition, these areas must be properly maintained. If roadways are designed to accommodate forklifts, separate walkways (with protective barriers) should be erected to protect those on foot.

As noted, training is crucial. OSHA's proposed operator training standard, as well as Ontario, Canada's new powered equipment guidelines, require pedestrian awareness training. Clearly, the high number of fatalities and injuries each year indicates that such training is necessary.

ADDITIONAL PEDESTRIAN SAFEGUARDS

Many other safeguards can be implemented as part of a facility's overall powered equipment program.

- Where possible, forklift operators should drive down the middle of the aisle. This allows for operator reaction time.

- Operators must be alert for employees taking short cuts or stepping out from between machines or product storage.

- Visitors may not heed a facility's safety rules. For some, it may be their first visit to a large production facility. Consequently, operators must always anticipate pedestrian error.

- Pedestrians should not be permitted into areas with unpredictable traffic patterns and no traffic lanes.

- When equipment is entering a building from outside, the operator must be prepared for pedestrians who may be in the path. Another caution: bright sun will affect the operator's eyesight; his/her eyes must adjust to the change in light before moving the powered equipment.

- Employees must never challenge a piece of powered equipment. A loaded truck may have to swerve to avoid a pedestrian. A load could be lost, and the lift truck may strike a person or object as a result of this erratic action.

- Unauthorized employees must not be allowed to operate lift trucks. In addition, no one other than the operator should occupy the equipment.

- Since operators cannot always rely on warning devices, they must constantly look in the direction of travel and to the sides of the unit.

- Operators must not move any load that requires other employees to balance, guide or keep in place. They should re-stack or band the load.

- Anyone working at a machine or near a fixed object should be asked to move when a lift truck enters the area.

- Operators must never jump off of a moving truck. In some cases, operators have jumped off, only to have the moving vehicle continue on and strike a co-worker. Operators must stop the truck, set the brake, lower the load, then exit the unit.

- When walking on a ramp, pedestrians must be alert for lift truck traffic. Ramps do not always allow for proper clearance.

- Employees must be aware of stacking procedures. Loads can fall if not secured.

- Proper housekeeping practices are essential. Cluttered aisles and walkways contribute to injuries and incidents.

- Provide separate pedestrian doors. Those on foot tend to use large, drive-through doors. Therefore, drive-through and walk-through doors should be clearly identified—and management must enforce their proper use.

- Where blind spots or areas that require special attention exist, operators

should use spotters to guide the load and truck. The lift truck should not be moved unless approved by the spotter—and not until the spotter is clear of both the lift truck and load.

- Identify walkways with yellow or white striped paint. There must be at least three ft. on each side of the widest load carried to accommodate both powered equipment and pedestrians.

- Establish a waiting area for truck drivers, since they should not be allowed on the dock. However, if drivers must remain in the dock area, they should be accompanied by management, and operators alerted to their presence.

- Establish one clearly marked walkway from plant or warehouse to loading dock office. Ideally, this walkway should follow a wall and be located in a low-traffic area. Protective guard rails are a must.

CONCLUSION

A greater focus must be placed on pedestrian injury or death caused by powered equipment. OSHA statistics show that more than 20 pedestrians are killed each year in incidents involving powered industrial trucks. These numbers may be low, however, because OSHA's research did not single out all causes of pedestrian injury.

The safety of non-employees—both inside and outside the building—must also be considered. Many of these individuals are not very familiar with powered industrial trucks and their movements. However, since these incidents rarely make the headlines, industry may ignore the need for pedestrian safety.

Due to downsizing, many firms have closed facilities and moved more product into already-crowded warehouses. This congestion, combined with the need to move more product with fewer people, can tempt operators to speed and disregard safety rules. In other words, the competitive nature of the workplace can lead to unsafe behavior. "Doing more with less" does have drawbacks.

Incidents can be prevented through proper training, use of safeguards and management enforcement. Awareness of pedestrian safety is gaining momentum. OSHA has identified this need in its proposed operator training standard. In addition, many manufacturers have added this element to their training programs.

With more than 875,000 pieces of powered equipment in the workplace and some 1.2 million operators, training and safety cannot be stressed enough. Without a doubt, every facility must place a greater focus on the safety of employees or visitors who are on foot. ■

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THIS DOCUMENT IS A DRAFT OF A PROPOSED OSHA REGULATION THAT HAS BEEN DEVELOPED BY THE MEMBERS OF THE INDUSTRIAL TRUCK ASSOCIATION. THIS PROPOSAL CALLS FOR A MANDATORY TRAINING AND CERTIFICATION PROGRAM FOR OPERATORS OF POWERED INDUSTRIAL TRUCKS. THIS DRAFT PROPOSES THAT EMPLOYERS CONTINUE TO BEAR THE ULTIMATE RESPONSIBILITY FOR SUCH TRAINING AS THEY DO NOW; HOWEVER, THIS PROPOSAL DEFINES FOR EMPLOYERS WHAT SUCH TRAINING SHOULD INCLUDE AND CALLS UPON THE FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION TO ENFORCE THE PROPOSAL. COMMENTS ON THIS DRAFT ARE WELCOME AND SHOULD BE SUBMITTED IN WRITING TO THE INDUSTRIAL TRUCK ASSOCIATION (SUITE 210, 1750 K STREET NW, WASHINGTON, DC 20006). THE INDUSTRIAL TRUCK ASSOCIATION INTENDS TO SUBMIT THIS DOCUMENT TO OSHA.

15 NOVEMBER 1986

PROPOSED OSHA REGULATION DEALING WITH TRAINING FOR AND
CERTIFICATION OF OPERATORS OF POWERED INDUSTRIAL TRUCKS

1. No individual(s) shall be permitted to operate an industrial truck until such individual(s) has received the training prescribed by this section and has received a certificate that such training has been successfully completed.
2. Training shall include:
 - A) Written and oral instructions, and written and oral and "hands on" examinations addressing:
 1. General characters of the truck such as travel controls, drive power, steering, stability, visibility, location of motor and appropriate ANSI standards.
 2. Applications regarding the type of surface, tires, gradability, operating environment, loads and attachments.
 3. Principles of operation including stability, steering, braking, power source, load manipulation, operator controls and instrumentation.
 - B) Review and examination of manufacturer and employer rules regarding:
 1. battery charging.
 2. refueling.
 3. accident reporting.
 4. maintenance.
3. Training is the responsibility of the employer but may be provided by other sources in conformance with the above.

B. ITA Proposed Draft Regulation for Operator Training (includes ITA sample training program)

INDUSTRIAL TRUCK ASSOCIATION
DRAFT
OSHA REGULATION
OPERATOR TRAINING AND CERTIFICATION
FOR OPERATION OF POWERED INDUSTRIAL TRUCKS

I. INTRODUCTION

This regulation aims to make the operation of powered industrial trucks safer. Specifically, it is intended to reduce the number of accidents and the amount of human suffering arising from such occurrences and property damage and to increase overall productivity. Operators of powered industrial trucks should be generally familiar with the various models of powered industrial trucks. However, an operator of a powered industrial truck must know the specific operating limits of the particular equipment he or she is operating. To convey this knowledge to the operator, it is essential that the operator be educated about powered industrial trucks in general and be trained on the particular trucks operated at the place of employment.

Certification by an employer that an employee has successfully completed a training course and demonstrated the ability to operate a powered industrial truck by passing a written and an operational examination will help make the operation of industrial trucks safer. Certification evidences an operator's competence to operate a powered industrial truck and promotes a safer work place for all employees. A record of certification is required to be kept with the employees personnel records.

II. CLASSES OF POWERED INDUSTRIAL TRUCKS

The method of operating industrial trucks varies among models. It is, therefore, essential that the operator demonstrate a knowledge of the operating information contained in the operating manual for those trucks for which he is certified. An operator must also be familiar with the specific capabilities and limitations of the different classes of powered industrial trucks. Information concerning the different classes of powered industrial trucks provided in this section and information concerning safety rules listed in Section III is to be tested by written examination which the operator must pass before operation of a truck is permitted.

A. Class I - Electric Motor, Sit-Down Rider,
Counter-Balanced Trucks (Solid and Pneumatic Tires).

1. General Characteristics:

- a. The operator is seated and generally faces forward.
- b. Travel controls among individual company models are unique; operators must review the manufacturer supplied manuals and familiarize themselves with the material.
- c. Drive power is generally by means of the front wheels.
- d. Steering is by means of rear wheels for greater maneuverability. Power steering is common.
- e. The truck travels equally well forward or reverse and should be driven in the direction of greater visibility. Special care should be taken while operating on ramps.
- f. Power is supplied by an electric battery located at the rear of the truck; the battery provides a counterbalance.
- g. Electric motors power the drive wheels, hydraulic pumps and power steering.
- h. Material is carried by forks (or attachments) mounted on a hydraulically operated mast at the front.
- i. Material travels vertically on the mast (which may also tilt forward or backward, and/or side shift).
- j. These trucks are designed to meet the requirements of ANSI/ASME B56.1 Safety Standard for Low Lift and High Lift Trucks.

2. Applications.

- a. Surface - Trucks with solid tires can travel on smooth, hard floors, such as concrete. Pneumatic tires may be available for rough surfaces. Maximum grade is approximately 10 percent.

- b. Typical Operating Environment:
 - i) Generally dry conditions;
 - ii) These trucks may be used in fire-hazardous areas with appropriate U.L./N.F.P.A. rating;
 - iii) These trucks may be used in areas requiring pollution-free operation, such as food processing, freezer storage and general warehousing.
- c. Loads - Stable, unitized loads, within the given capacity, that are interlocked, shrink packed or banded can be lifted on skids, pallets and slipsheets or with appropriate attachments.
- d. Attachments - Trucks can be fitted with almost any attachment to handle specialized loads.

3. Principles of Operation.

- a. Truck stability - three points of suspension are used to provide a solid footing on the operating surface. The two front tires are on an axle which is rigid to the truck frame, thus providing two of the points of suspension close to the load.

Three wheel trucks have a centrally located rear wheel for the third point of suspension. See diagram.

Four wheel trucks with widely spaced rear wheels are attached to a rear axle which pivots at its center. This arrangement allows the rear wheels to adjust to rest solidly on an uneven floor. The rear of the truck frame is supported at this center pivot of the axle, resulting in the three point suspension. See diagram above.

These three points of suspension form what is known as the stability triangle. Whenever the combined center of gravity of the truck and its load passes outside of this triangle, the operator should be aware that truck tipover may occur.

- b. Number of wheels - Four wheels spaced widely apart are most common. Three wheel trucks, or those with dual steer wheels are used for short turning radius.
- c. Location of steering and driving wheels - Driving wheels are located at the front and act as a fulcrum to counterbalance the load. Steering wheels are located at the rear for increased maneuverability. Power steering is common. Safe utilization of these features requires operator awareness and practice.
- d. Braking.
 - i) Service brakes - These usually operate on the front drive wheels and are usually of the hydraulic shoe and drum type.
 - ii) Parking brake - These usually operate on front drive wheels, using mechanical operation of the service brakes, or operates on a transmission or motor shaft.
 - iii) Dynamic braking electric trucks with solid state controls are designed to use the reversal of the drive motor as a means to slow motion of the truck.
- e. Power source - Industrial batteries with choice of voltage provide power. A drive motor(s) powers the drive wheels through conventional differential and drive axle, or in the case of two motors, through two separate gear boxes.

- f. Load manipulation - The load can be lifted and tilted with the mast and forks.

Attachments can provide for rotating, side-shifting, clamping or otherwise handling the load. The operator must be familiar with the safe operation of the attachments. The load is usually carried by the lift truck. The truck may also be used for towing. (See Section IIF.).

- g. Operator controls consist of:

- i) Steering wheel;
- ii) Key/toggle switch;
- iii) Service brake pedal;
- iv) Parking brake lever, pedal or automatic seat control;
- v) Accelerator pedal; (may be combined with direction selector)
- vi) Direction selector; (may be combined with accelerator pedal)
- vii) Load control levers - lift, tilt, attachments;
- viii) Horn or other means of warning.

- h. Instrumentation consists of:

- i) Hour meter;
- ii) Battery discharge indicator;
- iii) Diagnostics;
- iv) Overdrive.

B. Class II-Electric Motor Narrow Aisle Trucks
(Solid Tire)

1. General Truck Types.

There are many different truck configurations which provide various methods to handle high density storage of material in narrow aisle space. The most common feature of this type of truck is to equip as small a truck as possible with as short as practical a turning radius.

- a. High lift straddle truck - These trucks have outriggers in front which straddle palletized loads. Rollers at the forward end of the outriggers support the palletized load.
- b. Reach type outrigger truck - This is a high lift straddle truck in which the forks extend horizontally in a longitudinal direction to provide for stacking loads. Truck should be driven with forks in lowered position.
- c. Orderpicker truck - The distinguishing feature of this truck is that the operator controls the truck from a platform immediately behind the forks. This platform elevates in conjunction with the forks and allows the operator to take material manually from storage racks and place it on a pallet carried on the forks, or take material loaded on a pallet and place it on a storage rack. Railings and a tether are provided to prevent or arrest an operator's fall. Travel speed is restricted when the operator is elevated.
- d. Front side loader or turret truck - This truck contains a mechanism which permits the forks to swing to either side and extend them into pallets stored on racks. The truck remains straight in the travelling aisle. The load is then retracted from the rack, allowing the truck to continue its travel.

- e. Low lift pallet and platform trucks (rider type) - These trucks lift the load only enough to allow travel. A pair of forks, or a platform, is located at the front of the truck. Rollers mounted at the forward end of the forks (or platform) extend downward to lift and support the load. These rollers also allow the loaded truck to travel.

2. General Characteristics.

- a. The operator is usually standing and is commonly able to face in any direction.
- b. Travel controls vary among trucks - consult the manufacturer's operating manual and instruction decals.
- c. Drive power and steering are supplied through wheels located opposite the load end of the truck. There are also several types of stand-up trucks that drive through the wheels on the load end.
- d. This truck travels equally well forward or reverse and should be driven in the direction of greater visibility. Special care should be taken while operating on ramps.
- e. Power is supplied by an electric battery located approximately in the center of the truck.
- f. Electric motors power the drive wheel and hydraulic pumps.
- g. Material is carried by forks (or platform) mounted on a hydraulically operated mast (no mast on low lift types) which elevates vertically.
- h. This truck is designed to meet requirements of ANSI/ASME B56.1 Safety Standard for Low Lift and High Lift Trucks.

3. Applications.

- a. Surface - These trucks are intended for smooth, hard floors, such as concrete, with minimal grades.

b. Typical operating environment:

- i) Dry conditions;
- ii) These trucks may be used in fire-hazardous areas with appropriate U.L./N.F.P.A. rating;
- iii) These trucks may be used in pollution free areas, such as food processing, freezer storage plants and general warehousing.

c. Loads - Stable, unitized loads within specified capacities, that are interlocked, shrink packed or banded can be lifted on skids, pallets, slipsheets or with attachments.

4. Principles of Operation.

- a. Truck stability - Usually three points of suspension are used to insure a solid footing on an uneven floor. Two load carrying tires are mounted rigid to the truck frame or at the outward end of outriggers, forks or platform to support the load. A single tire or a pivoted axle at the opposite end of the truck provides the third point of suspension. Four point suspension with an articulated drive wheel is also used frequently on some trucks.
- b. Number of wheels - There are commonly three wheels. However, four wheel trucks often utilize spring loaded caster wheels or articulated axles.
- c. Steering, driving and braking are all operated through the wheel(s) located opposite the load end of the truck. Some trucks have additional wheels to allow for greater loads or higher speeds.
- d. Dynamic braking - Trucks with solid state electronic controls are designed to use the reversal of the drive motor as a means to slow the motion of the truck.
- e. Power source - Industrial batteries with choice of voltage provide power.

f. Load manipulation - These trucks have a vertical lifting and lowering capability. Tilt and reach is available on some models.

g. Operator controls consist of:

- i) Steering wheel, crank or arm;
- ii) Key switch;
- iii) Service brake pedal; this pedal may also be dual purpose as brake/parking brake control pedal.
- iv) Parking brake - This has automatic application when operator leaves the truck and removes his foot from the pedal.
- v) Accelerator - This is commonly hand operated;
- vi) Direction selector - This is commonly included in the accelerator control;
- vii) Load control - This usually consists of levers and sometimes is combined with the travel controls.

- A) Lift and lower;
- B) Tilt (not on all models);
- C) Reach (not on all models);
- D) Traverse (on front side loaders);
- E) Rotate (on front side loaders).
- F) Side shift.
- G) Attachments

viii) Horn or other means of warning.

h. Instrumentation consists of:

- i) Hour meter;
- ii) Battery discharge indicator.

C. Class III - Electric Motor Hand Trucks or Hand/Rider Trucks (Solid Tires).

1. General Characteristics. There are a multitude of different truck styles within this category. The most common feature of this class of truck is that these trucks are intended to be controlled by an operator walking in front of the truck. Additionally, some trucks provide for the operator to ride in a standing position.

NOTE: Some orderpickers are designed to be controlled by an operator walking alongside. These may have a steer arm which does not apply the brakes when released by the operator. This allows the truck to coast while the operator picks orders.

- a. Pedestrian controlled - A stand-up riding position is provided on some models.
- b. Travel is controlled with an arm, which rotates the drive unit for steering, moves up and down for braking on most models and contains switches for controlling direction and speed. Additional controls are sometimes provided when the truck is equipped for riding.
- c. Drive power and steering are provided by a drive unit containing the electric drive motor, gearing and drive tire. This unit rotates for steering and is capable of making a 90 degree turn in either direction.
- d. This truck travels equally well in forward and reverse.
- e. Power is supplied by an electric battery located between the drive unit and the load.
- f. Electric motors power the drive wheel and hydraulic pump.
- g. Material is carried by forks (or platform) mounted on a hydraulically operated mast (no mast on low lift types) which elevates vertically.
- h. This truck is designed to meet requirements of ANSI/ASME B56.1 Safety Standard for Low Lift and High Lift Trucks.

2. Applications:

- a. Surface - These trucks are intended for use on smooth, hard floors, such as concrete. Maximum grade is approximately 5 percent.

b. Typical Operating Environment:

- i) Dry conditions;
- ii) These trucks may be used in fire-hazardous areas with appropriate U.L. or equivalent rating.
- iii) These trucks may be used in pollution free areas, such as food processing, freezer storage plants and general warehousing.

c. Loads - Stable, unitized loads that are interlocked, shrink packed or banded can be lifted on skids, pallets or with the appropriate attachment.

3. Principles of Operation.

- a. Truck stability - Three points of suspension are used to insure a solid footing on any surface. Two load-carrying wheels are mounted rigid to the truck frame or at the outward end of outriggers, forks or platform to support the load. A single drive tire on the opposite end of the truck provides the third point of suspension. Casters on skids are sometimes provided for additional stability.
- b. Number of wheels - There are usually two load wheels and one steering (drive) wheel.
- c. Steering, driving and braking are all operated through an arm located opposite the load end of the truck.
- d. Dynamic braking - Electric trucks with solid state electronic controls are designed to use the reversal of the drive motor as a means to slow the motion of the truck.

- e. Power source - Industrial batteries with a choice of voltages provide power. The drive motor is directly mounted to the drive wheel.
- f. Load manipulation - Loads may be vertically lifted and lowered.
- g. Operator controls consist of:
 - i) Steering arm;
 - ii) Key switch;
 - iii) A brake which is activated when the steering tiller is moved to its raised or lowered position. The brake is usually applied automatically when the tiller is released. This also serves as a parking brake;
 - iv) Accelerator and direction selectors are mounted on arm for hand operation;
 - v) Load controls are located on arm and/or truck body; these control:
 - A) Lift and lower;
 - B) Tilt (not on all models);
 - C) Reach (not on all models).
 - vi) A horn is generally operated by a button on the tiller head and on the cross handle (grab) bar.
- h. Instrumentation consists of:
 - i) Hour meter;
 - ii) Battery discharge indicator.

D. Class IV - Internal Combustion Engine Trucks
(Solid Tires).

1. General Characteristics.

- a. The operator is seated and faces forward.
- b. Travel controls vary among models; consult the manufacturers' guide.
- c. Drive power is provided by means of the front wheels.
- d. Steering is provided by means of rear wheels for greater maneuverability. Power steering is common.
- e. This truck travels equally well in forward or reverse and should be driven in the direction of greater visibility.
- f. Power is supplied by gasoline, LPG or diesel fuel.
- g. Material is carried by forks (or attachments) mounted on a hydraulically operated vertical mast at the front.
- h. Material travels vertically on the mast (which may also tilt forward or backward).
- i. These trucks are designed to meet requirements of ANSI/ASME B56.1 Safety Standard for Low Lift and High Lift Trucks.

2. Applications:

- a. Surface -These trucks are intended for use on smooth, hard floors, such as concrete. Maximum grade for safe operation is approximately 20 percent.
- b. Typical Operating Environment:
 - i) Wet or dry conditions;

- ii) This truck may be used in fire-hazardous areas with appropriate U.L./N.F.P.A. rating;
 - iii) A ventilated atmosphere is required due to depletion of oxygen and combustion products in exhaust.
- c. Loads - Stable, unitized loads up to specified capacity that are interlocked, shrink packed or banded can be lifted on skids, pallets or with attachments.
 - d. Attachments - Trucks can be fitted with almost any type attachment to handle specialized loads.

3. Principles of Operation:

- a. Truck stability - refer to above description for Class I trucks.
- b. Number of wheels - Four wheels spaced widely apart are most common. Three wheel trucks, or those with dual steer wheels, are available for short turning radius.
- c. Location of steering and driving wheels - Driving wheels are at the front and act as a fulcrum to counterbalance the load. Steering wheels are at the rear for increased maneuverability. Power steering is common. Utilizing these features requires operator awareness and practice.
- d. Braking.
 - i) Service brakes usually operate on the front drive wheels, and are usually of hydraulic shoe and drum type; disk brakes are also available on some models.
 - ii) Parking brakes operate on front drive wheels, usually requiring mechanical operation of the service brakes.
- e. Power source - Internal combustion engines fueled by gasoline, LPG or diesel provide power. The engine powers the drive wheels through transmission, differential and drive axle, or through hydraulic pump and motors.

- f. Load manipulation - With a standard mast and forks the load can be lifted and tilted.

Attachments can provide for rotating, side shifting, clamping or otherwise hauling the load.

The load is usually carried by the lift truck attachment. The truck may also be used for towing if applicable. (See section IIF.).

- g. Operator controls consist of:

- i) Steering wheel;
- ii) Key switch;
- iii) Service brake pedal;
- iv) Parking brake lever or pedal;
- v) Accelerator pedal;
- vi) Direction selector or clutch;
- vii) Load control levers - lift, tilt, attachments;
- viii) Horn or other means of warning.

- h. Instrumentation consists of:

- i) Hour meter;
- ii) Ammeter (or indicator light);
- iii) Fuel gauge;
- iv) Engine temperature indicator;
- v) Engine oil pressure indicator.

E. Class V - Internal Combustion Engine Trucks (Pneumatic Tires).

The features of this type truck are the same as listed for Class IV trucks except that the Class V truck is designed to travel on rough surfaces such as improved earth or gravelled roads. Pneumatic tires provide a more cushioned ride. Maximum grade is approximately 20-30 percent.

F. Class VI - Electric and Internal Combustion Engine Tractors - Solid and Pneumatic Tires.

1. General Characteristics.

- a. The operator is seated and faces forward.
- b. Travel controls vary from model to model; consult manufacturers operating manual.
- c. Drive power is provided by means of rear wheels.
- d. Steering is by means of front wheels.
- e. Travels equally well forward or reverse. Visibility is excellent in either direction.
- f. Power.
 - i) electric battery; or,
 - ii) internal combustion engine (gasoline, LPG or diesel).
- g. Material is transported horizontally on trailers or carts towed by the tractor. There is no vertical movement of the loads.
- h. These trucks are designed to meet requirements of ANSI/ASME B56.9 Safety Standard for Industrial Tow Tractors.

2. Applications.

- a. Surface - This truck is intended to be used on smooth concrete, pavement, hardpacked gravel, or hardpacked dirt.
- b. Typical Operating Environment:
 - i) Electric tractors are generally used under dry conditions; they provide pollution-free operation.
 - ii) Internal combustion engine trucks may be used under wet or dry conditions. Ventilation is required.

- c. Loads of any type which can be placed on trailer may be carried.
- d. Attachments - Only couplers (for towing) and push plates (in front) are used with tow tractors.
- e. Tow tractors are often used instead of lift trucks when loads need to be moved along the ground. In most cases, the tow tractor has a greater towing capability than a fork lift truck. Tow tractors are used, for example, in the following situations: airlines use tow tractors to carry baggage; farms and nurseries use tow tractors to carry plants, trees, vegetables, flowers and other products; and, heavy manufacturing companies transport material such as steel and aluminum within the manufacturing facility.

3. Principles of Operation.

- a. Stability is ordinarily not a problem since only horizontal movement is involved. The major stability concern is excessive speed when turning.
- b. The number of wheels is almost always four. Some three wheel tractors are used for light duty applications.
- c. On four wheel trucks, steering wheels are at the front. Drive wheels are at the rear.
- d. Braking.
 - i) Service brakes operate on the rear drive wheels. They are usually hydraulic shoe and drum or disk type, although some mechanically operated drum brakes exist. Four-wheel brakes are also common.
 - ii) Parking brakes operate off the service brakes on the rear wheels or off a separate drive shaft brake.

- e. Power source consists of electric motor with gearing, or internal combustion engine (gasoline, LPG or diesel) with transmission and differential providing power to the rear drive wheels.
- f. Load manipulation - Loads are pulled (towed) or pushed horizontally. No vertical load movement.
- g. Operator controls consist of:
 - i) Steering wheel;
 - ii) Key switch;
 - iii) Accelerator pedal;
 - iv) Brake pedal;
 - v) Parking brake lever;
 - vi) Clutch pedal (manual transmission);
 - vii) Direction selector;
 - viii) Towing coupler handles;
 - ix) Horn;
 - x) Headlight switch;
 - xi) Accessory switches.
- h. Instrumentation consists of:
 - i) Electric powered tractor:
 - A) Speedometer.
 - B) Hour meter.
 - C) Battery discharge indicator.
 - D) Power light.

ii) Internal combustion engine powered tractor.

A. Speedometer.

B. Hour meter.

C. Fuel gauge.

D) Engine temperature indicator.

E) Engine oil pressure indicator.

F) Ammeter (or indicator light).

4. Operation Peculiar to Tractors

The employer is to review and practice the following with the employee-operator to establish understanding and skill on the part of the operator:

a. Daily operator inspection of the tractor.

b. Determination of the towing capacity.

c. Tires - The different hardness of solid tires, pneumatic, foam filled, solid pneumatic and differences in tread pattern (lug or other) will affect tractive effort.

d. Rolling Resistance - Many factors change the rolling resistance of a tractor and its tow. Different types of tires and trailers can greatly affect overall towing performance. In most cases, there is a set value for different surfaces when the rolling resistance is used to calculate drawbar pull.

e. Ramps - Any climb plays a major part in the rating of tow tractors. Ramps require greater care on the part of the operator. Ramps dramatically reduce the rating of the electric tractors.

- f. Visibility - The operator must be able to see forward and rearward. This is important because the loads being transported are usually long.
 - g. Turning - This requires practice, especially while towing long trailer trains. The operator must keep speed to a minimum when turning.
 - h. Coupling - The proper coupler must be used. The operator must be familiar with properly coupling and uncoupling the tow.
 - i. Braking - Maximum compressive load on the coupler occurs during braking. Practice is necessary to anticipate the tractor reaction when loaded and unloaded.
- G. Class VII - Rough Terrain Fork Lift Trucks (Pneumatic Tires). Features of this type truck are the same as listed for Item II.D., Class IV trucks, except as follows:
- 1. These trucks are designed to meet requirements of ANSI/ASME B56.6 Safety Standard for Rough Terrain Fork Lift Trucks.
 - 2. These trucks are intended for operation on unimproved natural terrain as well as disturbed terrain found at construction sites. Trucks typically can climb grades of approximately 45 percent. This is accomplished with the use of large diameter oversized pneumatic tires, increased under clearance and increased stability between the truck and the ground.
 - 3. Drive power may be through front wheels or both front and rear wheels (four-wheel drive).
 - 4. Material is carried by forks (or attachments) mounted on a hydraulically operated vertical mast, a linkage mechanism or by a horizontally mounted telescoping boom which pivots upward. The latter two types of fork lift trucks are known as variable reach trucks.
 - 5. Steering may be by rear wheels, four wheels, skid steer or articulated frame steer.

6. The parking brake is controled by a lever or pedal.
7. Instrumentation consists of:
 - a. Hour meter;
 - b. Ammeter (or indicator light);
 - c. Fuel gauge;
 - d. Engine temperature indicator;
 - e. Engine oil pressure indicator.
8. Options include a Frame Leveling Device.

III. SAFETY RULES

The employer must review all safety rules with the operator to instill a thorough understanding and as an integral part of the process of certification. Employers will want to address specific environmental conditions.

- A. Employer Safety Rules should address the following:
 1. Operator physical and mental ability.
 2. Operator training and certification.
 3. Unique travel conditions in specific areas of the employer's plant and other plant-specific safety considerations.
 4. Battery change and/or charge responsibility.
 5. Refueling procedure.
 6. Maintenance responsibility.
 7. Procedure involving accidents.
 8. Grounds for suspension or termination.
 9. Job description for operators of powered industrial trucks.

B. Standard Operating Safety Rules

1. Lift Trucks (Class I, II, III, IV and V) - refer to ANSI/ANSE B56.1 Safety Standard for Low Lift and High Lift Trucks, available from:

The American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, N.Y. 10017

2. Tractors (Class VI) - refer to ANSI/ASME B56.9 Safety Standard for Industrial Tow Tractors.

3. Rough Terrain Fork Lift Trucks (Class VII) - refer to ANSI/ASME B56.6 Safety Standard for Rough Terrain Fork Lift Trucks.

- C. Safety Rules particular to specific models - refer to the manufacturer's Operating Manual.

IV. OPERATION

The method of industrial truck operation varies among the trucks of different manufacturers and even among truck models of the same manufacturer. It is, therefore, essential that the operator study and know the operating manual for the specific model to be operated.

The operator must demonstrate skill in the safe operation of the powered industrial truck he will be operating. It is incumbent upon the employer to train the operator with respect to that operation, including, but not limited to:

- A. Safety Rules concerning the truck and any attachments.
- B. Daily Operator Inspection and Maintenance (as required).
- C. Refueling or Battery Charging.
- D. Determining Equipment Capacity.
- E. Starting and Operating of Truck Controls.
- F. Maneuvering (including steering away from the edge of a loading dock).

- G. Inching.
- H. Monitoring Instruments.
- I. Negotiating Ramps, Dock Boards, Elevators.
- J. Operating Over Poor Surfaces, such as Railroad Tracks.
- K. Loading/unloading Trailers or Box Cars.
- L. Towing.
- M. Attachments.
- N. Low Overhead Clearance.
- O. High Stacking (lift trucks only).
- P. Lifting and Tilting (lift trucks only).
- Q. Side Shifting.

V. CERTIFICATION

- A. Physical Requirements.

Operators shall have the requisite physical and mental ability to operate industrial machinery.

- B. Written Examination.

Employers will test prospective operators on their knowledge of the kind, operation and safety rules of powered industrial trucks by way of written examination. Before taking an operational test, an operator must achieve a passing score (70 percent) on this examination.

- C. Operational Examination for Demonstrating Competency.

After sufficient hands-on training, operators shall take and successfully complete an operational examination. Manufacturers shall provide the specific guidelines for the examination, which shall test the operator on items listed in Section IV. The test shall be administered by the employer or his designee.

D. Employer Responsibility.

It is the responsibility of the employer to certify that the operator has demonstrated the necessary competence to safely operate the powered industrial truck.

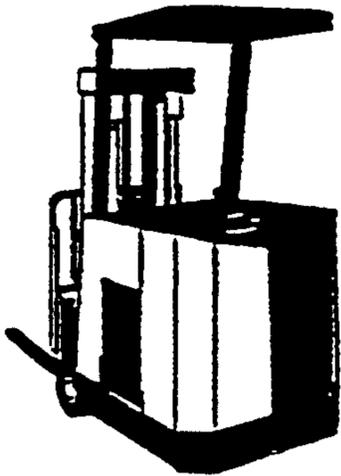
VI. ALTERNATE TRAINING AND CERTIFICATION

Employers have the sole responsibility to certify that operators are properly trained and can safely operate a powered industrial truck. The employer may delegate the task of training operators to any organization which regularly conducts such training and certification. However, the responsibility for insuring the adequacy of the training of operators by other organizations remains with the employer, since the employer must certify its employee-operators.

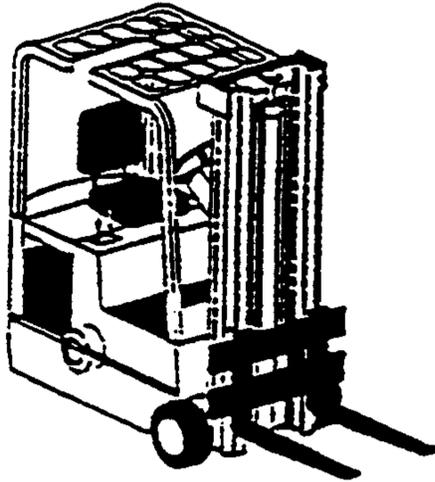
C. Pictorial Model Listing of Industrial Trucks

Pictorial Model Listing

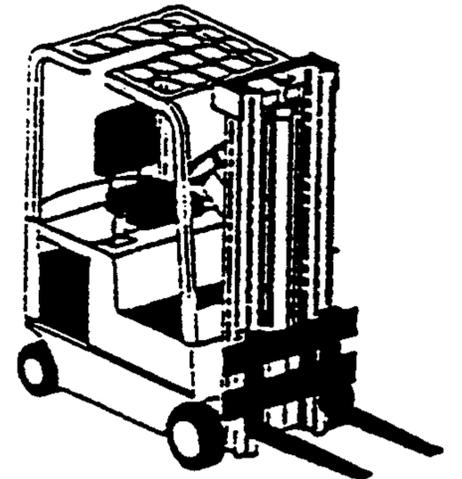
- Class I - Electric Motor Rider Trucks
 Lift Code 1 - Counterbalanced Rider Type. Stand-UP



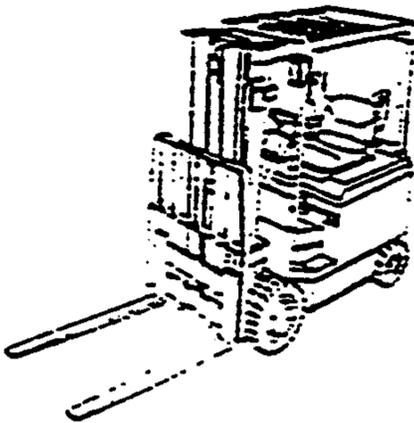
- Class I - Electric Motor Rider Trucks
 Lift Code 4 - Three Wheel Electric Trucks. Sit-Down



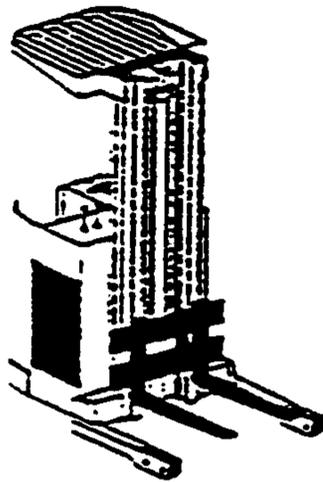
- Class I - Electric Motor Rider Trucks
 Lift Code 5 - Counterbalanced Rider. Cushion Tire. Sit Down.



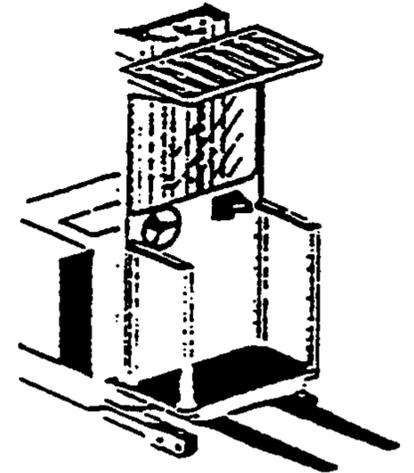
- Class I - Electric Motor Rider Trucks
 Lift Code 6 - Counterbalanced Rider. Pneumatic or Either Type Tire. Sit-Down



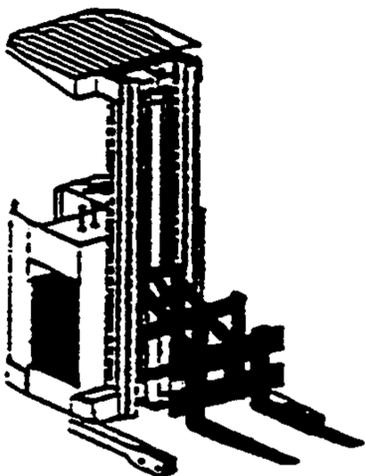
- Class II - Electric Motor Narrow Aisle Trucks
 Lift Code 1 - High Lift Straddle



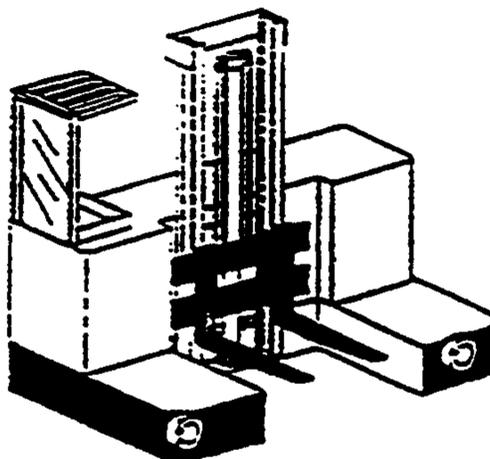
- Class II - Electric Motor Narrow Aisle Trucks
 Lift Code 2 - Order Picker



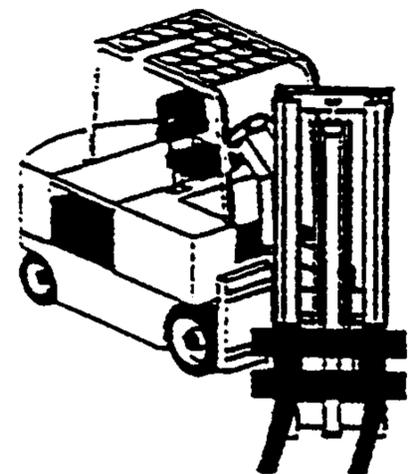
- Class II - Electric Motor Narrow Aisle Trucks
 Lift Code 3 - Reach Type Outrigger



- Class II - Electric Motor Narrow Aisle Trucks
 Lift code 4 - SideLoaders Platform

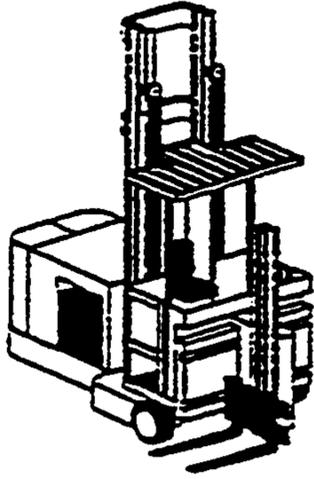


- Class II - Electric Motor Narrow Aisle Trucks
 Lift Code 4 - SideLoaders High Lift Pallet

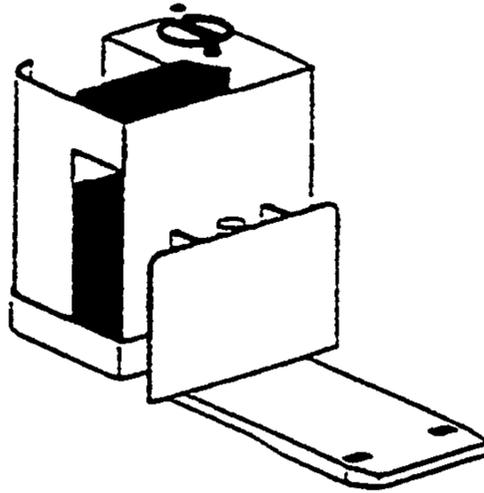


Pictorial Model Listing

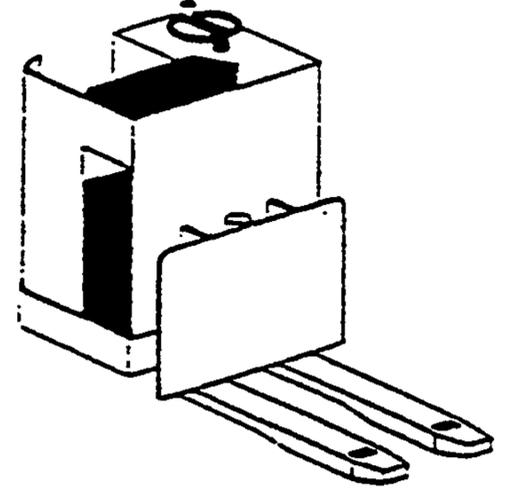
Class II - Electric Motor Narrow Aisle Trucks
Lift Code 4 - Turret Trucks



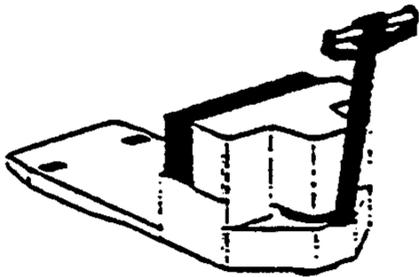
Class II - Electric Motor Narrow Aisle Trucks
Lift Code 5 - Low Lift Platform



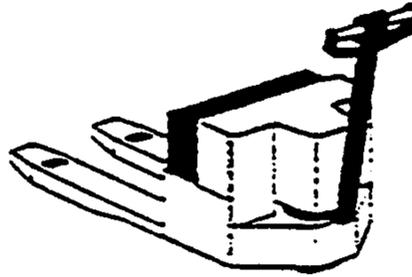
Class II - Electric Motor Narrow Aisle Trucks
Lift Code 6 - Low Lift pallet



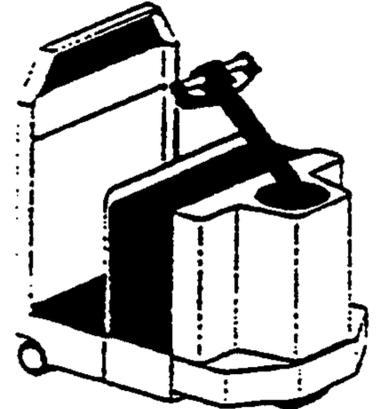
Class III - Electric Motor Hand Trucks
Lift Code 1 - Low Lift Platform



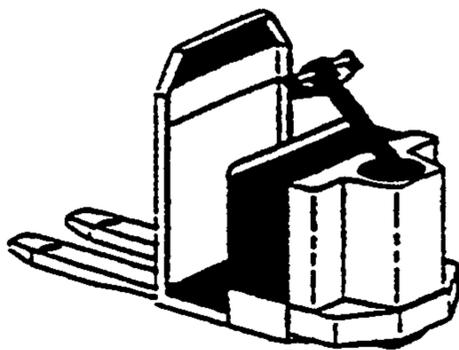
Class III - Electric Motor Hand Trucks
Lift Code 2 - Low Lift Walkie Pallet



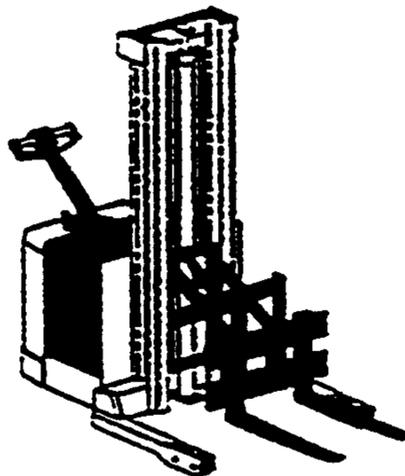
Class III - Electric Motor Hand/Rider Trucks
Lift Code 3 - Tractor



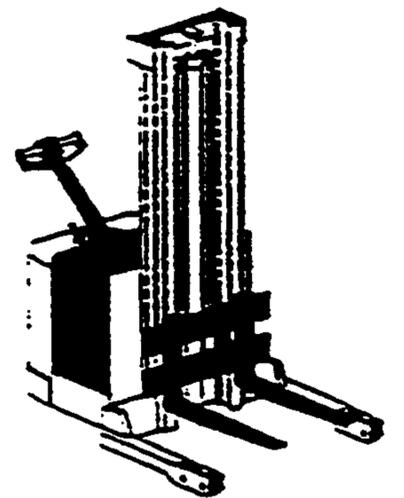
Class III - Electric Motor Hand Trucks
Lift Code 4 - Low Lift Walkie/Center Control



Class III - Electric Motor Hand Trucks
Lift Code 5 - Reach Type Outrigger

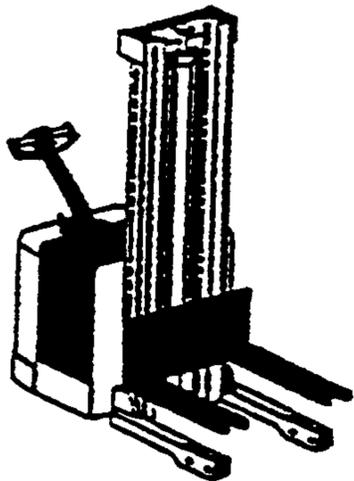


Class III - Electric Motor Hand Trucks
Lift Code 6 - High Lift Straddle

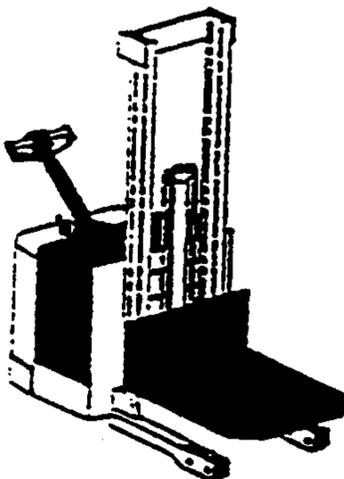


Pictorial Model Listing

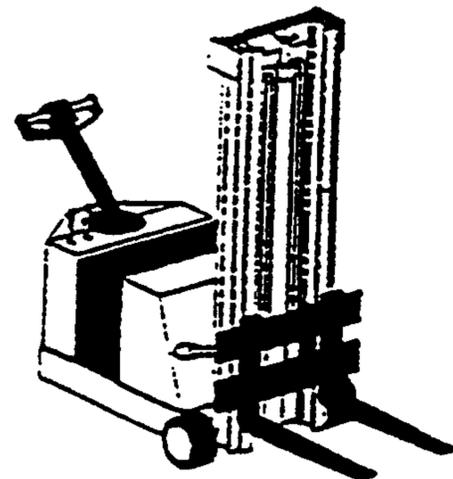
Class III - Electric Motor Hand Trucks
Lift Code 6 - Single Face Pallet



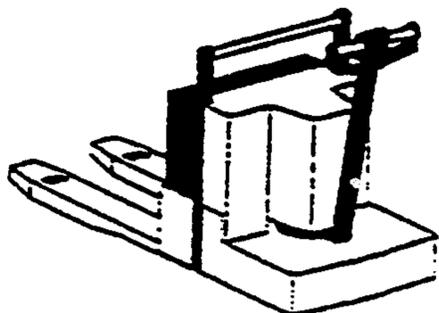
Class III - Electric Motor Hand Trucks
Lift Code 5 - High Lift Platform



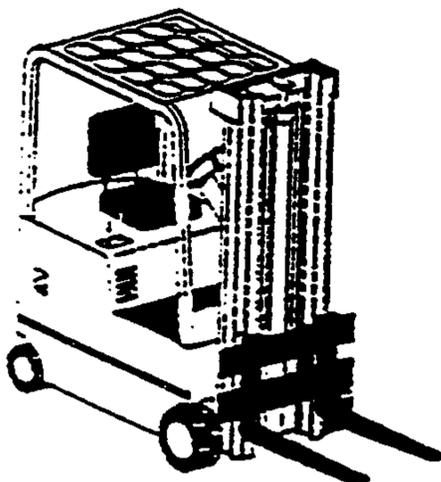
Class III - Electric Motor Hand Trucks
Lift Code 7 - High Lift Counterbalanced



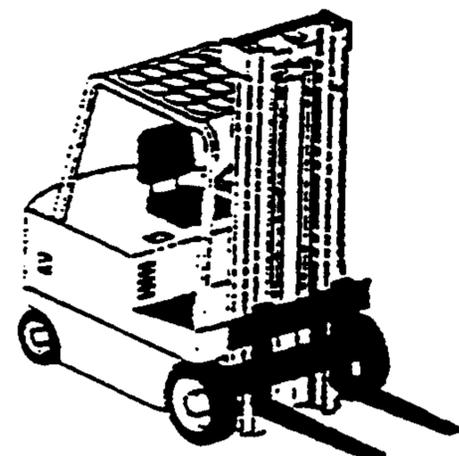
Class III - Electric Motor Hand Trucks
Lift Code 3 - Low Lift Walkie/Rider Pallet and End Control



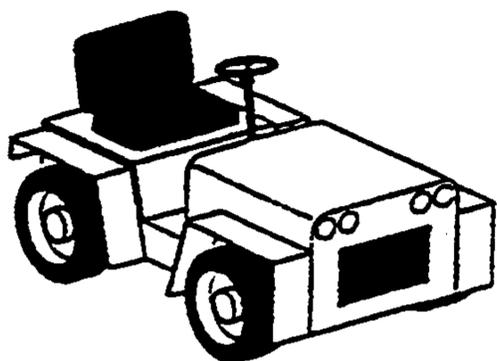
Class IV - Internal Combustion Engine Trucks
Lift Code 3 - Fork Counterbalanced. Cushion Tire



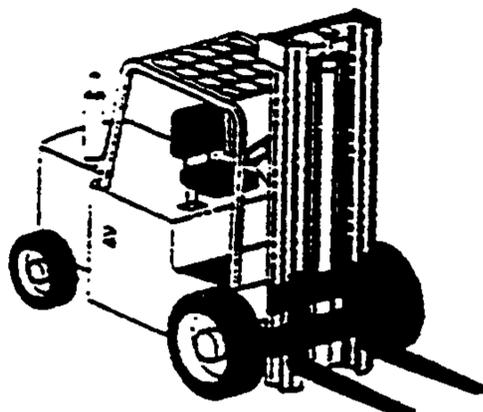
Class V - Internal Combustion Engine Trucks--Pneumatic Tires Only
Lift Code 4 - Fork Counterbalanced. Pneumatic Tire



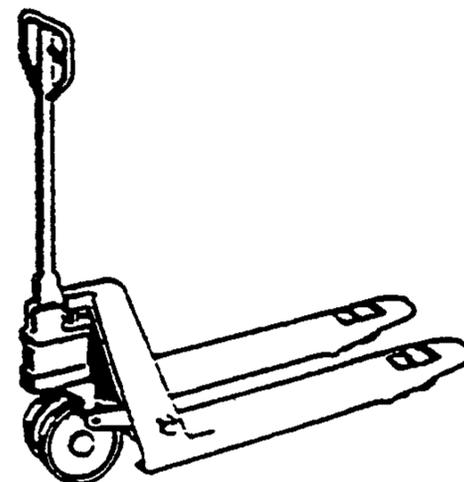
Class VI - Electric and Internal Combustion Engine Tractors
Lift Code 1 - Sit Down Rider



Class VII - Rough Terrain Fork Lift Truck
Lift Code 1 - All Rough Terrain Fork Lift Trucks



Hand Pallet Trucks





April 1, 1998 Modern Materials Handling

INDUSTRIAL TRUCK REPORT

**Our industrial truck report
has three parts.**

**Part I – Advances in
ergonomics**

Part II - Lift truck guide

Part III – Leasing tips

Your guide to commonly used lift trucks

Here's a pictorial walk-through of 17 standard lift truck models and their typical uses in warehousing and manufacturing operations, followed by a source selection chart. Illustrations are organized by Industrial Truck Association guidelines.

Our special thanks go to the Industrial Truck Association in Washington, D.C., for allowing us to adapt the drawings in this article from the group's Web site: www.indtrk.org

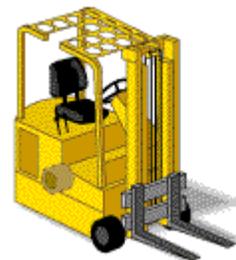
Class I - Electric motor rider trucks

Counterbalanced rider type, stand-up



Suited to short-distance moves of pallets and other loads that require the operator to frequently mount and dismount the truck

Three-wheel electric, sit-down



Made for longer distance travel and operation in restricted floor space that requires a tight turning radius aided by the single rear wheel.

Counterbalanced rider, sit-down



Used to move loads up to 10,000 lbs extended distances and in standard-width storage aisles for putaway and picking in racks of various heights

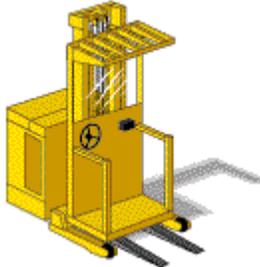
Class II - Electric motor narrow aisle trucks

High lift straddle



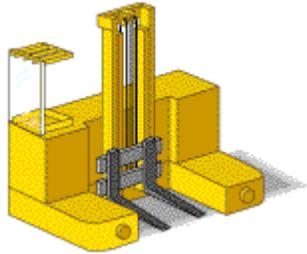
Intended for stacking pallet loads up to 4,000 lbs in multi-level storage racks. Straddle legs provide stability in the absence of a counterbalance

Orderpicker



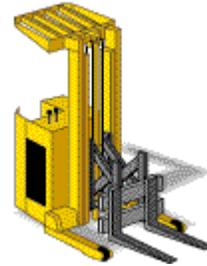
Designed to lift the operator on a platform along with the forks to a storage location for picking items or cases.

Sideloader, platform



Designed to handle oversized loads in narrow aisles, the outrigger platforms provide load stability during transportation. The mast does not pivot, making putaway and retrieval much like counterbalanced trucks

Reach type outrigger



Built for two-pallet deep storage in narrow aisles using the reach pantograph which extends into the rack. The outrigger arms provide stability.

Sideloader, high lift pallet



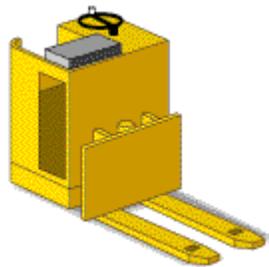
Used to store pallets in very narrow aisles to heights of 25 ft or more using a rotating mast that swings 90 deg to one side or the other side.

Turret truck



Suited to positioning loads in very narrow aisles using rotating forks that face right or left and traverse side-to-side across the front of the truck.

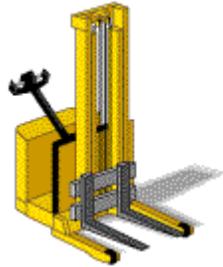
Low lift pallet



Made to transport loads longer distances and precisely position them on the floor or on a platform of minimal height. Platform versions are also available for handling skids and related loads

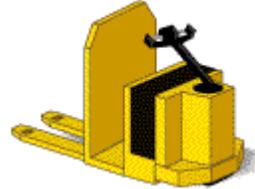
Class III - Electric motor hand trucks

High-lift straddle



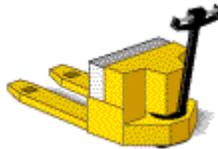
Built to lift loads to various heights depending on the length of the straddle arms which provide stability for the truck

Low lift walkie rider with center control



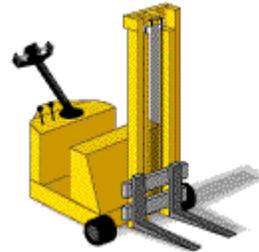
Designed to carry the pallet load and operator long distances as well as short ones while providing centered access to controls

Low lift walkie pallet



Intended as an economical, powered lift truck for transporting loads distances that an operator can comfortably walk. Tines raise just a few inches to clear the floor during transport

High-lift counterbalanced



Suited to accessing racks that the high-lift straddle truck cannot reach as well as heavier loads

Class IV - Internal combustion engine truck-cushion tires

Fork, counterbalanced



Intended as a general-purpose indoor lift truck for loads up to 10,000 lbs. Models come with multi-staged masts for accessing loads at various rack heights. Engines are typically powered by LP-gas or gasoline

Class V - Internal combustion engine truck-pneumatic tires only

Fork, counterbalanced



Suited to carry loads as heavy as 10,000 lbs both outdoor and indoor. Pneumatic tires make for softer rides and greater traction. Multi-staged masts and LP, gas, and diesel engines are available

Class VII - Rough terrain lift trucks

All rough terrain fork lift trucks



Ruggedized for outdoor conditions and difficult-to-traverse surfaces, these models transport loads that might exceed 10,000 lbs. They can also be used as the transportation interface between a storage yard and warehouse.

Source selection chart: industrial trucks

Class 1--Electric-powered rider trucks, including counterbalanced, sit-down, and stand-up types.

Class 2--Electric-powered narrow-aisle trucks, including orderpickers, side-loaders, turret trucks, stackers, and reach trucks.

Class 3--Electric-powered pallet trucks, including walkies, riders, low and high lift, and reach types.

Class 4--IC-powered counterbalanced lift trucks equipped with cushion tires.

Class 5--IC-powered counterbalanced lift trucks equipped with pneumatic tires.

Class 6--Electric-powered and IC-powered rider-type tow tractors.

Class 7--Rough terrain lift trucks.

Company	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
Atlet		X	X				
Balkancar	X			X	X		
Barrett Elec.	X	X	X				
Baumann		X			X		
Big Joe Mfg. Co.		X	X				
Blue Giant	X	X	X			X	
Boss Group USA					X		
Caterpillar	X	X	X	X	X		X
Case							X
Clark	X	X	X	X	X	X	X
Crown	X	X	X			X	
Daewoo	X			X	X		
Dahmer							X
Dockstocker	X		X				
Drexel	X	X					
Elwell-Parker	X			X		X	
Gehl							X
Halla America				X	X		
Harlo							X
Hyster	X	X	X	X	X		X
K-D Manitou							X
Kalmar AC	X	X	X	X	X		X
Komatsu	X	X	X	X	X		
Landoll		X					
Linde Baker	X	X	X		X	X	
Lull							X
Mitsubishi	X	X	X	X	X		
Multiton			X				
Nissan	X	X	X	X	X		
BT-Prime Mover	X	X	X				
Raymond	X	X	X			X	

Source selection chart: industrial trucks

Class 1--Electric-powered rider trucks, including counterbalanced, sit-down, and stand-up types.

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Class 7--Rough terrain lift trucks.

Company	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
Atlet		X	X				
Balkancar	X			X	X		
Barrett Elec.	X	X	X				
Baumann		X			X		
Big Joe Mfg. Co.		X	X				
Blue Giant	X	X	X			X	
Boss Group USA					X		
Caterpillar	X	X	X	X	X		X
Case							X
Clark	X	X	X	X	X	X	X
Crown	X	X	X			X	
Daewoo	X			X	X		
Dahmer							X
Dockstocker	X		X				
Drexel	X	X					
Elwell-Parker	X			X		X	
Gehl							X
Halla America				X	X		
Harlo							X
Hyster	X	X	X	X	X		X
K-D Manitou							X
Kalmar AC	X	X	X	X	X		X
Komatsu	X	X	X	X	X		
Landoll		X					
Linde Baker	X	X	X		X	X	
Lull							X
Mitsubishi	X	X	X	X	X		
Multiton			X				
Nissan	X	X	X	X	X		
BT-Prime Mover	X	X	X				
Raymond	X	X	X			X	

Royal Tractor	X						
Schaeff, Inc.	X	X	X				X
Sellick							X
Simpson Machine							X
Steinbock		X					
Taylor							X
TCM America	X		X	X	X		
Toyota	X	X	X	X	X		
Yale	X	X	X	X	X	X	

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Standard Interpretations

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- 1910.178(l)** - [Employers must evaluate prior training and ensure safe powered industrial truck operations.](#) [02/16/1999]
- 1910.178(l)** - [Fork inspection requirements for powered industrial trucks.](#) [10/22/1999]
- 1910.178(l)** - [Forklifts in construction: elevating personnel and operator training.](#) [09/30/1999]
- 1910.178(l)** - [Host employers may require site-specific forklift training of visiting workers.](#) [10/28/1999]
- 1910.178(l)** - [Installation of strobe lights on forklifts as an additional warning device for forklifts used in vessel holds.](#) [12/21/2004]
- 1910.178(l)** - [Log skidder operators must be trained in accordance with 1910.266\(i\)\(3\)\(ii\).](#) [08/30/1999]
- 1910.178(l)** - [Powered Industrial Truck 1910.178\(l\) training requirements applicable to construction; training for skid-steer loader operators.](#) [11/05/2004]
- 1910.178(l)** - [Powered industrial truck training content, certification, and record maintenance.](#) [10/01/1999]
- 1910.178(l)** - [Powered industrial truck training for employees working at another employer's worksite.](#) [04/10/2000]
- 1910.178(l)** - [Powered industrial truck training: different types of trucks.](#) [06/15/1999]
- 1910.178(l)** - [Powered industrial truck training: different types of trucks/workplace conditions.](#) [10/08/1999]
- 1910.178(l)** - [Refresher training requirements for operators of different types of trucks.](#) [04/08/1999]
- 1910.178(l)** - [Rough Terrain Forklift training course; OSHA doesn't approve products/services.](#) [08/23/1999]
- 1910.178(l)** - [Trailer trucks must be restrained/chocked during forklift dock operations.](#) [03/04/1998]
- 1910.178(l)** - [Training for travel lift \(mobile gantry crane\) operators.](#) [11/08/1999]
- 1910.178(l)(1)** - [Host employers must assure forklift operators of visiting employers are trained.](#) [04/06/1999]
- 1910.178(l)(1)** - [Powered Industrial Trucks: examination prior to being placed in service; evaluations conducted orally versus written; multi-level evaluations; seatbelt use.](#) [07/28/2004]

- 1910.178(l)(1)(i)** - [Disabled \(hearing impaired\) forklift operators.](#) [01/26/1998]
- 1910.178(l)(2)(ii)** - [Competency of powered industrial truck trainers; training must be truck- and site-specific.](#) [04/10/2000]
- 1910.178(l)(2)(iii)** - [Powered Industrial Truck \(forklift\) operator trainer qualifications.](#) [07/23/2003]
- 1910.178(l)(3)** - [Powered Industrial Trucks: examination prior to being placed in service; evaluations conducted orally versus written; multi-level evaluations; seatbelt use.](#) [07/28/2004]
- 1910.178(l)(3)(i)** - [Competency of powered industrial truck trainers; training must be truck- and site-specific.](#) [04/10/2000]
- 1910.178(l)(3)(i)(M)** - [Powered industrial truck requirements regarding "split-forking" and "bulldozing."](#) [11/02/1999]
- 1910.178(l)(3)(ii)** - [Competency of powered industrial truck trainers; training must be truck- and site-specific.](#) [04/10/2000]
- 1910.178(m)(2)** - [No person is allowed to stand or pass under the elevated portion of any powered industrial truck.](#) [04/14/2004]
- 1910.178(m)(5)** - [Requirements for leaving construction equipment and powder-actuated tools unattended on a construction building site; impalement protection from reinforcing steel for masonry workers on a scaffold.](#) [05/11/2005]
- 1910.178(m)(5)(ii)** - [Requirements for leaving construction equipment and powder-actuated tools unattended on a construction building site; impalement protection from reinforcing steel for masonry workers on a scaffold.](#) [05/11/2005]
- 1910.178(m)(5)(iii)** - [Requirements for leaving construction equipment and powder-actuated tools unattended on a construction building site; impalement protection from reinforcing steel for masonry workers on a scaffold.](#) [05/11/2005]
- 1910.178(m)(5)(iii)** - [The use of fork trucks in plants.](#) [01/29/1991]
- 1910.178(m)(7)** - [Clarification of OSHA's CPL 2-1.30 regarding tractor trailer chocking.](#) [11/09/1999]
- 1910.178(m)(7)** - [Trailer trucks must be restrained/chocked during forklift dock operations.](#) [03/04/1998]
- 1910.178(n)(4)** - [Response to request for variance from 1910.178\(n\)\(4\).](#) [02/12/1986]
- 1910.178(n)(8)** - [Evaluation of what is considered a safe speed to operate powered industrial trucks \(forklifts\).](#) [11/04/2004]
- 1910.178(n)(15)** - [Evaluation of what is considered a safe speed to operate powered industrial trucks \(forklifts\).](#) [11/04/2004]
- 1910.178(o)(1)** - [Powered industrial truck requirements regarding "split-forking" and "bulldozing."](#) [11/02/1999]
- 1910.178(p)** - [Clarification of the Powered Industrial Truck \(1910.178\) standard's use of the terms "in need of repair," "defective," and "unsafe."](#) [06/17/2004]

[1910.178\(p\)\(1\) - Clarification of the Powered Industrial Truck \(1910.178\) standard's use of the terms "in need of repair," "defective," and "unsafe."](#) [06/17/2004]

[1910.178\(p\)\(1\) - Powered industrial trucks must not be placed into service, or must be removed from service, when any condition exists that adversely affects the safety of the vehicle.](#) [09/13/2004]

[1910.178\(p\)\(1\) - Requirements for the sound level of a warning device \(horn\) located on a forklift.](#) [08/13/2004]

[1910.178\(q\) - Clarification of the Powered Industrial Truck \(1910.178\) standard's use of the terms "in need of repair," "defective," and "unsafe."](#) [06/17/2004]

[1910.178\(q\)\(1\) - Clarification of the Powered Industrial Truck \(1910.178\) standard's use of the terms "in need of repair," "defective," and "unsafe."](#) [06/17/2004]

[1910.178\(q\)\(5\) - Requirements for the sound level of a warning device \(horn\) located on a forklift.](#) [08/13/2004]

[1910.178\(q\)\(6\) - Powered Industrial Trucks: examination prior to being placed in service; evaluations conducted orally versus written; multi-level evaluations; seatbelt use.](#) [07/28/2004]

[1910.178\(q\)\(7\) - Fork inspection requirements for powered industrial trucks.](#) [10/22/1999]

[1910.178\(q\)\(7\) - Inspection requirements for powered industrial trucks not used for significant time periods.](#) [03/03/2005]

[1910.178\(q\)\(7\) - Powered Industrial Trucks: examination prior to being placed in service; evaluations conducted orally versus written; multi-level evaluations; seatbelt use.](#) [07/28/2004]

[1910.178\(q\)\(7\) - Powered industrial truck examinations do not have to be documented.](#) [02/07/2000]

[1910.178\(q\)\(7\) - Powered industrial trucks must not be placed into service, or must be removed from service, when any condition exists that adversely affects the safety of the vehicle.](#) [09/13/2004]

[1910.178\(q\)\(7\) - Pre-operation forklift examinations are not required to be written.](#) [05/09/2000]

[1910.178\(q\)\(7\) - Requirements for the sound level of a warning device \(horn\) located on a forklift.](#) [08/13/2004]

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

ELECTRIC BATTERY TIPS ON CARE AND SAFETY

Never lay tools on top of batteries. This can cause an arc (short circuit) between the cell connector bars and/or serious injury to the operator. Remember to replace plastic connector bar insulators if they have been temporarily removed for maintenance.

Don't take shortcuts (e.g. on lunch breaks) by charging batteries for less than at least 6 hours. During recharging, the battery must absorb enough energy to run the truck plus overcome the internal resistance of the cells. In other words, the amount of D.C. generated is greater than that taken to operate the lift truck. Ideally, a battery should be used 8 hours and allowed to cool 8 hours.

Batteries should need to be watered at about two to four week intervals. If they need to be watered more than this, you may wish to ensure that the battery charger is within $\pm 10\%$ of the battery's AH capacity with respect to the time period being charged. If this turns out to be within range, you may wish to check the manufacturer's specifications on both the charger and the battery and have them checked to see if they are performing up to "specs".

Check with the dealer for correct water refill levels on batteries. Do not over-water a battery. Add just enough water to cover the plates (about 1/8" over the plates). Too much water can cause the battery electrolyte substance to boil-over. This can cause corrosion or can act as a conductor that can drain the charge from the battery. Conversely, if a battery's plates are neglected and dry-out, they begin to undergo a process known as "sulfation". This means that the plates begin to harden and will no longer react to the chemical process. This greatly reduces a battery's life.

Refill water should be free of impurities. Distilled water is ideal. If distilled water is not used, you may wish to have your water tested to ensure that it contains only very small quantities of impurities (testing is normally done for iron, chloride, manganese, copper, nitrogen oxides, ammoniacal nitrogen, and total fixed residue or sulfated ash).

Proper lighting should be provided and maintained in the charging area. If operators cannot see into the battery, they may just assume that it is full and consequently fail to refill it. If a flashlight needs to be used, be certain that it has a plastic or rubber encasement to prevent accidental arcing. Do not allow matches or cigarette lighters to be used.

If battery-charging equipment is not power-assisted, ensure that operator injury hazards are eliminated.

Batteries should be kept clean. Accumulations of dirt on the battery top traps moisture, creating a conductive path which may result in ground leakage to the tray, compartment, or truck. This shortens battery life and may damage the electrical components. You should provide operators with a convenient water source. (If a garden hose is used, make certain that it has a non-metallic nozzle.) Provide paper towels, rags, non-metallic scrub brushes, plastic buckets and soap or detergent (non-ammonia based). Sodium bicarbonate can be used as a neutralizer. Also provide waste cans for proper disposal of these items after use.

In general, necessary personal protective equipment includes corrosion-resistant gloves, a face shield, protective apron, and eye goggles. Keep these items clean and in a sanitary condition. Also, an emergency eyewash and shower unit is recommended in areas where corrosives are in use. Eyewashes and showers must be flow-tested weekly. Make certain that the charging area is well ventilated to prevent concentrations of hydrogen from reaching the lower explosive level.

Adapted from:

Cohan, Bud, Lift Truck and Fleet Management and Operator Training, International Thomson Transport Press, 1st Edition, 1986

National Safety Council, Traveling Safely with Battery Powered Industrial Trucks, Electronic and Electrical Equipment Newsletter, National Safety Council, 44 North Michigan Avenue, Chicago, Illinois, 60611, February, 1980

LIQUID PETROLEUM GAS TIPS ON CARE AND SAFETY

Although liquid petroleum gas (LPG) produces much less exhaust than gasoline-powered forklifts, remember that it still exhausts carbon monoxide. Do not allow too many LPG forklifts to run in an enclosed building at the same time. Monitor the air periodically. Additionally, caution operators not to enter small enclosures and dismount the truck to pick-up items if the truck is left running.

Never drop, drag, or slide cylinders. Use a hand truck to securely transport tanks or roll the cylinder on its footing slightly off of the vertical. Valves on empty cylinders must be closed during storage and transportation.

It is recommended that cylinders be changed outside, although codes allow for changing indoors. Inspect cylinders before each installation for sharp dents, gouges, leaks, excessive external corrosion, and damaged collars or footings. Remove any damaged tanks from service immediately and contact the service company about the condition of the tank.

In addition, make specific preventative maintenance checks on the following: filler valve, liquid service valves, cylinder service valve coupling, safety relief valve, and magnetic liquid level gauge.

Tanks must be properly secured while transporting or when mounted to truck. Instruct operators on the proper mounting so that they always place the cylinder-locating pin in the twelve o'clock position. This allows the tank to vent vapors correctly (instead of being blocked by the liquid). Show operators proper installation so they don't force clamps on backwards.

When parking trucks for more than a few minutes, the following should be done:

- 1) Shut-off container fuel valve and run the engine "dry".
- 2) Turn-off the ignition switch.
- 3) See that no source of ignition or heat is present.

LPG can change from a liquid to a gas and back to liquid again, depending on the atmospheric pressure and temperature. Pressure in the tank increases directly as temperature increases.

When LPG vaporizes rapidly, it has a refrigerating effect. Care must be taken to avoid skin burns or frostbite.

No more than 300 pounds (full and/or empty) may be stored inside, and any tank must be secured and protected from damage by truck traffic. If stored outside, remember to keep the gas in a cool, shady area which is not likely to accumulate ice and rain. If tanks are stored horizontally, the safety relief valve must be in the twelve o'clock position so that vapors will be vented correctly.

LPG in its natural state is odorless. However, it has been odorized so leaks in the system can be detected. Pay attention to your nose!

Adapted from:

National LP Gas Association, "Safe Use of LP Gas in Industrial Trucks", Pamphlet, National LP Gas Association, 1301 West 22nd Street, Oak Brook, Illinois, 60521, 1980.

Department of Labor, 29 CFR, Subtitle B, Chapter XVII Occupational Safety and Health Administration, Parts 1900-1910, U.S. Government Printing Office, Superintendent of Documents, 1993.

Handbook of Compressed Gases, 3rd Edition, Compressed Gas Association, Van Nostrand Reinhold, NY, 1989.

National Fire Codes, NFPA 58, "Standard for the Storage & Handling of Liquefied Petroleum Gas", Volume 2, National Fire Protection Association Standards Council, 1 Batterymarch Park, Quincy, MA, 02269, 1992 Edition.

Internet Resources for Powered Industrial Trucks

June 2004

Government

Department of Energy, Technical Reference on Powered Industrial Trucks

http://tis-hq.eh.doe.gov/docs/osh_tr/ch6.html

National Institute for Occupational Safety and Health

NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts, 2001.

<http://www.cdc.gov/niosh/2001-109.html>

Occupational Safety and Health Administration

Links to safety and health information about powered industrial trucks

<http://www.osha.gov/SLTC/powerindustrialtrucks/index.html>

Training reference materials

<http://www.osha.gov/dcsp/ote/trng-materials/pit/pit.html>

Ohio Bureau of Workers' Compensation, Division of Safety & Hygiene

Ohio Forklift Rodeo Championship

<http://www.ohiobwc.com/employer/programs/safety/forklift.asp>

Online safety booklet

<https://www.ohiobwc.com/downloads/blankpdf/PowerIndTrucks.pdf>

Video Library – videos on forklift safety are found under “Industrial Safety”

<http://www.ohiobwc.com/employer/programs/safety/VideoLibrary.asp>

Oklahoma State University's Online safety library

<http://www.pp.okstate.edu/ehs/links/forklift.htm>

Associations

Industrial Truck Association

<http://www.indtrk.org/>

Propane Education and Research Council

<http://www.propanecouncil.org/trade/forklift/safety.htm>

Safety meeting outlines

<http://www.oan.org/members/safety/forklift.pdf>

To search for ANSI standards

<http://www.nssn.org/>

Businesses

The Grey House Safety and Security Directory

Buying guide and OSHA compliance information

<http://safety.365media.com/safety/index.asp>

News and information on material handling and warehousing

<http://www.manufacturing.net/mmh/>

<http://www.mhmonline.com/>

Online training courses

<http://www.free-training.com/osha/forklift/forkmenu.htm>

<http://usaforklift.com/Modules.html>

Safety meeting outlines

<http://www.eig.com/smodex.html#equipmentthaz>

Compiled by:
Ohio Bureau of Workers' Compensation
Division of Safety & Hygiene Libraries
30 W. Spring St., L-3
Columbus, OH 43215
(800) 644-6292
(614) 466-7388
library@bwc.state.oh.us
www.ohiobwc.com

Resources Available from the Division of Safety & Hygiene (DSH) Libraries

(800) 644-6292 (614) 466-7388

library@bwc.state.oh.us

www.ohiobwc.com

Safety training:

- Safety talks, outlines and scripts - DSH Safety leader's discussion guide, Training Center's One-hour safety presentations, reference books, web resources
- Videos – hundreds of safety and health topics
- Books and articles on training techniques

Machine and equipment safety:

- Safety standards (ANSI, NFPA, CGA)
- Books and articles on power presses, material handling equipment, lockout/tagout, etc.

Sample written programs:

- DSH program profiles and sample written programs
- Reference books
- Internet resources

Illness and injury statistics:

- Statistics from the U.S. Bureau of Labor Statistics
- National Safety Council's *Injury Facts*
- National Institute of Occupational Safety & Health (NIOSH) studies

Hazard communication and chemical safety:

- Chemical safety information
- Material safety data sheets (MSDSs)
- Sample written programs
- Videos
- Internet resources

Safety standards

- American National Standards Institute (ANSI) standards (including standards for construction, machinery and equipment, personal protective equipment)
- National Fire Protection Association (NFPA) fire codes (including the Life Safety Code and the National Electrical Code)
- Compressed Gas Association (CGA) standards

Other topics of interest (books, articles, magazines, videos and standards):

- Confined spaces
- Electrical safety
- Job safety analysis
- New employee orientation
- Powered industrial trucks
- Respiratory protection
- Scaffolds
- Spill response

Directories and lists of vendors of safety equipment

Occupational Safety & Health Administration (OSHA) regulations

Manual of Uniform Traffic Control Devices (MUTCD)

Recommendations of useful Internet sites

BWC publications

Saving You Time and Research

Requests for copies of OSHA standards, information on starting a safety committee, a video on accident investigation techniques -- these are some of the thousands of inquiries BWC's Division of Safety & Hygiene (DSH) libraries receive each year.

DSH has two libraries to serve you:

- The central library in the William Green Building in downtown Columbus;
- The resource center and video library located at the Ohio Center for Occupational Safety and Health (OCOSH) in Pickerington.

Both libraries are open 8 a.m. to 4:45 p.m., Monday through Friday. Your need for information does not require a visit to the library. You can phone, fax, or e-mail your requests and receive a quick response.

The central library provides free information services on the topics of occupational safety and health, workers' compensation and rehabilitation.

The OCOSH resource center provides similar services for those who visit OCOSH for meetings and training center classes.

The video library offers an extensive collection of videotapes to supplement your organization's safety and health training program. It is a convenient and popular source for Ohio employers to borrow quality occupational safety- and health-related training aids.

Visit our Web site at **www.ohiobwc.com**.

Central library
30 W. Spring St., Third Floor
Columbus OH 43215-2256
1-800-OHIOBWC
(614) 466-7388
(614) 644-9634 (fax)
library@bwc.state.oh.us

OCOSH Resource Center
13430 Yarmouth Drive
Pickerington OH 43147
1-800-OHIOBWC
Resource center (614) 728-6464
Video library (614) 644-0018

INTERNET WEB SITES
for
OCCUPATIONAL SAFETY & HEALTH INFORMATION
September 2007

The Ohio Bureau of Workers' Compensation provides a variety of safety tools and resources on our web site, www.ohiobwc.com. Click on Safety Services to find out more about what BWC's Division of Safety & Hygiene offers online. Tools and resources include lifting guidelines, recordkeeping spreadsheets, sample OSHA program guides, and training materials. You'll also find a longer version of this list of web sites.

GENERAL

CANADIAN CENTRE FOR OCCUPATIONAL HEALTH & SAFETY (CCOHS)

<http://ccohs.ca>

This Canadian government site has an extensive Internet directory. There is also a unique feature called "OSH Answers" and a guide to safety-related acronyms.

NATIONAL SAFETY COUNCIL (NSC)

<http://www.nsc.org>

Visit this web site for information on safety in the workplace, at home, on the road and in the community.

NYCOSH

<http://www.nycosh.org>

The New York Committee for Occupational Safety & Health offers news releases, links to helpful safety resources, strategies for safer workplaces, information on workplace hazards, workers' compensation and much more.

OCCUPATIONAL HAZARDS

<http://www.occupationalhazards.com>

The online version of the magazine *Occupational Hazards* is filled with today's headlines, articles, white papers, case studies, and product news.

OKLAHOMA STATE UNIVERSITY

<http://www.pp.okstate.edu/ehs>

The Department of Environmental Health & Safety at OSU has an online safety resource library with topics from A-Z. Go to the "Links Library" option.

OREGON HEALTH & SCIENCE UNIVERSITY

<http://www.croetweb.com>

This site consists of information on occupations & industries, chemical hazards, workplace safety issues, ergonomic issues, biological hazards, and includes materials in Spanish.

VERMONT SIRI

<http://hazard.com>

Contains a wide variety of resources: MSDSs, an online library of graphics, articles and PowerPoint presentations, e-mail discussion list archives, and a list of safety & health consultants.

FEDERAL GOVERNMENT**AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY**

<http://www.atsdr.cdc.gov/>

Look for information on hazardous substances, emergency response and hazardous waste sites.

BUREAU OF LABOR STATISTICS, SAFETY & HEALTH

<http://www.bls.gov/bls/safety.htm>

Find national statistics on work-related injuries and illnesses and fatalities.

CENTERS FOR DISEASE CONTROL & PREVENTION (CDC)

<http://www.cdc.gov>

A good resource for general public health issues throughout the United States. Health topics from A-Z give an in-depth look at most communicable diseases as well as topics such as safe driving, violence, and air pollution.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

<http://www.epa.gov>

The EPA's web site provides a wealth of information on a wide range of topics. Of particular interest: resources on lead, asbestos, indoor air quality, mold, and school environmental issues.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

<http://www.fema.gov>

For information on disasters and emergencies nationwide, access this web site. Publications include options for emergency preparedness and prevention, response and recovery, disaster fact sheets, and public awareness information.

MINE SAFETY AND HEALTH ADMINISTRATION

<http://www.msha.gov>

Features information on mine safety and health, including noise, dust, statistics, safety hazard alerts and talks, training, regulations, and rescue.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH (NIOSH)

<http://www.cdc.gov/niosh/homepage.html>

NIOSH's site describes their services and research activities and provides information on many workplace safety and health topics. Most of their publications are available online.

NATIONAL LIBRARY OF MEDICINE (NLM)

<http://www.nlm.nih.gov>

The world's largest medical library: a reliable source for medical, health and chemical hazard information.

OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

<http://www.osha.gov>

OSHA'S web site includes compliance assistance resources, online publications, statistics, OSHA standards & directives, and a very useful A-Z site index.

OHIO**OHIO DEPT. OF HEALTH**

<http://www.odh.state.oh.us>

Provides a wide variety of public health information, including occupational and environmental health, women's health, and health resources.

OHIO EPA (OEPA)

<http://www.epa.state.oh.us>

Use the "Topic Index" to find Ohio EPA regulations and information on permits, hazardous waste, pollution prevention, wastewater, wetlands, and much more.

STATE LIBRARY OF OHIO/OHIOLINK

<http://slonet.state.oh.us/>

Search the State Library of Ohio's online catalog which includes BWC's Division of Safety & Hygiene library books.

SPECIFIC (BY SUBJECT)**CONSTRUCTION**

<http://www.cdc.gov/elcosh/index.html>

eLCOSH is a comprehensive library of construction safety information presented in both English and Spanish with items searchable by trade, hazard, job site, etc.

DRUG-FREE WORKPLACE

<http://www.dol.gov/workingpartners/welcome.html>

Working Partners for an Alcohol- and Drug-Free Workplace. Provides guidelines on establishing a workplace substance abuse program. Search the Substance Abuse Information Database. From the U.S. Dept. of Labor.

EMERGENCY MANAGEMENT GUIDE FOR BUSINESS & INDUSTRY

<http://www.fema.gov/business/guide/index.shtm>

Presents a step-by-step approach to emergency planning, response, and recovery for companies of all sizes. From the Federal Emergency Management Agency.

ERGONOMICS

<http://www.ergoweb.com>

Ergoweb's site offers ergonomics news, a buyer's guide and case studies, in addition to sources for software and services.

HAZARDOUS MATERIALS AND HAZARDOUS WASTE

<http://tools.niehs.nih.gov/wetp>

The National Clearinghouse for Worker Safety and Health Training is a resource for workers and trainers who are involved in the handling of hazardous waste or in responding to emergency releases of hazardous materials and terrorist actions.

INDOOR AIR QUALITY

<http://sis.nlm.nih.gov/enviro/indoorairpollution.html>

Compiled by the National Library of Medicine, this web page provides information on a variety of indoor air topics as well as glossaries, database searches and web pages in Spanish.

MSDS

<http://www.ilpi.com/msds>

Touted as "Where to find material safety data sheets on the Internet", this site offers links to 100 free sites as well as news, FAQs, and an MSDS glossary.

SAFETY MANUALS & SAMPLE WRITTEN PROGRAMS**OSHA**

http://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html

OSHA provides sample written programs for employers to use as guidance when developing their own customized programs tailored to their specific workplaces.

ILLINOIS ONSITE SAFETY & HEALTH CONSULTATION PROGRAM

<http://www2.illinoisbiz.biz/osha/resource.htm>

At this site you will find sample written programs on a variety of topics. Also available are checklists and safety guide books, some in Spanish.

SAFETYNET

<http://medical.smis.doi.gov/prog.htm>

Sponsored by the U.S. Department of the Interior, you will find sample written safety programs to use as templates. Health hazard information and medical reference material is also available.

Ohio Bureau of Workers' Compensation, Div. of Safety & Hygiene Libraries

(800) 644-6292, press options 2 – 2 - 1

(614) 466-7388 (614) 644-9634 (fax)

E-Mail: library@bwc.state.oh.us

www.ohiobwc.com

One Hour Safety Presentation

One Hour Safety Presentation

The main goal of the Division of Safety & Hygiene is the reduction of accidents and illnesses in the workplace. Toward this goal, the One Hour Safety presentation is designed to support the delivery of a presentation to co-workers in your workplace to help them understand and promote safer and healthier work environments. It is recommended that you take the DSH Training Center course as a background for using One Hour Safety Presentation to train others at your workplace. Call 1-800-OHIOBWC, option 2, 2, 2 for class dates and locations.

The One Hour Safety Presentation contains:

- Transparency Masters from which films can be made to use on an overhead projector,
- Instructor Notes which gives the instructor suggestions and script notations to use during the presentation, and
- Student Handouts which can be copied for those attending the presentation.

Materials are included for a one-hour presentation on each of these topics:

- ✓ Accident Analysis
- ✓ Bloodborne Pathogens
- ✓ Effective Safety Teams
- ✓ Enhancing Safety through a Drug-Free Workplace
- ✓ Ergonomics Basic Principles
- ✓ Ergonomics Developing an Effective Process
- ✓ Hazard Communication
- ✓ Lockout/Tagout and Safety-related Work Practices
- ✓ Machine Guarding Basics
- ✓ Measuring Safety Performance
- ✓ Powered Industrial Trucks Training Program
- ✓ Respiratory Protection
- ✓ Violence in the Workplace

Applications used:

- 1) Text documents (ending in .txt) can be opened with any word processing program.
- 2) Microsoft PowerPoint slides (ending in .ppt) can be opened with the Microsoft PowerPoint program. If you do not have PowerPoint and you do have Windows 95, 98, 2000 or Windows NT operating system, you can view the PowerPoint slides by downloading a free PowerPoint Viewer from the following website:
<http://office.microsoft.com/downloads/default.aspx?Product=PowerPoint&Version=95|97|98|2000|2002&Type=Converter|Viewer>
- 3) Adobe Reader document (ending in .pdf) contains the One Hour Safety Presentation in read-only format. It can be opened when you download Adobe Reader, which is available free of charge at the following website:
<http://www.adobe.com/products/acrobat/readstep2.html>

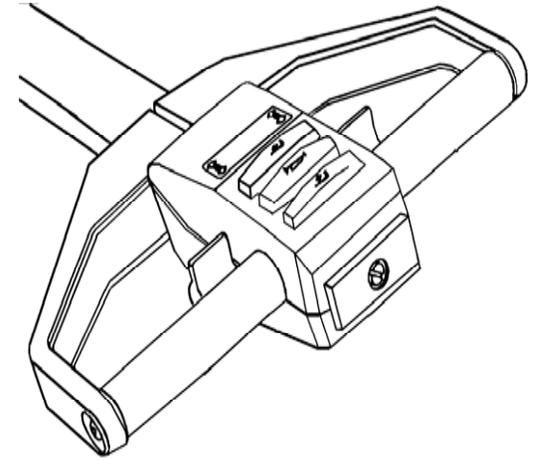
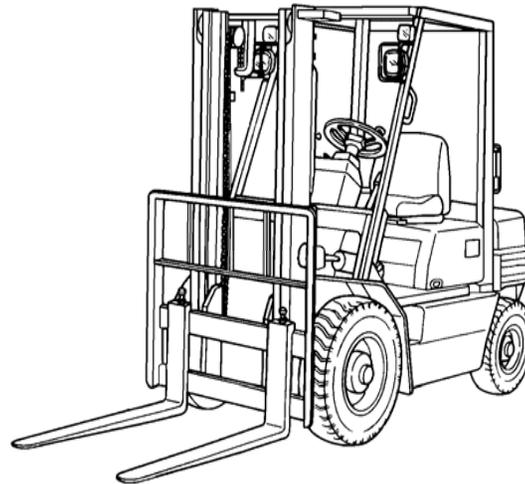
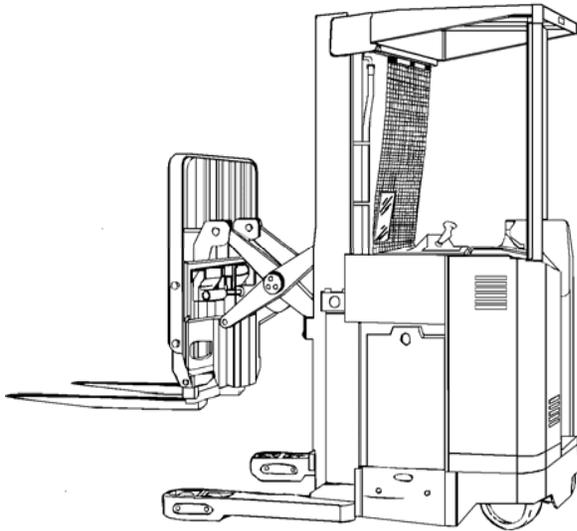
If you have comments or questions about these materials for One Hour Safety Presentation, please e-mail us: OCOSHTrng@bwc.state.oh.us

Transparency Masters

Powered Industrial Truck

29 CFR 1910.178

Final Rule



“1.5 million workers operating nearly 1 million powered industrial trucks.”

**Roughly 100 workers killed per year
related to powered industrial truck
operations :**

95,000 Injured (lost work days**) per year**

**Lack of training is one cause of powered
industrial truck accidents. OSHA notes that
many of the accidents listed could have been
caused by improper training.**

Development of a Training Program

- ***1910.178 (L)(2)(ii)***-Training must consist of a combination of formal classroom instruction, operator practical exercises, and evaluation of the operator's performance in the workplace
- ***1910.178 (L)(2)(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

**Training Program Content:
1910.178 (L)(3) -**

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

Truck Related Topics Content:

1910.178 (L)(3)(i)-

- **(A) All operating instructions - warnings and precautions for the types of trucks the operator will be authorized to operate**
- **(B) Similarities to, and differences from the automobile:**

Forklift

Narrow wheel track

Short wheelbase

High structure

3-point suspension

Center of Gravity is higher and moves in a significant range

w/loads

3 or 4 wheels, Steers from the rear

Automobile

Wide wheel track

Long wheelbase

Low structure

4- point suspension

Center of Gravity is low and moves in a narrow range

4 wheels , Steers from the front

Truck Related Topics Content: 1910.178 (L)(3)(i)- Continued

- **(C) Controls & Instruments - Location, What they do, How they operate**
- **(D) Engine or Motor - operation and maintenance**
- **(E) Steering & Maneuvering**
- **(F) Visibility - including restrictions due to loading**
- **(G) Fork and attachments - adaptation operations and limitations**
- **(H) Vehicle capacity**
- **(I) Vehicle stability**

Truck Related Content Continued: 1910.178 (L)(3)(I)

- **(J) Vehicle Inspection and maintenance / that the operator will be required to perform**
- **(K) Refueling and/or charging, recharging batteries**
- **(L) Operating limitations - and**
- **(M) Any other operating instructions, warnings or precautions listed in the operator's manual for the types of vehicles that the employee is being trained to operate**

Workplace Related Topics Content

Continued: 1910.178 (L)(3)(ii)

- **(A) Surface conditions where the vehicle will be operated**
- **(B) Composition of loads to be carried & load stability**
- **(C) Load manipulation, stacking , un-stacking**
- **(D) Pedestrian traffic in areas where vehicle will be operated**
- **(E) Narrow aisles and other restricted places**
- **(F) Hazardous classified locations**

Workplace Related Content

Continued: 1910.178 (L)(3)(ii)

- **(G) Ramps and other sloped surfaces that could effect the vehicle's stability**
- **(H) Closed environments and other areas where insufficient ventilation or poor 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**

Other Hazards

- **Falling Loads**
- **Falling from Platforms, Curbs, Trailers, etc..**
- **Obstructed Views**
- **Inattention**
- **Riders**
- **Vehicle Not Maintained**
- **Carbon Monoxide**
- **Rough - Uneven - Unleveled floors**
- **Unusual Loads**
- **Classified Areas**
- **Narrow Aisles**
- **Pedestrians**

Training program implementation

- ***1910.178 (L)(2)(i)* - Trainees may operate a powered industrial truck only:**
- ***1910.178 (L)(2)(i)(A)* - Under the direct supervision of a person who has the knowledge, training, and experience to train operators and evaluate their competence; and,**
- ***1910.178 (L)(2)(i)(B)* - Where such operator does not endanger the trainee or other employees**

Refresher Training and Evaluation 1910.178 (L) (4)(i)

Refresher training , including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (L)(4)(ii) to ensure the operator has the skills needed to operate the powered industrial truck safely

Refresher Training

1910.178 (L)(4)(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: When the operator has been involved in an accident or a near miss incident**
- **C: When the operator has received an evaluation that reveals that the operator is not operating the truck safely**

Refresher Training Continued: 1910.178 (L)(4)(ii)

- **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**

Evaluation

1910.178 (L)(4)(iii)

- **An evaluation of each powered industrial truck operator's performance shall be conducted at least every three years**

Avoidance of Duplicative Training

1910.178 (L)(5)

- **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**

Operator Qualification

- ***1910.178 (L)(1)(i)* - The employer shall ensure: each potential 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 (L)**
- ***1910.178 (L)(1)(ii)* - Prior to permitting an employee to operate a powered industrial truck (except for training purposes) the employee has successfully completed the training required by this paragraph (L), except as permitted by paragraph (L)(5) - (Avoidance of Duplicative Training Section)**

Certification
1910.178 (L)(6)

The employer shall certify that each operator has :

Been trained and evaluated as required in paragraph (L)

The certification shall include:

Name of Trainee Operator

Date of Training

Date of the Evaluation

**Identify the person(s) performing the training and
evaluation**

Instructor Notes

Thank you for your interest in teaching the basics of safe operation of powered industrial trucks to your employees and for promoting self-sufficiency on behalf of the Division of Safety & Hygiene.

A few points to keep in mind while teaching this class to your employees.

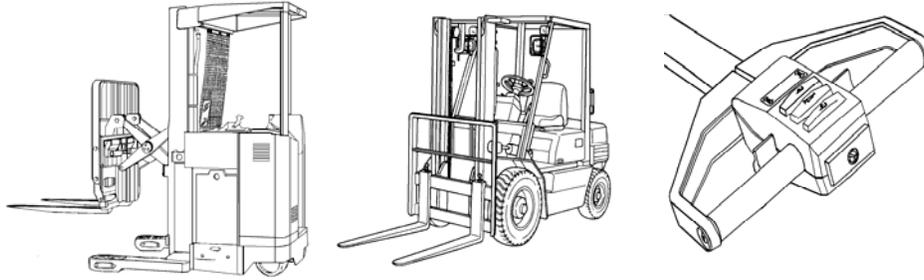
Try to do everything you can to get your students “involved” with the information that you will be presenting. This means using actual work place examples wherever possible. Try to use your own forklifts, your own inspection forms, your own loads and hazards, and certainly refer to your company specific procedures when at all possible.

If possible, incorporate some exercises into your training. These exercises might be as simple as small groups reviewing a specific inspection checklist or as involved as having people actually drive the forklift and pick up and move a load in their immediate work area. You might even have each person present a review of an operational procedure. The key is to get your class involved so that they are not just listening to you lecture.

Encourage questions and repeat questions for clarity to be sure that everyone has heard and understood. Even if you know the answer, a good technique is to ask the class if anyone can answer the question. On questions where you’re not sure of the answer or there is disagreement within the class, tell the class that you’ll check on it during a break or as soon after the class as possible. Follow-up and make sure everyone gets the information.

Remember, your goal is to teach your employees to be safe and to provide accurate information about powered industrial trucks operation and about your specific powered industrial trucks training program.

**Powered Industrial Truck
29 CFR 1910.178
Final Rule**



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industrial truck accidents. OSHA notes that
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Development of a Training Program

- **1910.178 (L)(2)(ii)-Training must consist of a combination of formal classroom instruction, operator practical exercises, and evaluation of the operator's performance in the workplace**
- **1910.178 (L)(2)(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**

You'll need to have some type of manual or trainer's guide covering the specifics of the information covered in the class.

Also need a driving or skills test and will have to maintain your training records.

**Training Program Content:
1910.178 (L)(3) -**

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

Truck Related Topics Content: 1910.178 (L)(3)(i)-

- **(A) All operating instructions - warnings and precautions for the types of trucks the operator will be authorized to operate**
- **(B) Similarities to, and differences from the automobile:**

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Narrow wheel track
Short wheelbase
High structure
3-point suspension
Center of Gravity is higher and moves in a significant range w/loads
3 or 4 wheels, Steers from the rear

Automobile

Wide wheel track
Long wheelbase
Low structure
4- point suspension
Center of Gravity is low and moves in a narrow range
4 wheels , Steers from the front

This identifies each topic area that has to be covered in training.

**Truck Related Topics Content:
1910.178 (L)(3)(i)- Continued**

- **(C) Controls & Instruments - Location, What they do, How they operate**
- **(D) Engine or Motor - operation and maintenance**
- **(E) Steering & Maneuvering**
- **(F) Visibility - including restrictions due to loading**
- **(G) Fork and attachments - adaptation operations and limitations**
- **(H) Vehicle capacity**
- **(I) Vehicle stability**

**Truck Related Content Continued:
1910.178 (L)(3)(I)**

- **(J) Vehicle Inspection and maintenance / that the operator will be required to perform**

- **(K) Refueling and/or charging, recharging batteries**

- **(L) Operating limitations - and**

- **(M) Any other operating instructions, warnings or precautions listed in the operator's manual for the types of vehicles that the employee is being trained to operate**

Workplace Related Topics Content
Continued: 1910.178 (L)(3)(ii)

- **(A) Surface conditions where the vehicle will be operated**
- **(B) Composition of loads to be carried & load stability**
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- **(E) Narrow aisles and other restricted places**
- **(F) Hazardous classified locations**

Workplace Related Content
Continued: 1910.178 (L)(3)(ii)

- **(G) Ramps and other sloped surfaces that could effect the vehicle's stability**
- **(H) Closed environments and other areas where insufficient ventilation or poor 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**

Other Hazards

- **Falling Loads**
- **Falling from Platforms, Curbs, Trailers, etc..**
- **Obstructed Views**
- **Inattention**
- **Riders**
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- **Rough - Uneven - Unleveled floors**
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- **Narrow Aisles**
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Training program implementation

- **1910.178 (L)(2)(i) - Trainees may operate a powered industrial truck only:**
- **1910.178 (L)(2)(i)(A) - Under the direct supervision of a person who has the knowledge, training, and experience to train operators and evaluate their competence; and,**
- **1910.178 (L)(2)(i)(B) - Where such operator does not endanger the trainee or other employees**

Can no longer just give cursory training and release for driving.

**Refresher Training and Evaluation
1910.178 (L) (4)(i)**

Refresher training , including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (L)(4)(ii) to ensure the operator has the skills needed to operate the powered industrial truck safely

Have to develop an effective method for re-training.

Refresher Training 1910.178 (L)(4)(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: When the operator has been involved in an accident or a near miss incident**

- **C: When the operator has received an evaluation that reveals that the operator is not operating the truck safely**

This tells when refresher training is needed.

The company needs to assign accountability to individuals to monitor these situations that call for re-training.

Records may be necessary.

**Refresher Training Continued:
1910.178 (L)(4)(ii)**

- **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**

Evaluation
1910.178 (L)(4)(iii)

- **An evaluation of each powered industrial truck operator's performance shall be conducted at least every three years**

There is no direction on how the evaluation is to be accomplished. It might be partly through observation, oral questioning, written documentation, etc.

Avoidance of Duplicative Training

1910.178 (L)(5)

- **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**

This means, if a potential operator can provide specific information indicating that their past training meets the specific needs of your operation, duplicative training is not required. However, without such proof of specific past training, complete training would be needed.

Operator Qualification

- **1910.178 (L)(1)(i) - The employer shall ensure: each potential 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 (L)**
- **1910.178 (L)(1)(ii) - Prior to permitting an employee to operate a powered industrial truck (except for training purposes) the employee has successfully completed the training required by this paragraph (L), except as permitted by paragraph (L)(5) - (Avoidance of Duplicative Training Section)**

Certification
1910.178 (L)(6)

The employer shall certify that each operator has :

Been trained and evaluated as required in paragraph (L)

The certification shall include:

Name of Trainee Operator

Date of Training

Date of the Evaluation

**Identify the person(s) performing the training and
evaluation**

This is not a license but just a written record to authorize the operator to use the equipment in the environment in which they were trained.

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 identify 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:

1. a discussion with the employee
2. an observation of the employee operating the powered industrial truck
3. written documentation of previous training
4. 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 to adopt medical qualification requirements which are necessary to assure that an individual 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 vehicles, 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 understands 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 cost 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 Longshoring. 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 states that only those employees determined 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 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
- Toploaders
- Semi-tractor/utility vehicles
- Sidehandlers
- 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.

Student Handouts

Powered Industrial Truck
29 CFR 1910.178
Final Rule



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Lack of training is one cause of powered industrial truck accidents. OSHA notes that many of the accidents listed could have been caused by improper training.

Development of a Training Program

- 1910.178 (L)(2)(ii)-Training **must** consist of a **combination of formal classroom instruction, operator practical exercises, and evaluation** of the operator’s performance in the workplace
- 1910.178 (L)(2)(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

**Training Program Content:
1910.178 (L)(3) -**

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

**Truck Related Topics Content:
1910.178 (L)(3)(i)-**

- (A) All operating instructions - warnings and precautions for the types of trucks the operator will be authorized to operate
- (B) Similarities to, and differences from the automobile:

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Narrow wheel track
Short wheelbase
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Center of Gravity is higher and moves in a significant range w/loads
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**Truck Related Topics Content:
1910.178 (L)(3)(i)- Continued**

- (C) Controls & Instruments - Location, What they do, How they operate
- (D) Engine or Motor - operation and maintenance
- (E) Steering & Maneuvering
- (F) Visibility - including restrictions due to loading
- (G) Fork and attachments - adaptation operations and limitations
- (H) Vehicle capacity
- (I) Vehicle stability

**Truck Related Content Continued:
1910.178 (L)(3)(I)**

- (J) Vehicle Inspection and maintenance / that the operator will be required to perform
- (K) Refueling and/or charging, recharging batteries
- (L) Operating limitations - and
- (M) Any other operating instructions, warnings or precautions listed in the operator's manual for the types of vehicles that the employee is being trained to operate

**Workplace Related Topics Content
Continued: 1910.178 (L)(3)(ii)**

- (A) Surface conditions where the vehicle will be operated
- (B) Composition of loads to be carried & load stability
- (C) Load manipulation, stacking , un-stacking
- (D) Pedestrian traffic in areas where vehicle will be operated
- (E) Narrow aisles and other restricted places
- (F) Hazardous classified locations

**Workplace Related Content
Continued: 1910.178 (L)(3)(ii)**

- (G) Ramps and other sloped surfaces that could effect the vehicle's stability
- (H) Closed environments and other areas where insufficient ventilation or poor 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

Other Hazards

- Falling Loads
- Falling from Platforms, Curbs, Trailers, etc..
- Obstructed Views
- Inattention
- Riders
- Vehicle Not Maintained
- Carbon Monoxide
- Rough - Uneven - Uneveled floors
- Unusual Loads
- Classified Areas
- Narrow Aisles
- Pedestrians

Training program implementation

- *1910.178 (L)(2)(i)* - Trainees may operate a powered industrial truck only:
- *1910.178 (L)(2)(i)(A)* - Under the direct supervision of a person who has the knowledge, training, and experience to train operators and evaluate their competence; and,
- *1910.178 (L)(2)(i)(B)* - Where such operator does not endanger the trainee or other employees

Refresher Training and Evaluation 1910.178 (L) (4)(i)

Refresher training , including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (L)(4)(ii) to ensure the operator has the skills needed to operate the powered industrial truck safely

**Refresher Training
1910.178 (L)(4)(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: When the operator has been involved in an accident or a near miss incident
- C: When the operator has received an evaluation that reveals that the operator is not operating the truck safely

**Refresher Training Continued:
1910.178 (L)(4)(ii)**

- 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

**Evaluation
1910.178 (L)(4)(iii)**

- An evaluation of each powered industrial truck operator's performance shall be conducted at least every three years

**Avoidance of
Duplicative Training**

1910.178 (L)(5)

- 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

Operator Qualification

- *1910.178 (L)(1)(i)* - The employer shall ensure: each potential 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 (L)
- *1910.178 (L)(1)(ii)* - Prior to permitting an employee to operate a powered industrial truck (except for training purposes) the employee has successfully completed the training required by this paragraph (L), except as permitted by paragraph (L)(5) - (Avoidance of Duplicative Training Section)

**Certification
1910.178 (L)(6)**

The employer shall certify that each operator has :

Been trained and evaluated as required in paragraph (L)

The certification shall include:

Name of Trainee Operator

Date of Training

Date of the Evaluation

Identify the person(s) performing the training and evaluation
