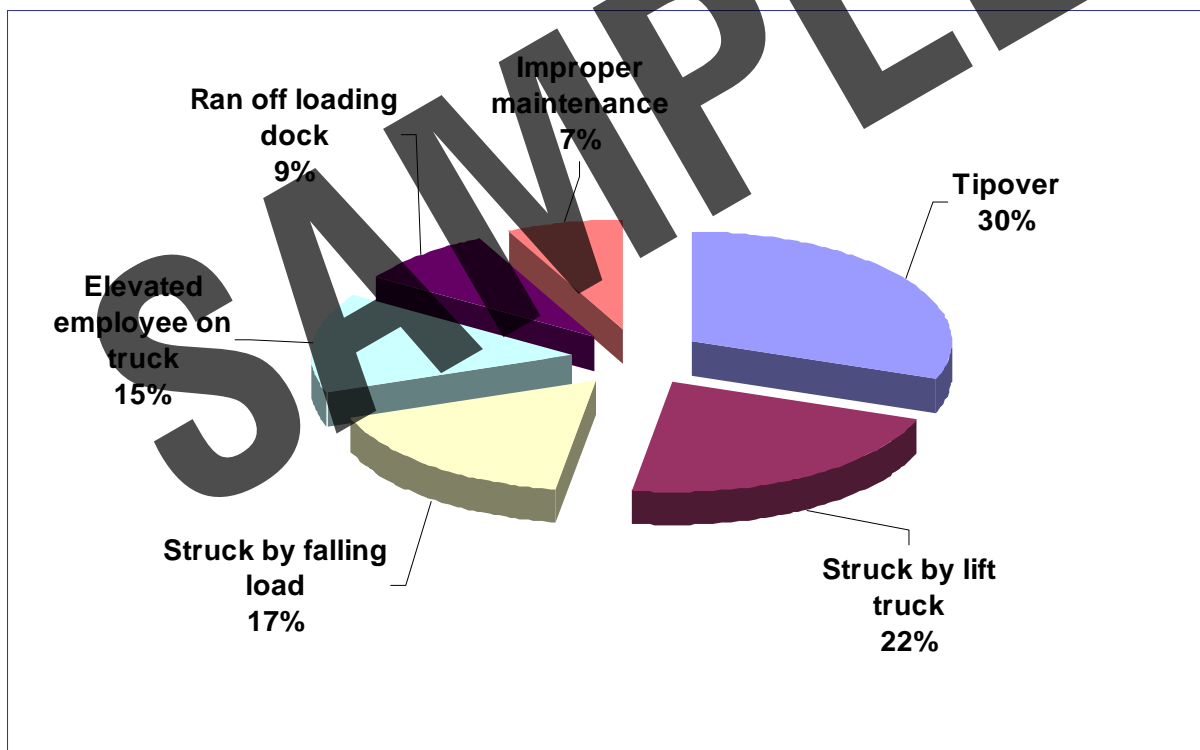


Introduction

Why Forklift Operator Safety Training?

1. Training can reduce the risk of accidents and injuries to you and those you work with.
2. Training can also reduce operating cost of your company by avoiding damage to property and product.
3. The Federal Occupational Safety and Health Act, OSHA, requires all lift truck operators to be trained and authorized to operate a lift truck

Lift Truck Accidents



Each year approximately 100 workers are killed and almost 95,000 are injured in lift truck accidents.

Introduction Review

1. According to OSHA, approximately _____ workers are killed each year in forklift accidents.
 - a. 25
 - b. 50
 - c. 75
 - d. 100

2. The major reasons why forklift training are so important are:
 - a. It's the law.
 - b. It protects the workers.
 - c. It reduces operating costs.
 - d. All the above.

3. The number one cause of forklift accidents is:
 - a. Running off the loading dock.
 - b. Tip over.
 - c. Struck by falling load.
 - d. Improper maintenance.

4. Once you are trained you can operate any type of forklift.
 - a. True
 - b. False

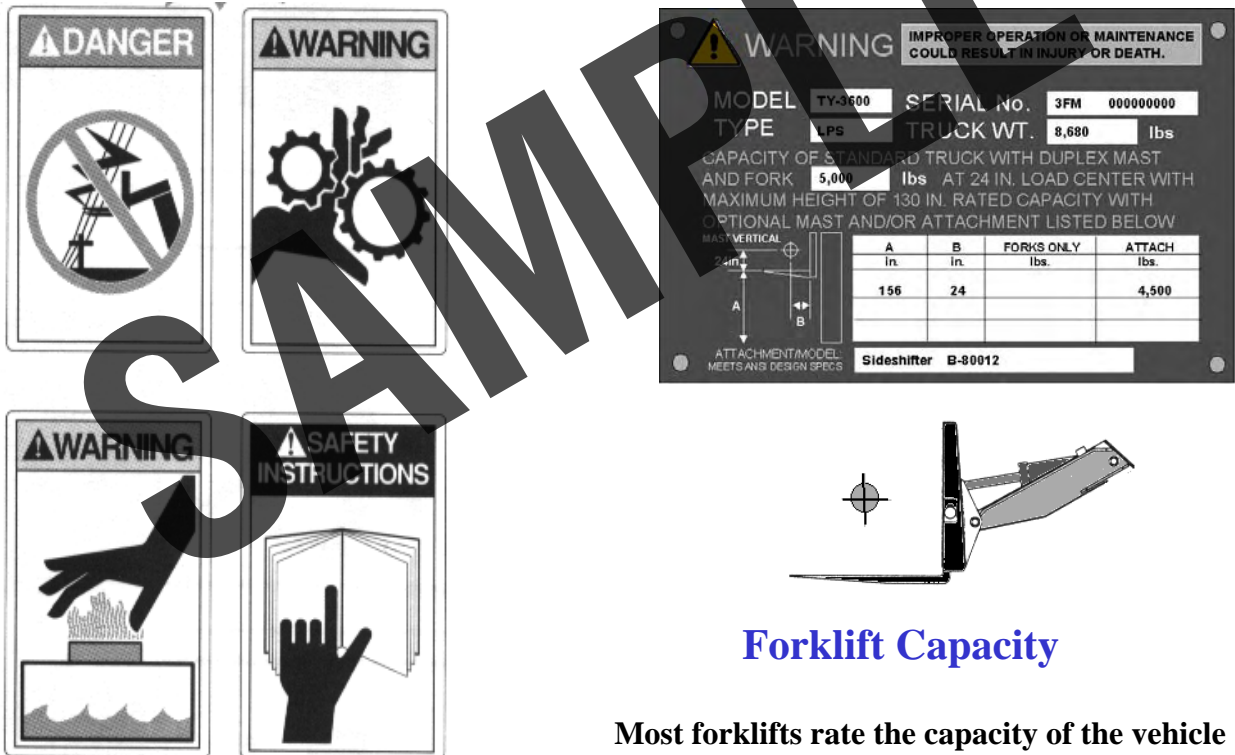
SAMPLE

Forklift Fundamentals

What is a professional forklift operator?

- Is responsible.
- Is on time.
- Is rested, alert, and physically prepared.
- Is knowledgeable about safe operating procedures and company policy.
- Never stops learning about his profession.
- Is a skilled operator and never stops trying to improve upon those skills.
- Keeps the machine under control at all times.
- Wears protective clothing where applicable.

Warning Labels & Capacity Plates



Forklift Capacity

Most forklifts rate the capacity of the vehicle based on a load center measured 24" from the the backrest and 24" up from the forks.

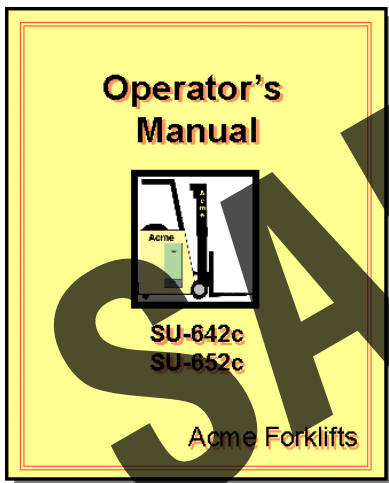
When the loads center of gravity is outside this range, the capacity of the machine decreases.

Forklift labels must be legible and kept intact as provided by the manufacturer. Illegible labels need to be replaced.

Forklift Fundamentals

Forklifts vs. Automobiles

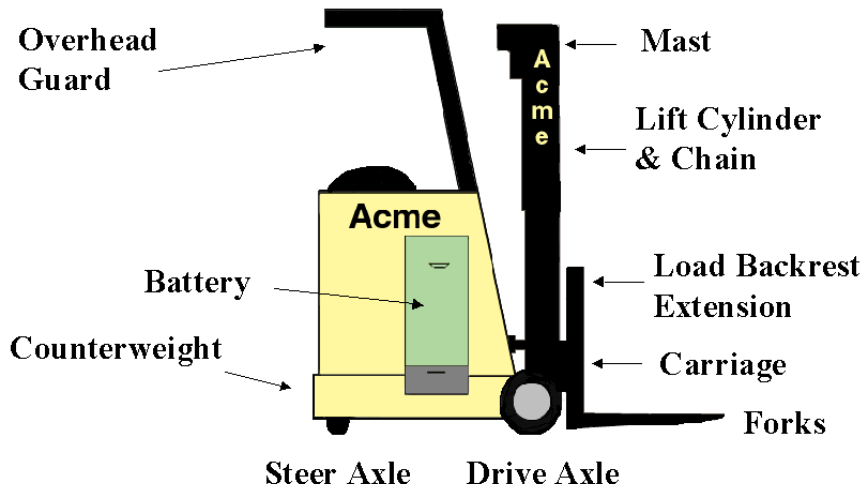
- Forklifts are not to be used for transporting people. Only the operator is to be aboard the vehicle when in motion.
- A typical forklift will weigh in excess of 5,000 pounds where a most automobiles weigh much less than this.
- Like automobiles, forklift operators must be properly trained and have passed a proficiency examination prior to operating the machine.
- Different types of forklifts are designed to operate on various types of surfaces. Most automobiles are designed to operate on relatively smooth surfaces.
- Forklifts typically do not have as efficient braking as an automobile.
- Forklifts use multiple kinds of steering.



Operators Manual

A well-trained forklift operator is familiar with the design of the forklift he is operating. The vehicle manufacturer's Operation and Maintenance Manual is very important in becoming familiar with the machine. To know how to inspect, operate, and fuel the vehicle correctly, operators must read and understand the manual. **It is required that the Operation and Maintenance Manual be kept on the machine at all times.**

Forklift Terminology



Forklift Fundamentals

Mast Terminology

Overall lowered height is the distance from the floor to the top of the mast when the forks are completely lowered.

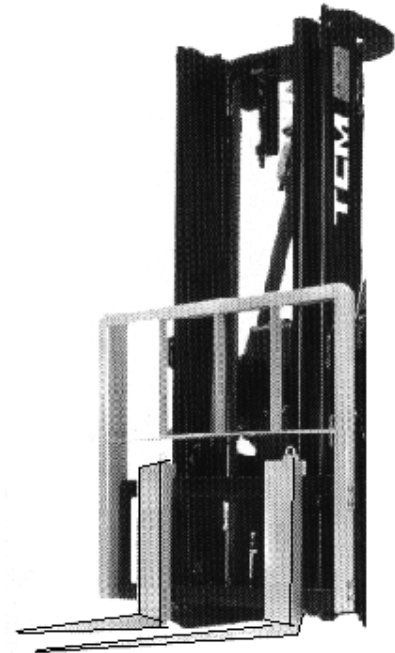
Free lift is the distance the forks can be raised without increasing the overall height of the mast.

Maximum fork height is the distance from the floor to the top of the carrying surface of the forks when the mast is fully extended.

Overall height raised is the distance from the floor to the top of the load backrest extension when the mast is fully extended.

Mast Types

- **Simplex**
 - Two stages
 - Limited free lift (4-6")
- **Duplex**
 - Two stages
 - Free lift (50-60")
 - Load and unload capabilities
 - Lift height about 144"
- **Triplex**
 - Three stages
 - Free lift (50-60")
 - Load and unload
 - High stack heights (190")
- **Quad**
 - Four stages
 - Free lift (50-60")
 - Load and unload plus high stacking (276")



Forklift Fundamentals

Forklift Tires

The type of tires on a forklift can affect the performance significantly. Two different styles of tires are commonly found on most forklifts.

- **Cushion**
 - Smooth, dry surfaces
 - Less traction
 - Low ground clearance
 - More compact dimensions
 - Not for uneven, rough or wet surfaces
- **Pneumatic**
 - Indoor or outdoor
 - Better traction
 - Greater ground clearance
 - Larger dimensions
 - Optional solid, softer tires

Forklift Fuels

Forklifts use a variety of fuels. The four most common are:

Propane, Diesel, Gas and Battery

- **Propane** is the most versatile, being used both indoors and out.
- **Gas** and **Diesel** are primarily used outdoors.
- **Battery** powered forklifts are primarily used indoors. Electric forklifts are rapidly gaining in popularity because they are extremely quiet and charges can last up to 8 hours.

Forklift Fundamentals Review

1. Which is not a characteristic of a professional forklift operator?
 - a. Capable of spinning the tires without spilling the load
 - b. Responsible
 - c. Keeps the forklift under control at all times
 - d. Never stops learning about his profession

2. The primary sources of fuel for a forklift are:
 - a. Gasoline
 - b. Diesel
 - c. Propane
 - d. Batteries
 - e. All the above

3. All forklifts are required to have all warning labels visible and legible.
 - a. True
 - b. False

4. The Operation and Maintenance Manual is to be on the machine at all times.
 - a. True
 - b. False

5. The operator is not required to wear a seat belt when:
 - a. Moving the forklift from one end of the yard to the other.
 - b. When maneuvering the machine for repairs.
 - c. When operating the machine inside a container.
 - d. When using a seat belt would prove more dangerous than not wearing one.

6. The major difference between automobiles and forklifts is:
 - a. Forklifts typically weigh more.
 - b. Forklifts use rear wheel steering.
 - c. Forklifts do not carry passengers.
 - d. All the above.

Forklift Fundamentals Review

7. **Cushion tires work best on:**
- a. Railroad crossings
 - b. Wet outdoor surfaces
 - c. Uneven or rough surfaces
 - d. Smooth, dry surfaces
8. **The term free-lift refers to the distance the forks can be raised without increasing the overall height of the mast.**
- a. True
 - b. False

SAMPLE

Pre-Operation Inspection

Every forklift part must always be in safe working order. OSHA requires vehicle inspection before each day's use and before each shift for machines used around the clock. Thorough inspections are essential to forklift safety. Never use a forklift that has any damage or operating problem. It must be reported and removed from service. *About 6% of all forklift accidents are a result of improperly maintained forklifts.*

Forklifts that are inspected regularly result in:

- Reduced downtime
- Increased productivity
- Reduced cost
- Improved safety
- Better care of equipment
- *Federal OSHA requires it!*

Visual Inspection

- Overall condition
- Frame
- Tires & wheels
- Forks
- Front-end
- Overhead guard
- Engine compartment
- Hood latch/battery restraint
- LP components
- Electric components
- Capacity plates
- Warning decals & plates
- Operator's compartment
- Leaks

Operational Inspection

- Operator restraint system
- Horn
- Warning devices
- Unusual engine noise
- Fuel level
- Gauge readings
- Hydraulics
- Steering lock to lock
- Service brake
- Park brake
- Plugging on electric powered trucks



Pre-Operation Inspection

For liquid propane powered vehicles, check for:

- Proper mounting of tank
- Pressure relief valve pointing up
- Locating pin in proper location
- Hoses and connections
- Tank restraint brackets
- Leaks
- Tank for dents, nicks, and cracks
- Tank fits within profile of vehicle

Always use proper protective equipment such as face shield, long sleeves and gauntlet gloves when checking LP tanks and connections. LP is very cold when released and could cause frostbite.

Use a soapy solution to check for leaks. **Never use matches or a lighter!**

For electric powered vehicles, check for:

- Electrolyte level. *Never use matches or a lighter.*
- Cable and connectors for frayed and exposed wires.
- Battery restraint system in place and hood latches.

Always use proper protective equipment such as a face shield and glasses, rubber apron and gloves when checking electrolyte. This is an acid and will cause severe burns to the skin if in contact.

Upon completion of pre-operation inspection:

- Report any defects to appropriate personnel
- Never operate a machine in need of repair
- *Make repairs only if trained and authorized.*

Pre-Operation Inspection Review

1. **Federal OSHA requires the forklift to be inspected:**
 - a. Once a week
 - b. At the start of the day or shift
 - c. Once a month
 - d. Once a quarter

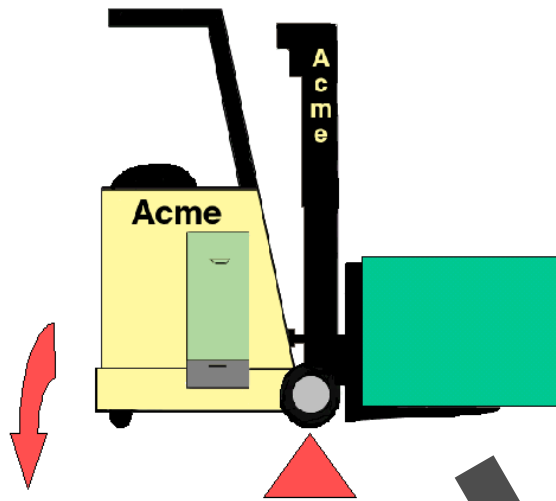
2. **Pre-Operation inspections can:**
 - a. Improve Safety
 - b. Reduce downtime
 - c. Reduce cost
 - d. All the above

3. **When defects are noted during the pre-operation-inspection it is OK to continue to use the forklift until the job is completed.**
 - a. True
 - b. False

4. **When checking for propane leaks it is best to:**
 - a. Use a soapy solution
 - b. Use a match or lighter
 - c. Smell for leaks
 - d. All the above

5. **It is not necessary to be authorized to make repairs to a forklift so long as you have access to the proper tools.**
 - a. True
 - b. False

Balance, Stability & Capacity



The load on the forks is offset by the weight of the vehicle.

Offsetting Weights:

For Internal Combustion Forklifts

- Counterweight (principle weight) Engine
- Transmission
- Frame
- Steering suspension and axle

For Electric Powered Forklifts

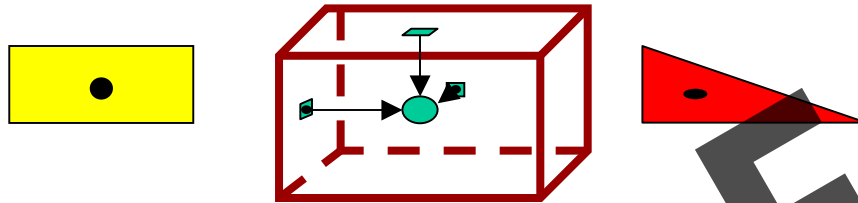
- Industrial battery (principle weight)
- Motors and Pumps
- Frame
- Steering suspension and axle
- Counterweight
- Control Panel



Balance, Stability & Capacity

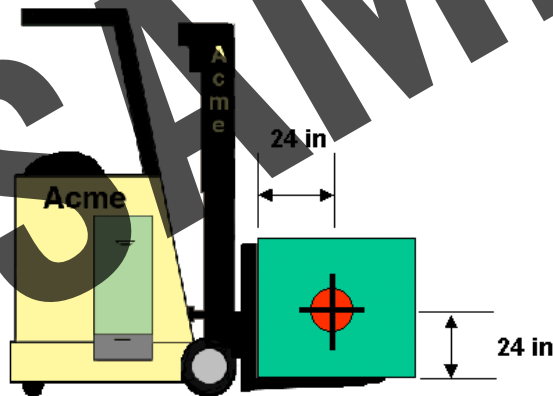
Center of Gravity

The center of gravity is a point in an object around which all the weight is evenly distributed. This point is often different than the physical center of the object. This is because the weight distribution is not always even.



Loads Center of Gravity

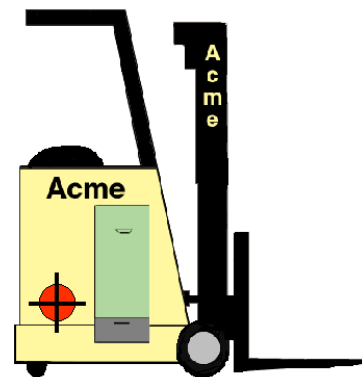
Most forklifts rate the capacity of the vehicle based on the loads center of gravity being 24 inches up from the forks and 24 inches from the backrest. This information will be found on the capacity plate.



When the load's center of gravity moves outside of this range, the capacity of the forklift decreases.

Forklift Center of Gravity

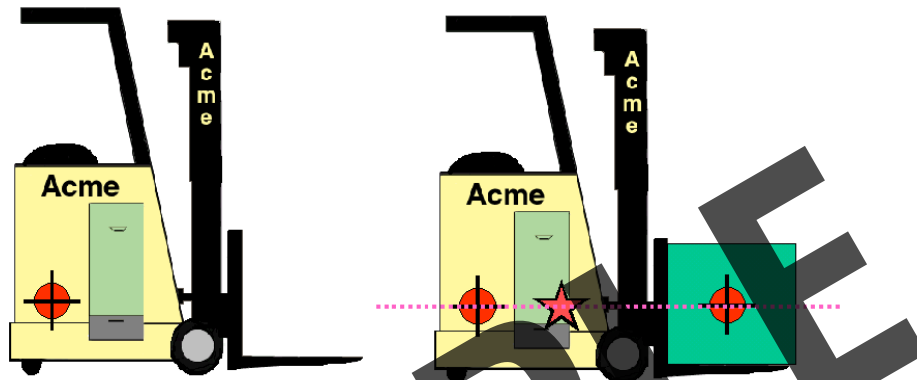
The forklift has a center of gravity also. It will be towards the back of the machine as indicated at right.



Balance, Stability & Capacity

The Combined Center of Gravity

When the forklift picks up a load, a combined center of gravity is produced as indicated by the star in the diagram below. The exact location of that point depends on the weight of the load and its center of gravity.



The center of gravity will also change as the load is raised and lowered, tilted back or forward or shifting the load from side to side.

Static and Dynamic Conditions

The forklift's balance is affected by both static and dynamic conditions. Static conditions are those which affect the forklift when it is not moving. Dynamic conditions are created when the forklift is moving.

Static Conditions include:

- Load size
- Load shape
- Load position on forks
- Lift height
- Amount of tilt
- Tire pressure on pneumatics

Dynamic Conditions include:

- Acceleration
- Speed
- Braking
- Ramps and other uneven surfaces

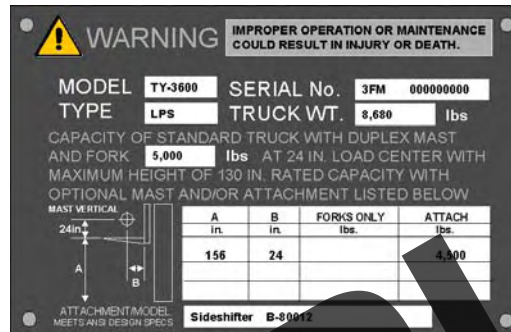


Balance, Stability & Capacity

Forklift Capacity Plates

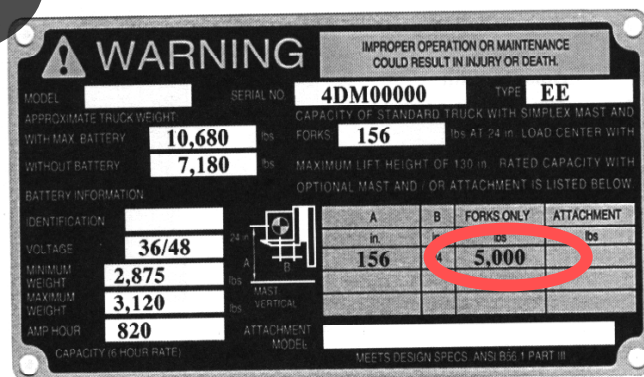
All forklifts are required by law to display a legible capacity plate securely attached to the machine. One of the main things this plate indicates is the maximum weight the machine can lift to a specific height. It will also show the forklift's load center.

A typical capacity plate for an internal combustion powered forklift is shown below



The capacity plate for an **electric powered forklift** contains additional information, which includes:

- Vehicle weight with battery
- Vehicle weight without battery
- Vehicle voltage
- Minimum battery weight
- Maximum battery weight
- Amp hours



In order for the forklift to lift its rated capacity and to be stable, it is extremely important to maintain the battery weight within the maximum/minimum range as indicated on the capacity plate.

Balance, Stability & Capacity

Attachments to the Forklift

The capacity of the forklift is affected any time an attachment is added to the vehicle. The attachment will:

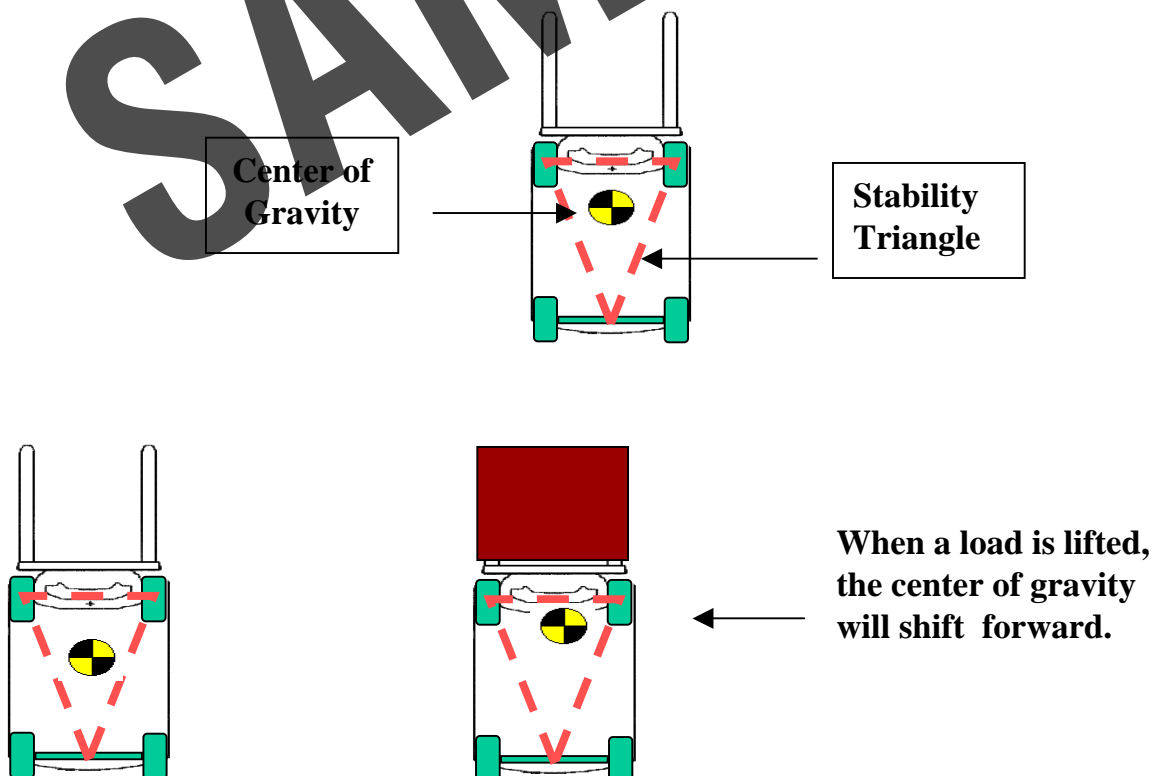
- Add weight to the front of the forklift causing it to be partially loaded.
- The additional weight may extend the load center.

If you add an attachment to the forklift after you receive it from the manufacturer, you must:

- Have prior written approval from the manufacturer to add an attachment
- Have a new capacity plate installed on the forklift indicating the new capacity with the attachment. This plate is only available through the forklift manufacturer.

The Stability Triangle

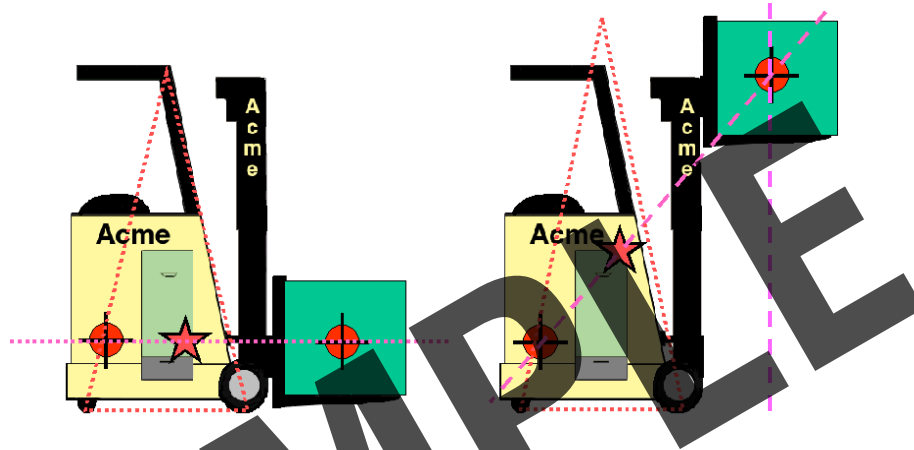
The stability triangle is the area inside a set of straight lines drawn between the two drive wheels and the center point of the steering axle.



Balance, Stability & Capacity

The Stability Pyramid

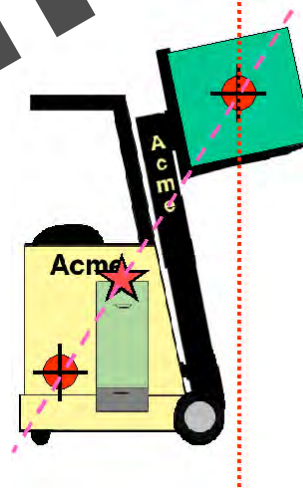
The stability pyramid is a result of the load being lifted. The height of the pyramid increases as the height of the load increases. The center of gravity changes dramatically when the load is raised. In the diagrams below, note how the resulting center of gravity, as indicated by the *star* moves up and forward with an increase in height.



Moving the center of gravity outside of the stability triangle/pyramid can result in:

- Loss of steering
- Loss of traction
- Unstable loads
- Potential for a tip over

Tip over accounts for about 25% of all forklift accidents!



Causes of tip over accidents are:

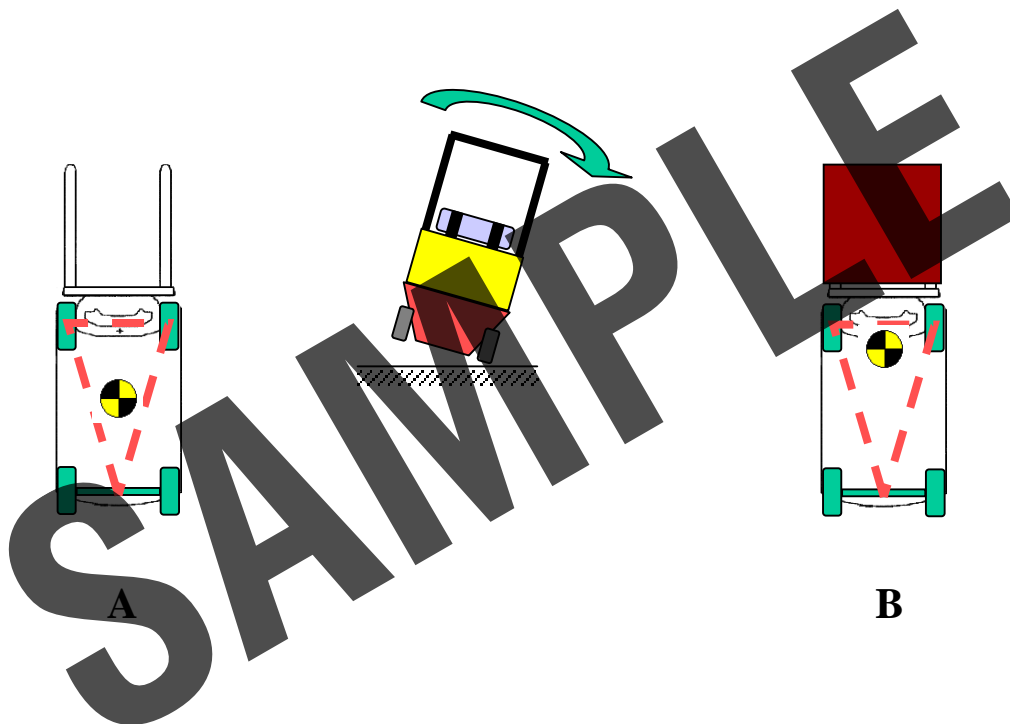
- Overloading the forklift
- Traveling with the load to high
- Traveling with the mast tilted beyond vertical
- Sharp turns
- Braking abruptly
- Wet or uneven surfaces
- Driving on ramps
- Low tire pressure on pneumatic lift trucks
- Excessive speed.
- Pot holes
- Overhead obstructions



Balance, Stability & Capacity

Lateral Stability

When the forklift is unloaded the center of gravity moves toward the rear of the machine and places it closer to the sides of the triangle as can be seen in diagram A. This increases the chance of a side tip over. With a load on the forks, the center of gravity moves forward and farther from the sides of the triangle as seen in diagram B. which decrease the chance of a side tip over. If the vehicles, as shown, turn to quickly, the unloaded forklift will tend to tip over easier than the loaded forklift.



Balance, Stability & Capacity Review

1. **The stability of a forklift is based on what principle?**
 - a. Principle of gravity
 - b. Principle of stability
 - c. Principle of Balance
 - d. Principle of Momentum

2. **The balancing point of the forklift is:**
 - a. The counterbalance
 - b. The drive wheels
 - c. The steering wheels
 - d. The mast

3. **Which of the following is not one of the key offsetting weights for an internal combustion engine forklift?**
 - a. The forks
 - b. The counterbalance
 - c. The frame
 - d. The transmission

4. **The principle offsetting weight for an electric powered forklift is:**
 - a. The frame
 - b. The motor and pumps
 - c. The steering suspension and axle
 - d. The battery

5. **The point around which all weight is evenly distributed is:**
 - a. The weight of the load
 - b. The center of gravity
 - c. The balance point
 - d. The stability pyramid

6. **The center of gravity is always at the physical center of the load.**
 - a. True
 - b. False

Balance, Stability & Capacity Review

7. When a load is lifted, the center of gravity for the forklift does not change position.
- a. True b. False
8. Which is not one of the three points of the stability triangle of a forklift?
- a. Center point of the steering axle
b. Left drive wheel
c. Highest point of the forklift
d. Right drive wheel
9. What may happen when the combined center of gravity moves outside of the stability pyramid?
- a. Potential for a tip over
b. Loss of steering
c. Loss of traction
d. All the above
10. A legible capacity plate is always to be mounted on the machine.
- a. True b. False
11. An attachment to the forklift can be installed at any time without the written approval of the manufacturer.
- a. True b. False
12. The lateral stability of a forklift is better when it is unloaded.
- a. True b. False

Safe Operating Guidelines

Climbing On and Off a Forklift

Many forklift operators suffer minor injuries from climbing on and off of their machine. Before you climb aboard the forklift make sure your hands and feet are free of grease and oil. Squarely face the vehicle and use the three point method for mounting and dismounting: Two feet and a hand or two hands and a foot in contact with the machine. Avoid grabbing the steering wheel when mounting and dismounting the forklift. The play in the steering wheel could cause you to lose your balance. Never jump on or off a stationary or moving forklift.

General Safety Guidelines

Before operating a forklift, read the operator's manual and follow the manufacturer's recommended operating procedures. Observe all warning plates and decals on the machine. If you are involved in an accident, report it immediately to your supervisor.

When operating the forklift:

- Always use the operator restraint system
- Keep all body parts inside the operator's compartment
- Only operate the machine from the operator's compartment
- Use the forklift for its intended purposes only
- Use only in designated areas
- Use personal protective equipment in enclosed, confined areas
- Obey traffic signs
- Stay in approved aisles
- Maintain clear path of travel
- Travel in reverse if forward vision blocked
- Use horn at intersections, blind corners, pedestrians, other vehicles
- Three truck distance between trucks when traveling in the same direction
- Watch out for rear end swing
- Check overhead clearance
- Slow down on wet, slippery or uneven surfaces
- Use extreme caution when handling hazardous materials
- Cross railroad tracks and other rough surfaces at an angle
- Never make on-the-go directional changes with a load
- Check operating surfaces for support capability
- Keep a safe distance from docks and ramps

About 7% of all forklift accidents are a result of vehicles falling off of docks



Safe Operating Guidelines

Pedestrian Traffic

Approximately 18% of all forklift accidents occur when pedestrians are struck by forklifts.

Another 14% of all forklift accidents occur when pedestrians are struck by falling loads.

When operating a forklift:

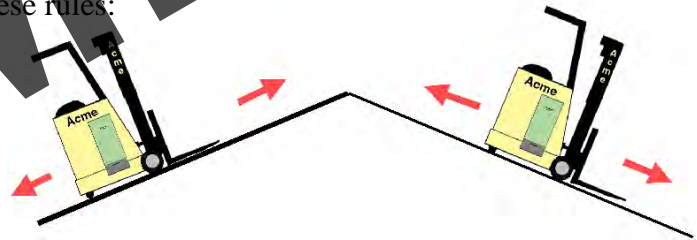
- Always give pedestrians the right of way
- Slow down and sound horn at blind corners and intersections
- Check convex mirrors
- When passing, sound horn, make eye contact and stay clear.
- Follow normal traffic patterns
- Signal pedestrians to stop when in the middle of a job
- Wave them on only when it is safe for them to pass
- Watch out for rear end swing when working in tight quarters.
- ***No riders are allow on the forklift***

Rules for ramps

When traveling on ramps, remember these rules:

With a load, travel with the load up the grade.

Without a load, travel with the forks down the grade.



Tractor trailers & rail cars

Before starting to load or unload trailers and rail cars follow these basic guidelines:

- Make sure the wheels are chocked
- Secure the rail car or trailer to the dock
- Use jack stand on the front of the trailer
- Check the condition of the dock plate
- Check loading surfaces for condition and capacity
- Sound horn when backing out
- Communicate with the trailer driver when completing the job
- Enter the rail car at a sharp angle to allow room for maneuvering



Safe Operating Guidelines

Parking the Forklift

Attended Parking

- **Engine running**
- **Within 25 feet and full view**
- **Set park brake**
- **Lower forks to ground**
- **Directional control in neutral and locked**

Unattended Parking

- **Beyond 25 feet or out of view**
- **Park in a safe area**
- **Set park brake**
- **Lower forks to ground**
- **Directional control in neutral and locked**
- **Power off**
- **Chock wheels if on incline**
- **Turn off LP service valve**
- **Disconnect battery on electric forklifts**

SAMPLE

Safe Operating Guidelines Review

1. **When moving up or down a ramp with an unloaded forklift, the forks should be pointed:**
 - a. Down the grade
 - b. Up the grade
 - c. It doesn't matter which way
 - d. Depends on the size of the load

2. **When parking your forklift, it is important that:**
 - a. The controls are neutralized, the forks lowered to the ground and the parking brake set.
 - b. The forks are up against a load.
 - c. The controls are neutralized, the park brake set and the forks are raised a few inches off the ground
 - d. It be easily accessible.

3. **When you are more than 25 feet from your forklift or it is out of sight, you should turn of the ignition.**
 - a. True
 - b. False

4. **When making a turn at an intersection, you should:**
 - a. Slow down
 - b. Sound horn
 - c. Watch for rear end swing
 - d. All the above

5. **When operating a lift truck, it is:**
 - a. The pedestrian's responsibility to watch out for you.
 - b. Your responsibility to watch out for the pedestrian
 - c. Management's responsibility to keep pedestrians out of the work area.

Safe Operating Guidelines Review

6. **When following another forklift you should maintain at least:**
- a. Two vehicle lengths behind
 - b. Three vehicle lengths behind
 - c. Four vehicle lengths behind
 - d. Five vehicle lengths behind
7. **If a load obstructs your forward vision, you must travel in reverse or use a spotter to direct you.**
- a. True
 - b. False
8. **When moving a wide load it is OK to hang out of the operator's compartment to see around it.**
- a. True
 - b. False
9. **When loading a tractor trailer you should:**
- a. Chock the wheels of the trailer
 - b. Check the condition of the floor
 - c. Make sure the dock plate is secure
 - d. All the above
10. **A railroad track should be crossed:**
- a. Straight on
 - b. Diagonally
 - c. Backwards
 - d. All the above

Safe Load Handling

General Handling Techniques

Before engaging a load, check for;

- Load weight
- Poorly balanced load and its center of gravity
- Loosely stack loads
- Poorly lashed loads

The forks should be:

- Correct length and capacity for the load
- At least 2/3rd the length of the load and completely under the load
- Wide as load permits
- Evenly spaced

Additional cautions:

- Use care when handling long, wide or high loads and use a spotter when necessary
- Use special care when operating a forklift without a backrest extension
- Never allow anyone under an elevated load.

Engaging a Load

- Move slowly into position and squarely face the load
- Space forks evenly under the load
- Engage the load until the load touches the back of the forks
- Do not slam into the load
- Lift and tilt the mast back slightly to cradle the load
- Watch the top clearance in middle rack positions
- Check behind you, use the horn and slowly back away
- Lower the load to travel position (6-8 inches above the ground) as soon as the load clears the rack
- *Never turn with a load raised in the air*

Inching Pedal

- Allows for faster lift speeds when stacking or depositing loads
- Disengages the transmission
- Allows faster lift while giving forklift creeping movement
- Activates brakes when depressed to floor
- Never ride the inching pedal. This will shorten the transmission and brake life.

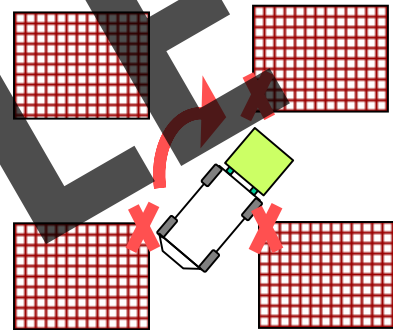
Safe Load Handling

Traveling With a Load

- Maintain control
- Start, turn and brake smoothly
- Look in the direction of travel
- Travel in reverse if forward vision is blocked
- Slow down at aisles, sharp corners, ramps, dips, blind corners, wet or rough surfaces
- Watch for overhead obstructions
- Use horn at intersections, blind corners, pedestrians, other vehicles
- Slow, easy going speed
- Controlled stops
- Watch for obstructions

Executing Turns

- Approach and turn slowly
- Sound horn
- Start the turn when the inside drive wheel reaches the corner
- Watch out for rear end swing



Depositing Loads

- Square the forklift with the deposit location
- Watch for rear end swing in narrow aisles
- Raise load and creep into position
- Place load, check behind you, sound horn and back away
- If mis-aligned, don't shove or push load with forks
- Don't overly lower the mast. This will cause slack in the chain.
- Watch for top clearance in middle rack positions

Elevating Personnel

About 12% of all forklift accidents are a result of personnel falling off of elevated forks

- If the forklift is used for overhead maintenance, use an OSHA/ANSI approved maintenance platform specially built for this purpose.
- Never move the forklift with personnel on the platform
- Stay with the forklift when personnel are on the platform



Safe Load Handling


How to Survive a Tip over








Always fasten your seat belt before operating the forklift.

- **Never jump! Stay with the forklift.**
- Hold on tight
- Brace your feet
- Lean forward and away from the fall.

The only time you are exempt from wearing a seatbelt is in the event that wearing one would present a greater hazard than not wearing one.

Example: Working on a pier or dock.



 WARNING	 FASTEN SEAT BELT	 DON'T JUMP!	 HOLD ON TIGHT TO STEERING WHEEL	 BRACE FEET	 LEAN AWAY FROM IMPACT	 LEAN FORWARD
	TIPOVER CAN OCCUR IF TRUCK IS IMPROPERLY OPERATED. INJURY OR DEATH COULD RESULT.		IN CASE OF TIPOVER			
FOR SAFETY NOTICE FOLLOWING WARNINGS 1. Lateral tipover can occur when unloaded if the combination of speed and sharpness of turn produces an overturning moment which exceeds the stability of the truck. 2. Lateral tipover can occur if overloaded or loaded within capacity and the load is elevated and if turning and/or braking when traveling rearward or if turning and/or accelerating when traveling forward produces an overturning moment which exceeds the stability of the truck. Rearward tilt and/or off-center positioning of the load and/or uneven ground conditions will further aggravate the above conditions. 3. Longitudinal tipover can occur if overloaded or when loaded within capacity of the load is elevated if forward tilt, braking in forward travel, or commencing rearward travel produces an overturning moment which exceeds the stability of the truck.				4. Serious injury or death can occur to the operator if he/she is trapped between the truck and the ground.		

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Safe Load Handling Review

1. **When engaging the load:**
 - a. Approach it at an angle and let the forks straighten it.
 - b. Slam into the load to make sure it is tight against the backrest.
 - c. Squarely engage the load until it touches the carriage.
 - d. The forks do not need to be more than half way under the load.

2. **You should sound your horn when approaching an intersection, door openings, and other blind spots.**
 - a. True
 - b. False

3. **When traveling with a load, the mast should be:**
 - a. Tilted slightly forward
 - b. Tilted slightly back
 - c. The position of the mast doesn't affect the stability of the forklift.
 - d. Forward when going up a ramp to keep the load level.

4. **When picking up a load, you should:**
 - a. Spread the forks as wide as the load permits
 - b. Make sure the load touches the back of the carriage.
 - c. Carefully pick up the load to travel height and tilt the mast back.
 - d. All the above

5. **You should never turn a forklift with the load raised above travel height.**
 - a. True
 - b. False

6. **Loose loads should never be higher than the backrest.**
 - a. True
 - b. False

7. **Only an OSHA/ANSI approved platform should be used to elevate personnel.**
 - a. True
 - b. False



Forklift Refueling

General Safety Rules

- Follow company policies
- Observe safety rules
- Must be authorized and trained to refuel

Refueling Gasoline and Diesel Forklifts

- Start the shift with a full tank
- Refuel only when the engine is cool
- Refuel in designated areas only
- No smoking, sparks, or flame
- Know where the fire extinguishers are and how to use them
- Park in the “unattended” mode
- Use the correct type of fuel
- Clean up spills
- Do not top-off the fuel tank

Liquid Propane Characteristics

- LP is heavier than air
- LP is extremely flammable
- LP is extremely cold
- LP is odorless in its natural state

Liquid Propane Fueling Guidelines

- Do not refuel near confined area, elevator shafts or open pits
- Do not park the forklift or store fuel tank near:
 - High heat sources
 - Stairways
 - Exits
 - Areas for safe egress
- Turn off service valve if parked for long periods of time
- Do not roll, drag, or strike LP tanks
- Turn off service valves on all empty containers

Forklift Refueling

Replacing LP tanks

- Must be trained and authorized and follow company policy
- Wear protective clothing
- Replace tanks in designated areas
- Replace tanks in the “attended” parking mode
- Turn off service valve
- Let fuel run out of supply line
- Attempt to restart engine with key off
- Disconnect the fuel line and remove the LP tank
- Check new tank for damage
- Tank must be compatible and fit within the confines of the vehicle
- Place tank in proper position
- Secure the tank with bracket restraints
- Open the service valve slowly. Too fast will cause back pressure check valve to close
- Check for leaks with soapy solution

SAMPLE

Refueling Review

1. **When refueling a forklift, you should:**
 - a. Follow company policy
 - b. Never smoke
 - c. Shut off the engine
 - d. All the above

2. **What happens if the service valve on an LP tank is opened too quickly?**
 - a. The fuel supply line could burst.
 - b. The back pressure check valve will close
 - c. The engine will no restart
 - d. The fuel supply valve will freeze open

3. **LP tanks can be replaced in confined spaces.**
 - a. True
 - b. False

4. **LP fuel is lighter than air.**
 - a. True
 - b. False

5. **When fueling a gasoline or diesel forklift, always top off the tank.**
 - a. True
 - b. False

6. **When parking a LP powered forklift overnight, always:**
 - a. Shut off the service valve
 - b. Avoid high heat sources
 - c. Avoid parking in confined spaces
 - d. All the above

7. **After installing the LP tank, it is best to check the connections with a soapy solution.**
 - a. True
 - b. False

Battery Care

Battery Size and the Affect on Load Capacity

- Vehicle lifting capacity is directly affected by the battery size
- Vehicle stability
- Charge life
- Work cycle duration

What is an Industrial Battery?

- Six or more cells connected in series
- Each cell contains a group of positive and negative plates
- Cells submerged in solution of sulfuric acid and water known as electrolyte
- Each cell when fully charged equals 2.14 volts
- The battery voltage equals the number of cells times two

Battery Hazards

- Weight
- Acid
- *If any body part becomes exposed to electrolyte, immediately flush the affected part at the nearest eye wash station for 15 minutes. Then seek medical attention.*
- Explosive fumes
- Electrical

General Safety Rules

- Follow company policy
- Observe safety rules
- Must be trained and authorized

Changing Batteries

- Change in designated areas only
- Use proper equipment when changing batteries
- Cover top of exposed terminals with plywood
- Use a hoist with enough capacity
- Wear protective equipment
- Face shield
- Safety glasses
- Rubber gloves



Battery Care

Changing Batteries, cont.

- Rubber apron
- Clear route for removal
- Install fully charged battery
- Secure battery with restraint system and latch hood

Charging Batteries on the Forklift

- Park the forklift in the “unattended” mode
- Open battery compartment fully. This allows hydrogen gas to escape
- Connect battery to the compatible charger. Do not connect the charge to the vehicle connection
- Check cable and connectors for damage
- Charge battery per manufacturer’s instructions
- When complete, *turn off charger first*. If not done, a spark could be produced which may ignite the hydrogen gas released during the charging process.

Watering Batteries

- Always add after charging
- Add water to a battery before charging *only if the separator plate is uncovered*. Then, only add enough water to cover plate.
- Use distilled or approved tap water
- Never attempt to add acid

Battery Care

Insuring Maximum Battery Life

- Discharge to battery manufacturer's recommended level: usually 80%
- Battery life is typically 1,500 to 2,000 cycles
- A cycle is one complete discharge and one complete charge
- Avoid quick, opportunity charges
- Follow the 8-8-8 rule
- Run 8 hours, charge 8 hours, cool 8 hours
- Do not overcharge a battery
- Creates high temperature
- Causes boil over
- Don't undercharge
- Plates become brittle
- Shortens battery life

SAMPLE

Battery Care Review

1. **What is the explosive gas generated by batteries when charging.**
 - a. Oxygen
 - b. Nitrogen
 - c. Hydrogen
 - d. Potassium

2. **Personal protective equipment should be worn when handling batteries.**
 - a. True
 - b. False

3. **You must be trained and authorized to charge a battery.**
 - a. True
 - b. False

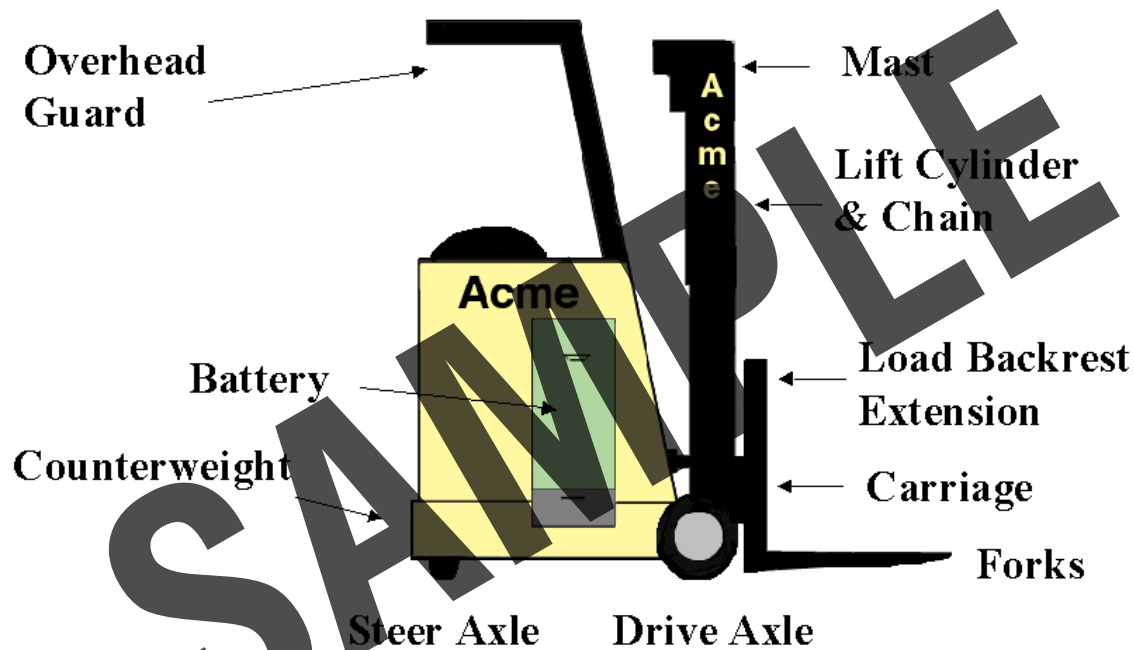
4. **Battery size affects:**
 - a. Load capacity
 - b. Stability
 - c. Work cycle duration
 - d. All the above

5. **Normally, you should only add water:**
 - a. Before charging
 - b. During charging
 - c. After charging
 - d. It really doesn't matter

6. **If you are exposed to electrolyte, the first thing you need to do is:**
 - a. Seek medical attention immediately
 - b. Wait until the shift is over
 - c. Go the nearest eyewash station and flush the affected area
 - d. None of the above

SAMPLE

STUDENT MANUAL



Stand-up Forklift Operator Safety Training

