

CHAPTER 13 MATERIALS HANDLING AND EQUIPMENT

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CHAPTER 13 MATERIALS HANDLING AND EQUIPMENT

A. INTRODUCTION

1. This chapter addresses the safety and health requirements for Smithsonian Institution (SI) materials handling and storage and applies to all SI worksites. All materials handling and storage shall be performed in accordance with the requirements contained in the Occupational Safety and Health Administration (OSHA) standards in 29 CFR 1910 Subpart N, "Materials Handling and Storage," and the National Fire Protection Association (NFPA) Standard 505, "Powered Industrial Trucks Type Designations, Areas of Use, Maintenance, and Operations." Since injuries may result from improperly handling and storing materials, it is important to be aware of incidents that may occur from unsafe or improperly handled equipment and improper work practices when handling and storing materials. Topics discussed in this chapter include:
 - a. Moving Loads (General)
 - b. Loading Docks Material Handling
 - c. Manually Moving Loads
 - d. Forklifts/Powered Industrial Trucks
 - e. Hoists
 - f. Scissor Lift Work Platforms
 - g. Slings And Hooks
 - h. Cranes And Gentries
 - i. Other Material Handling Equipment
 - j. Storage Requirements (General)
 - k. Storage Of Hazardous Materials/Chemicals (General)
 - l. Storage Of Other Materials
2. Refer to Chapter 19, "Chemical Handling and Storage", of this *Manual* for detailed information on hazardous materials/chemicals handling, use, and storage and Chapter 22, "Compressed, Liquefied and Cryogenic Gases", of this *Manual*, for information on compressed gas handling, use, and storage.

B. CHAPTER SPECIFIC ROLES AND RESPONSIBILITIES

1. **Safety Coordinators** shall:
 - a. Assist supervisors in complying with this Chapter and ensuring that resources are available to fully comply.

- b. Ensure retention of all employee equipment training certificates.
2. **Supervisors** shall:
- a. Ensure hazard controls detailed in this chapter are implemented.
 - b. Develop Job Hazard Analyses per Chapter 4, “Safety Risk Management Program”, of this *Manual* for the more hazardous, non-routine material handling operations.
 - c. Ensure employees receive training prior to operating and demonstrate they are competent to operate material handling equipment.
 - d. Allow employees to only operate material handling equipment for which they have been trained;
 - e. Ensure employees follow all safety requirements and perform safely.
 - f. Ensure employees have and use personal protective equipment to include safety shoes and hard hats when moving objects that are overhead and goggles when moving liquids that could pose a splash hazard.
3. **Employees** shall:
- a. Perform material handling operations and operate material handling equipment safely to prevent injury or damage;
 - b. Inspect and perform safety checks on material handling equipment before each use to ensure equipment is in proper working order and is appropriate for material being handled;
 - c. Report any deficiencies found during pre-use inspections to supervisor;
 - d. Not operate material handling equipment for which they have not been trained.
 - e. Follow all safety requirements, use required personal protective equipment and perform their duties safely.

C. HAZARD IDENTIFICATION

- 1. Back injury is the number one injury associated with improper material handling.
- 2. Heavy or unbalanced loads could fall and injure employees, especially head and feet.
- 3. Vehicle becomes unbalanced and overturns with driver not wearing seat belts.
- 4. Improper or unsafe use of material handling equipment could cause injury or property damage.
- 5. Falls from working platforms or ladders could occur (refer to Chapter 10, “Fall Protection”, of this *Manual*).

6. Damaged or poorly maintained equipment could cause injury.
7. Battery charging and filling pose significant risks (refer to Chapter 19, "Chemical Handling and Storage", of this *Manual*).
8. Loading docks pose numerous risks for injury or property damage to include:
 - a. falls from unguarded dock edges,
 - b. slips/trips due to wet or icy surfaces,
 - c. caught between/under due to crowded staging areas, unbalanced loads,
 - d. collision due to numerous pieces of moving equipment or vehicles,
 - e. tip over due to steep inclines improperly traversed,
 - f. lift platforms could fail or operate improperly,
 - g. Wheeled vehicles could roll if not properly secured, or damage to vehicles could occur due to tight maneuver room,
 - h. Overhead doors may open or close unexpectedly,
 - i. Hazardous chemicals with their commensurate risks may be involved during loading/unloading operations (refer to Chapter 19, "Chemical Handling and Storage", of this *Manual*).
 - j. Any fuel-operated material-handling vehicle poses the risk of fire and explosion.
 - k. Material handling equipment used in cramped spaces or populated areas pose significant hazards of injury or property damage.

D. HAZARD CONTROLS

1. Moving Loads (General)

- a. Check the load first to decide how best to move it—forklift, hand truck, hoist, conveyor, manually, etc. Then check the route to be taken and remove obstacles, or find another route if the obstacle cannot be moved. Make sure there is space for the load at its destination and that equipment, platforms, elevators, etc. are rated to handle the load weight and bulk.
- b. Forklifts, hand trucks, dollies, or other material handling equipment (MHE) carrying unbalanced loads or loads that obstruct the operator's view may be dangerous to the operator and any other employees in the area. Place loads carefully so they are stable and will not fall off or tip the equipment over. Load heaviest objects at the bottom and secure/strap any bulky or awkward items. Ensure operator has sufficient view in direction of movement.
- c. Whenever MHE are equipped with seat belts, operators will wear them.

- d. Consider a ground guide when negotiating bulky loads through narrow aisles or crowded spaces.
- e. When operating on a ramp or steep incline, employees shall keep loads downhill to prevent the load from rolling over them if they lose control.
- f. Employees shall inspect material handling equipment before each use (Refer to Attachments 1 and 2- Safety Check Lists for Gas/LPG and Electric Forklifts):
 - (1) Check the framework for obvious signs of damage such as broken welds or fractured boards.
 - (2) Check the tires for large pieces missing from solid tires and air missing from pneumatic tires.
 - (3) Ensure accessories (e.g., handle extensions, nose plate extensions, stair climbers, etc.) are properly attached.
 - (4) Inspect straps and ratchets for damage or deterioration. Test wheel brakes to ensure they work.
 - (5) If damage/defects are noted, remove the equipment from service and tag with a "Do Not Use" sign until it is repaired. (Refer to Chapter 9, "General Workplace Safety", of this *Manual*.)

2. Loading Docks Material Handling

- a. Employees shall keep loading docks clear of water and ice as much as possible.
- b. Adequate space shall be available for the safe loading/unloading of docked materials.
- c. Employees shall stay away from unguarded dock edges.
- d. Secure movable dock loading/unloading plates.
- e. Check dock plate load capacity before loading it.
- f. Block or chock truck/trailer wheels to keep them from moving.
- g. Be alert to overhead door movements.
- h. Employees shall protect their hands from being crushed against solid objects and watch for pinch points when going through doorways or other tight spaces. Use hand and forearm protection (e.g., long-cuff, heavy work gloves) and safety shoes to protect from falling loads or wheeled vehicles in tight spaces.

3. Manually Moving Loads

- a. Manual lifting and moving loads is a major potential source of back injuries among workers. When manually moving materials, employees shall follow proper lifting techniques. Employees shall seek additional assistance when:
 - (1) A load is so bulky they cannot grasp or lift it;
 - (2) When they cannot see around/over the load;
 - (3) When the load is too heavy to handle for one person, and
 - (4) When a worker cannot safely handle the load manually.
- b. Supervisors shall assist employees in reducing the potential for back injuries by employing the following lifting principles whenever possible:
 - (1) Eliminate the need to handle materials manually by using/installing mechanical lifting aids (e.g. lift truck, conveyor, hoist, etc.);
 - (2) Manually move the load with a handling aid (e.g. cart, dolly, etc.);
 - (3) Reduce the size or weight of the objects lifted;
 - (4) Change the height of a pallet or shelf.
- c. Using safe manual lifting techniques may reduce back injuries such as pulls and disc impairments. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back.

4. Forklifts/Powered Industrial Trucks

- a. OSHA defines “powered industrial trucks” as “mobile, powered, driven vehicles used to carry, pull, push, lift, stack, or tier materials.”
- b. Trucks shall have a label indicating acceptance by a nationally recognized testing laboratory. No one shall be permitted to make modifications or additions affecting the capacity or safe operation of a powered industrial truck without the manufacturer’s prior written approval. Any modifications and additions shall be added to the truck’s capacity, operation, and maintenance information and postings.
- c. Forklifts/powered industrial trucks shall also comply with the National Fire Protection Association (NFPA) Standard 505, “Powered Industrial Trucks Type Designations, Areas of Use, Maintenance, and Operations.”
- d. Powered industrial trucks operating in potentially hazardous atmospheres must be approved for that purpose and have additional safeguards for use. Refer to OSHA 29 CFR 1910.178(b) for more detail on these requirements. [1910.178 Powered Industrial Trucks Standard](#)
- e. Because of the fire hazard, only electrically powered material handling equipment will be used in museums, collections areas and populated spaces. Newly purchased forklifts will be battery powered. Large, gas-

powered equipment required for lifting extremely large exhibits may only be used when no visitors are present.

- f. Trucks shall not be parked and left unattended in areas occupied by or frequented by the public.
- g. Contact the Office of Safety, Health and Environmental Management if clarification is required on which powered industrial trucks may be used in what type of environments.
- h. Forklifts/powering industrial trucks shall be inspected prior to use and documented on Attachments 1 and 2. Keep on hand the last five (5) checklists for auditing purposes to ensure documentation of inspections.
- i. Forklifts/powering industrial trucks have a high center of gravity and may tip over if not driven slowly and carefully by trained, authorized operators. Materials lifted incorrectly or placed improperly on the forks may easily slip, causing a hazard to the operator and any other employees in the area. When picking up materials with a forklift/powering industrial trucks, operators shall:
 - (1) Follow the manufacturer's operational instructions.
 - (2) Keep forks and loads low and tilted back while moving.
 - (3) Center the load on the forks as close to the mast as possible, which minimizes tipping or chances of the load falling.
 - (4) Do not overload forklifts/powering industrial trucks because it will impair the controls and cause tipping. Do not put extra weight on the rear of a counter-balanced forklift/powering industrial truck to allow an overload.
 - (5) Adjust the load to the lowest safe position when traveling.
 - (6) If the load obstructs the operator's forward view, then the operator shall travel with the load trailing the vehicle. Consider the use of a ground guide if needed.
 - (7) Pile and cross-tier stacked loads correctly.
- j. Additional safety precautions for forklifts/powering industrial trucks:
 - (1) Provide sufficient head room under overhead installations, lights, pipes, and sprinkler systems.
 - (2) Forklifts shall be equipped with a cage over the operator's seat to protect them from shifting or falling loads. The forklift shall also be equipped with a vertical load back rest extension when the load presents a hazard to the operator.
 - (3) Forklifts shall be equipped with a back-up alarm and a horn. When a forklift is used inside a building it must have a strobe light attached to its roll cage.

- (4) Be careful when approaching doorways, aisle crossings, and other intersections—sound a warning signal whenever pedestrians or other moving equipment are operating in the same area. When more than one forklift is operating in the same area, follow the rules of the road- e.g. yield to the right, stop at intersections and clear before preceding, etc.
- (5) Where applicable provide signage to warn pedestrians to be on the look-out for powered industrial trucks and stay out of the way when truck is in use.
- (6) Park a forklift with the forks lowered and tilted flat, brake set, and keys removed. Block the wheels if the truck is parked on an incline. These precautions will be followed when an operator will be more than 25 feet away from the vehicle or the vehicle is out of sight.
- (7) Set the brakes when using the truck to load/unload materials. The dock/board/bridge plate shall be secured so they will not move when equipment drives over them.
- (8) Additional riders are prohibited on forklifts/powered industrial trucks.
- (9) Never stand or walk under the raised part of a forklift/powered industrial truck.
- (10) Do not put arms/legs between the uprights of the mast or outside the running lines of a forklift/powered industrial truck.
- (11) Locate battery-charging installations in designated areas, and ensure fire extinguishers are within 25 feet when charging. This area must be designated as a “No Smoking” area. Spill control supplies must be available for neutralizing and flushing spilled electrolyte. The battery-charging equipment shall be protected from truck damage. Provide ventilation of battery-charging gases.
- (12) Disconnect battery before repairing an electrical system.
- (13) Provide auxiliary directional lighting on forklifts/powered industrial trucks when the general lighting is less than 2 lumens/square foot.

5. Hoists

- a. OSHA requires that all hoisting equipment be inspected initially and per the inspection section “n” below, according to standards set by the individual manufacturer and ANSI.
- b. Inspections:
 - (1) Prior to First Use/Major Alteration: Following assembly and erection of hoists, and before being put in service, an inspection and test of all functions and safety devices shall be made under the supervision of a Competent Person (one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to employees, and who has

authorization to take prompt corrective measures to eliminate them). A similar inspection and test shall be required following major alteration of an existing installation.

- (2) Daily (or prior to use) inspections: Daily (or prior to use if hoists are not used daily) inspections shall be performed by the operator at the start of each shift, or at the time the hoist is used for the first time during each shift. The inspection regimen shall include, but not be limited to, an examination of the chain for wear, twists, excessive dirt, broken links, and proper lubrication. Hooks shall be inspected for deformations, cracks, damage, and properly operating latches.
 - (3) Frequent inspections: Frequent inspections are the next level up from daily inspections. Frequent inspections shall be performed by a person who is trained, experienced, and qualified to perform hoist inspections. How often the frequent inspections are done is a function of hoist service. If the hoist is seeing normal service, then the frequent inspections should be conducted once a month. For heavy service, the frequent inspections should be weekly to monthly. Severe service applications warrant frequent inspections, daily to weekly. During frequent inspections, check the hoist more thoroughly than the operator's daily inspections. Use American Society of Mechanical Engineers (ASME) Standard B30.16, "Overhead Hoists (Underhung)," and the manufacturer's recommendations to determine frequent inspection criteria. ASME B30.16 outlines construction, installation, operation, inspection, and maintenance requirements for hand chain-operated chain hoists and electric and air-powered chain and wire rope hoists used for, but not limited to, vertical lifting and lowering of freely suspended, unguided, loads which consist of equipment and materials.
 - (4) Periodic inspections: Periodic inspections shall be performed by a qualified inspector, and at intervals recommended by the manufacturer and according to the severity of the service. Hoists shall also be inspected and tested at not less than three month intervals. Periodic inspections are more thorough than frequent inspections. According to the severity of the service, the inspector shall refer to ASME B30.16 and the manufacturer's recommendations. Disassembly is not required for any of these inspections unless the inspection indicates a breakdown is needed. However, prior to placing the hoist back in service, load testing is required if some disassembly involving load-bearing components has occurred.
- c. The most important variables in safe hoist operation are knowledge about the hoist, the load, and safe operating practices, and the training and communication that support that knowledge.
 - d. Safe hoist operation begins with proper hoist selection. The hoist must be matched to the application. Hoist capacity is of primary importance; it is

critical that the hoist selected has a capacity that exceeds the weight of the load. Consider a powered hoist if the load has to be lifted a long distance or repeatedly.

- e. Ensure the hoist's load chain is long enough to reach the load. The chain must be straight and properly seated in the load sheave. Avoid tip loading unless the hook is specifically designed for point loads.
- f. Operator training shall be specific to the type of hoist the operator will be using, including information about lift capacity as well as inspections and maintenance, slip clutches, load limit devices, braking mechanisms, and wear limits. Training shall include a discussion of balanced lift points and safe rigging practices.
- g. Slings or other attachments shall be seated in the saddle of the hook and hook latches shall be present and functioning properly. The hoist's load chain shall never be used as a sling.
- h. Loads shall always be lifted slowly at first to ensure everything is seated and operating properly. Lift loads vertically, and do not side pull a load, which places additional stress on the hoist and risks uncontrolled load swings.
- i. Avoid using the hoist's travel limits to stop operation. These limits are usually not designed for regular everyday usage; they are intended for emergency use.
- j. When the hoist is coupled to a trolley, take care not to crash the trolley into the end stops on the beam. Hitting the end stops increases stress on the hoist and may cause dangerous load swings.
- k. Jogging the hoist's motor shall be minimized; it generates heat in the motor's windings, which could lead to motor failure.
- l. Supervisors shall ensure hoist operators and signal persons can communicate, especially in noisy environments where lifting operations require a hoist operator and a signal person (e.g., rigging or hook-up person) to use hand signals or voice communication. Hand signals shall be documented and posted. Except to obey a stop signal, the operator shall only respond to hand signals from the designated signal person.
- m. Before giving the signal to lift a load, the operator shall inspect their surroundings, to ensure they have a solid foundation for executing a manual lift, and that all personnel are clear of the load. The operator shall communicate their intention to begin lifting to employees in the immediate vicinity of the lift, and pay close attention to the hoist in progress. Operators shall never leave a load unattended or suspended.
- n. It is the hoist inspector's responsibility to alert maintenance workers of an inspection's findings. Hoists that do not pass inspection need to be tagged "Out of Service" and removed from the hoisting area until repaired or replaced.

- o. The employer shall prepare a certification record for frequent and periodic inspections that includes the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; and a serial number, or other identifier, for the hoist that was inspected and tested. The most recent certification record shall be maintained on file.

6. Scissor Lift Work Platforms

- a. Lifting and elevating the work platform **must** be done on flat, firm surfaces.
- b. The safety bar located inside the lifting mechanism must be used to prevent lowering of the scissor-type lift during maintenance or inspection.
- c. **DO NOT:**
 - (1) Elevate the work platform if it is not on a firm level surface; or
 - (2) Exert excessive side force while the work platform is elevated;
 - (3) Overload (the relief valve does not protect against overloading);
 - (4) Alter or disable limit switches;
 - (5) Raise the platform in windy or gusty conditions. (The manufacturer recommends not raising to full height or half height in windy or gusty wind conditions). The manufacturer follows a 20 mph wind speed as a guide. The manufacturer recommends not raising the lift if the wind speed is 20 mph or greater.)
 - (6) Park the work platform on high traffic sidewalks that will impede foot traffic or wheelchair traffic.
- d. Safety Devices
 - (1) The guardrails must be upright and locked in place with locking pins.
 - (2) The safety bar must be used for inspection and maintenance.
 - (3) Do not reach through scissor assembly without ensuring that the safety bar is in its proper position.
 - (4) The operator must wear a personal protective device (positioning device system) to prevent movement past or over handrails. The personal protective device will consist of a body belt with a lanyard attached to an anchor point to ensure a 100% no-fall situation. The anchor point must be positioned so the employee cannot reach the handrail with slack in the lanyard; this will prevent an employee from being able to fall from the platform.
- e. Operators must read and completely understand the operator's manual before being allowed on a work platform.
- f. Inspect and/or test for the following daily (documentation not required):
 - (1) Operating and emergency controls;

- (2) Safety devices and limit switches;
 - (3) Tires and wheels;
 - (4) Outriggers;
 - (5) Air, hydraulic, and fuel systems for leaks;
 - (6) Loose or missing parts;
 - (7) Guardrail systems;
 - (8) Engine oil level; and
 - (9) Hydraulic reservoir level.
- g. Do not operate unless proper authorization and training have been received.

7. Slings and Hooks

- a. Personnel using slings should adhere to the inspection and safe use criteria established by OSHA and available in this OSHA guidance document found at the following link: [OSHA Guidance Document](#)
- b. Personnel using hooks for moving materials will use hooks with self-closing safety latches or their equivalent to prevent components from slipping out of the hook.

8. Cranes and Gantries

- a. Some SI departments utilize overhead cranes to facilitate materials handling. Contractors who use cranes on SI construction sites may affect emergency access, vehicular and pedestrian traffic flow. Though this machinery facilitates the work, unsafe operators can put lives and property at risk.
- b. Operators of cranes and hoists must be aware of equipment limitations, inspection requirements, proper rigging, and control functions. OSHA mandates that operators receive training in these procedures. If your department maintains and operates a crane or gantry, ensure operators are properly trained and that all requirements of the OSHA Crane Standards are met per the link [OSHA Crane and Hoist Safety](#).

9. Rated Capacity Markings

All material-handling equipment (e.g., forklifts/powered industrial trucks, conveyors, hoists, dollies, carts, etc.) shall have a rated capacity noted on it that determines the maximum weight the equipment can safely handle and the conditions under which it can handle that weight. Employers must ensure that the equipment-rated capacity is displayed on each piece of equipment.

10. Storage Requirements (General)

- a. Emergencies could become disasters if exits, fire alarms, power switches, sprinklers, light switches, etc., are blocked – even temporarily. Employees shall not block emergency access or equipment. Aisles and

passageways must be kept clear of obstructions and slip, trip, and fall hazards. A 36 inch clearance shall be maintained around emergency equipment and the emergency equipment shall be clearly marked.

- b. Do not store materials in excess of supplies needed for immediate operations in aisles/passageways.
- c. Employers shall mark permanent aisles and passageways. Obstructions in aisles (e.g. columns, posts, etc.) shall be clearly marked.
- d. When using aisles and passageways to move materials mechanically, employees shall allow sufficient clearance for aisles at loading docks, through doorways, wherever turns must be made, etc. Sufficient clearance will prevent workers from being pinned between the equipment and objects in the workplace and will prevent the load from striking an obstruction and possibly falling on an employee.
- e. When different levels exist, ramps shall be used by vehicles moving materials.
- f. Doors shall be of sufficient height and width to accommodate material handling equipment. Aisles shall be 2 feet wider than the widest vehicle used. Exit access aisles in storage areas shall be at least 44 inches wide.
- g. There must be enough operating space for handling and stacking materials safely in all storage areas.

11. **Storage of Hazardous Materials/Chemicals using Material Handling Equipment**

- a. Read labels and Material Safety Data Sheets (MSDSs) before storing chemicals or flammable/combustible materials. Match storage conditions to material handling requirements (e.g., dry, cool, ventilated, etc.). Refer to Chapter 19, "Chemical Handling and Storage", of this *Manual*, for other hazardous materials storage requirements. Smoking and using open flames or spark-producing devices are prohibited in chemical storage areas. Non-compatible materials must be segregated in storage. Refer to Chapter 36, "Fire Protection", of this *Manual*, for information on flammable/combustible materials.
- b. Trash, brush, long grass, and other combustible materials shall be kept away from areas where flammable/combustible materials are handled or stored.
- c. All spills of flammable/combustible materials shall be immediately cleaned up following guidelines outlined in the facility Emergency Spill and Leak Response Plan.

12. **Storage of Other Materials**

- a. When storing materials, employees shall:
 - (1) Prevent creating hazards when storing materials by being aware of the material's height and weight; how accessible the stored

materials are to the user – consider the need for availability of the material; and the condition of the storage containers. All materials stored in tiers must be stacked, racked, blocked, inter-locked, or otherwise secured to prevent sliding or collapse.

- (2) Keep storage areas free from accumulated materials that may cause slips, trips, falls, or fires or that may contribute to harboring pests.
 - (3) If possible, place bound materials on racks and secure it by stacking, blocking, or inter-locking to prevent it from sliding, falling, or collapsing.
 - (4) Stack lumber no more than 16 feet high if handled manually and no more than 20 feet if using a forklift.
 - a. Remove all nails from used lumber before stacking it.
 - b. Stack and level lumber on supported bracing.
 - (5) Ensure stacks are stable and self-supporting. Observe height limitations when stacking materials.
 - (6) Stack bags and bundles in interlocking rows and limit the height of the stack to keep them secure.
 - (7) Block the bottom tiers of drums/barrels/kegs to keep them from rolling if stored on their side.
 - a. Stack drums/barrels/kegs symmetrically.
 - b. Place planks, pallets, etc. between each tier of drums/barrels/kegs to make a firm, flat stacking surface when stacking on end.
 - c. Chock the bottom tier on each side to prevent shifting in either direction when stacking two or more tiers high.
 - (8) Materials must not be stored on scaffolds or runways in quantities exceeding those needed for immediate operations.
- b. Additional safe material storage practices include:
- (1) Ensuring shelves and racks are sturdy and in good condition.
 - (2) Stacking all materials on a flat base.
 - (3) Placing heavier objects closer to the floor and lighter/smaller objects higher.
 - (4) Not stacking items so high that they could block sprinklers (18" of clearance) or come in contact with overhead lights or pipes.
 - (5) Using material-handling equipment or a ladder to place or remove items above your head.
 - (6) Never standing on a shelf, rack, boxes, or a chair.

E. TRAINING

1. **Manual Load Movement.** Employees shall receive back injury prevention training as part of the SI new hire safety orientation, including:
 - a. The dangers of improper manual lifting and body warning signals when manually lifting/carrying a load improperly.
 - b. Avoidance of unnecessary physical stress and strain. Use mechanical moving equipment whenever possible.
 - c. Lifting aids available (e.g. stages, platforms, steps, trestles, shoulder pads, handles, wheels, mechanical moving equipment, etc.).
 - d. Awareness of what an employee may comfortably handle without strain—an employee should understand his/her body strengths and weaknesses.
 - e. Demonstrate and practice safe manual lifting techniques due to high incidence of back injuries.
 - f. Consider periodic safety talks at least annually to remind personnel about the importance of safe lifting techniques.
 - g. The PPE required for manual movement of loads includes:
 - (1) Eye protection;
 - (2) Hand and forearm protection for loads with sharp/rough edges; and
 - (3) Steel-toed safety shoes/boots. Metatarsal guards shall be required to protect the instep area from impact if working with heavy loads or moving equipment.
2. **Forklift/powered industrial truck training**
 - a. Supervisors must develop a forklift/powered industrial truck training program specific to the type of truck to be driven and the work conditions encountered.
 - b. Purchase of powered industrial equipment shall include as part of the purchase contract that the dealer provide training to supervisors and operators.
 - c. Supervisors must evaluate the operator's performance in the workplace and certify each operator has received the training needed.
 - d. Certification shall include the operator's name, the training date, the evaluation date, the trainer's name, and the evaluator's name.
 - e. Supervisors must conduct a re-evaluation of each forklift/powered industrial truck operator's performance at least every three years.
 - f. A forklift/powered industrial truck operator must be re-evaluated and must attend refresher training if:
 - (1) The operator is observed operating the vehicle in an unsafe manner;
 - (2) The operator is involved in an accident or a near-miss incident;

- (3) The operator's evaluation shows unsafe operation of the truck;
- (4) The operator is assigned to drive a different type of truck; or
- (5) The condition of the workplace changes in a manner that could affect safe operation of the truck.

3. Scissor Lift Work Platform (including cherry pickers and other articulated arm work platforms) Operator Qualification/Training

- a. Only trained and authorized personnel should use the work platform.
- b. Operators must be familiar with the procedures listed for scissor lifts in this chapter before operating the equipment.
- c. Authorized personnel performing training must provide means of evidence that training has been done. The training document will contain:
 - (1) Name of entity providing the training;
 - (2) Name of trainer;
 - (3) Specific statement that the training covered self-propelled work platforms;
 - (4) Date of training; and
 - (5) Name of person receiving training.
- d. Workplace Inspection. Before and during use, the user shall:
 - (1) Check the area for possible hazards such as, but not limited to:
 - (a) Drop-off or holes;
 - (b) Slopes;
 - (c) Bumps;
 - (d) Debris;
 - (e) Overhead obstructions;
 - (f) Wind and weather conditions; and
 - (g) Presence of unauthorized persons.
 - (2) Inspect all safety devices and PPE that will be used including:
 - (a) Body belts (for positioning only)
 - (b) Lanyards
 - (c) Emergency stop button
 - (d) Hand rails
 - (e) Entry gate
 - (f) Safety bar
 - (g) Outriggers

F. REQUIRED INSPECTIONS

1. Employees shall inspect material handling equipment (MHE) before each use.
2. OSHA requires that all MHE be regularly inspected according to standards set by the individual manufacturer and ANSI:
 - a. Following assembly and before being put in service.
 - b. Following major alteration of an existing installation.
 - c. Frequent - weekly to monthly (heavy MHE use), and daily to weekly (severe MHE use).
 - d. Periodic - at no more than three month intervals.
 - e. Hoist inspection certification records that include the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; equipment a serial number or other identifier for the hoist that was inspected and tested.
 - f. The most recent certification record shall be maintained on file.
 - g. Forklifts/powered industrial trucks shall be inspected prior to use. Attachments 1 and 2 contains forklift Inspection Checklists. Attachment 1 is for a LPG or gas forklift and Attachment 2 is for an electric forklift.

G. RECORDS AND REPORTS

1. Keep Forklift Inspection Checklists for at least the last 5 uses. For example, if you use the forklifts on a daily basis, then keep 5 days worth of checklists. If you use the forklifts less often, then keep for the dates of the last 5 uses.
2. Keep training records that include the employee's name, training topic(s), trainer's name, and date of training.
3. Inspection records. Unless otherwise noted in previous sections, daily inspection records need not be kept. Periodic inspections and load testing records shall be maintained for at least one year. Format could include tags, painting directly on device or forms with appropriate data.

H. REFERENCES

1. Part 1910 CFR Occupational Safety and Health Administration, Subpart N, Materials Handling and Storage (1910.176 – 1910.184) [Subpart N](#)
2. U.S. Army Corps of Engineers, EM 385-1-1 3 November 2003, Safety and Health Requirements Manual, Section 14, Material Handling, Storage, and Disposal, and Section 17, Conveyors. [EM 385-1 Army Corps of Engineers](#)
3. U.S. Department of Labor, Occupational Safety and Health Administration, Materials Handling and Storing, OSHA 2236, 2002 (Revised). [OSHA 2236](#)
4. U.S. Department of Labor, Occupational Safety and Health Administration, Small Business Handbook, OSHA 2209-02R, 2005, Self-Inspection section. [OSHA 2209](#)
5. OSHA Crane, Derrick and Hoist Safety [OSHA Crane, Derrick and Hoist Safety](#)
6. National Fire Protection Association (NFPA) Standard 505, "Powered Industrial Trucks Type Designations, Areas of Use, Maintenance, and Operations," 2006.

Daily Forklift Checklist (Gas of LPG)

Operator's Daily Checklist: Gas or LPG Forklift

Check each item before the shift starts. Put a check in the box if the item is OK. Explain any unchecked items at the bottom and report them to a supervisor. **Do not use an unsafe forklift! Your safety is at risk.**

Forklift Serial Number:	
Operator:	
Hour Meter Reading:	Date:
Visual Check	
✓	Tires are inflated and free of excessive wear or damage. Nuts are tight.
	Forks and mast are not bent, worn, or cracked. Upper limit stops are OK.
	Load back rest extension is in place and not bent, cracked or loose.
	Overhead guard is in place and not bent, cracked or loose.
	Attachments (if equipped) operate OK and are not damaged.
	Forklift body is free of excessive lint, grease or oil.
	Engine oil is full and free of leaks.
	Hydraulic oil is full and free of leaks.
	Radiator is full and free of leaks.
	Fuel level is OK and free of leaks.
	Battery connections are tight.
	Covers over battery and other hazardous parts are in place and secure.
	Load rating plate is present and readable.
	Warning decals and operators' manual are present and readable.
	Seat belt or restraint is accessible and not damaged, oily or dirty.
	Engine runs smooth and quiet without leaks or sparks from the exhaust.
	Horn works.
	Turn signal (if equipped) operates smoothly.
	Lights (head, tail and warning) work and are aimed correctly.
	Gauges and instruments are working.
	Lift and lower operates smoothly without excessive drift.
	Tilt operates smoothly without excessive drift or "chatter".
	Control levers are labeled, not loose or binding and freely return to neutral.
	Steering is smooth and responsive free of excessive play.
	Brakes work and function smoothly without grabbing. No fluid leaks.
	Parking brake will hold the forklift on an incline.
	Backup alarm (if equipped) works

Operator's Daily Checklist: Gas or LPG Forklift

Check each item before the shift starts. Put a check in the box if the item is OK. Explain any unchecked items at the bottom and report them to a supervisor. **Do not use an unsafe forklift! Your safety is at risk.**

Forklift Serial Number:	
Operator:	
Hour Meter Reading:	Date:
Visual Check	
✓	Tires are inflated and free of excessive wear or damage. Nuts are tight.
	Forks and mast are not bent, worn, or cracked. Upper limit stops are OK.
	Load back rest extension is in place and not bent, cracked or loose.
	Overhead guard is in place and not bent, cracked or loose.
	Attachments (if equipped) operate OK and are not damaged.
	Forklift body is free of excessive lint, grease or oil.
	Engine oil is full and free of leaks.
	Hydraulic oil is full and free of leaks.
	Radiator is full and free of leaks.
	Fuel level is OK and free of leaks.
	Battery connections are tight.
	Covers over battery and other hazardous parts are in place and secure.
	Load rating plate is present and readable.
	Warning decals and operators' manual are present and readable.
	Seat belt or restraint is accessible and not damaged, oily or dirty.
	Engine runs smooth and quiet without leaks or sparks from the exhaust.
	Horn works.
	Turn signal (if equipped) operates smoothly.
	Lights (head, tail and warning) work and are aimed correctly.
	Gauges and instruments are working.
	Lift and lower operates smoothly without excessive drift.
	Tilt operates smoothly without excessive drift or "chatter".
	Control levers are labeled, not loose or binding and freely return to neutral.
	Steering is smooth and responsive free of excessive play.
	Brakes work and function smoothly without grabbing. No fluid leaks.
	Parking brake will hold the forklift on an incline.
	Backup alarm (if equipped) works

Daily Forklift Checklist (Electric)

Operator's Daily Checklist: Electric Forklift

Check each item before the shift starts. Put a check in the box if the item is OK. Explain any unchecked items at the bottom and report them to a supervisor. **Do not use an unsafe forklift! Your safety is at risk.**

Forklift Serial Number:	
Operator:	
Hour Meter Reading:	Date:
Visual Check	
✓	Tires are inflated and free of excessive wear or damage. Nuts are tight.
	Forks and mast are not bent, worn, or cracked. Upper limit stops are OK.
	Load back rest extension is in place and not bent, cracked or loose.
	Overhead guard is in place and not bent, cracked or loose.
	Attachments (if equipped) operate OK and are not damaged.
	Forklift body is free of excessive lint, grease or oil.
	Hydraulic oil is full and free of leaks.
	Battery connections are tight.
	Covers over battery and other hazardous parts are in place and secure.
	Load rating plate is present and readable.
	Warning decals and operators' manual are present and readable.
	Seat belt or restraint is accessible and not damaged, oily or dirty.
	Motor runs smooth and quiet without leaks or sparks from the exhaust.
	Horn works.
	Turn signal (if equipped) operates smoothly.
	Lights (head, tail and warning) work and are aimed correctly.
	Gauges and instruments are working.
	Lift and lower operates smoothly without excessive drift.
	Tilt operates smoothly without excessive drift or "chatter".
	Control levers are labeled, not loose or binding and freely return to neutral.
	Steering is smooth and responsive free of excessive play.
	Brakes work and function smoothly without grabbing. No fluid leaks.
	Parking brake will hold the forklift on an incline.Backup alarm (if equipped) works.
	Backup alarm (if equipped) works
	Battery charge level is OK while holding full forward tilt.

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Check each item before the shift starts. Put a check in the box if the item is OK. Explain any unchecked items at the bottom and report them to a supervisor. **Do not use an unsafe forklift! Your safety is at risk.**

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Forklift Serial Number:	
Operator:	
Hour Meter Reading:	Date:
Visual Check	
✓	Tires are inflated and free of excessive wear or damage. Nuts are tight.
	Forks and mast are not bent, worn, or cracked. Upper limit stops are OK.
	Load back rest extension is in place and not bent, cracked or loose.
	Overhead guard is in place and not bent, cracked or loose.
	Attachments (if equipped) operate OK and are not damaged.
	Forklift body is free of excessive lint, grease or oil.
	Hydraulic oil is full and free of leaks.
	Battery connections are tight.
	Covers over battery and other hazardous parts are in place and secure.
	Load rating plate is present and readable.
	Warning decals and operators' manual are present and readable.
	Seat belt or restraint is accessible and not damaged, oily or dirty.
	Motor runs smooth and quiet without leaks or sparks from the exhaust.
	Horn works.
	Turn signal (if equipped) operates smoothly.
	Lights (head, tail and warning) work and are aimed correctly.
	Gauges and instruments are working.
	Lift and lower operates smoothly without excessive drift.
	Tilt operates smoothly without excessive drift or "chatter".
	Control levers are labeled, not loose or binding and freely return to neutral.
	Steering is smooth and responsive free of excessive play.
	Brakes work and function smoothly without grabbing. No fluid leaks.
	Parking brake will hold the forklift on an incline.Backup alarm (if equipped) works.
	Backup alarm (if equipped) works
	Battery charge level is OK while holding full forward tilt.

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