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Materials Handling

Introduction

S.C. Swiderski, LLC requires that safety planning and practices for commonplace tasks be as thorough as for operations with unusual hazards. Commonplace tasks make up the greater part of the daily activities of most employees and, not unexpectedly, offer more potential sources of accidents with injuries and property damage. Every operation or work assignment begins and ends with the handling of materials. Whether the material is a sheet of paper (paper cuts are painful) or a cylinder of toxic gas, accident risks can be reduced with thorough planning. Identifying obvious and hidden hazards should be the first step in planning work methods and job practices.

Thorough planning should include all the steps associated with good management from job conception through crew and equipment decommissioning. Most of the material presented in this chapter is related to the commonplace and obvious. Nevertheless, *a majority of the incidents leading to injury, occupational illness, and property damage stem from a failure to observe the principles associated with safe materials handling and storage.* A less obvious hazard is the potential failure of used or excessive motorized handling or lifting equipment. The Safety & Compliance Officer must be notified whenever it is desired to acquire a crane, forklift, truck, or other motorized handling or lifting equipment from outside sources.

Handling Materials

In the handling of materials, employees must know the following:

- There must be safe clearance for equipment through aisles and doorways.
- Aisle ways must be designated, permanently marked, and kept clear to allow unhindered passage.
- Motorized vehicles and mechanized equipment will be inspected daily or prior to use.
- Vehicles must be shut off and brakes must be set prior to loading or unloading.
- Containers of combustibles or flammables, when stacked while being moved, must be separated by dunnage sufficient to provide stability.
- If dock boards (bridge plates) are used when loading or unloading operations are taking place between vehicles and docks, precautions must be observed.
- Trucks and trailers will be secured from movement during loading and unloading operations.
- Dock plates and loading ramps will be constructed and maintained with sufficient strength to support imposed loading.

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- Hand trucks must be maintained in safe operating condition.
- Chutes must be equipped with sideboards of sufficient height to prevent the handled materials from falling off.
- At the delivery end of rollers or chutes, provisions must be made to brake the movement of the handled materials.

The supervisor must enforce the use of safe lifting techniques and maintain lifting equipment in good mechanical condition. Employees are required to observe all established safety regulations relating to safe lifting techniques. The Safety & Compliance Officer provides training programs followed by certification for employees who have demonstrated the ability to operate Power Industrial Trucks (PIT) and rough terrain forklifts.

Manual Lifting Rules

Manual lifting and handling of material must be done by methods that ensure the safety of both the employee and the material. It is S.C. Swiderski, LLC policy that employees whose work assignments require heavy lifting be properly trained and physically qualified, by medical examination if deemed necessary. The following are rules for manual lifting: Inspect the load to be lifted for sharp edges, slivers, and wet or greasy spots. Wear gloves when lifting or handling objects with sharp or splintered edges. These gloves must be free of oil, grease, or other agents that may cause a poor grip.

Inspect the route over which the load is to be carried. It should be in plain view and free of obstructions or spillage that could cause tripping or slipping. Consider the distance the load is to be carried. Recognize the fact your gripping power may weaken over long distances. Size up the load and make a preliminary "heft" to be sure the load is easily within your lifting capacity. If it is not, get help. If team lifting is required, personnel should be similar in size and physique. One person should act as a leader and give the commands to lift, lower, etc. Two persons carrying a long piece of pipe or lumber should carry it on the same shoulder and walk in step. Shoulder pads should be used to prevent cutting shoulders and help reduce fatigue.

To lift an object off the ground, the following are manual lifting steps:

Make sure of good footing and set your feet about 10 to 15 inches apart. It may help to set one foot forward of the other. Assume a knee-bend or squatting position, keeping your back straight and upright. Get a firm grip and lift the object by straightening your knees - not your back. Carry the load close to your body (not on extended arms). To turn or change your position, shift your feet - do not twist your back. The steps for setting an object on the ground are the same as above, but in reverse.

Mechanical Lifting

Mechanical devices must be used for lifting and moving objects that are too heavy or bulky for safe manual handling by employees. Employees who have not been trained must not operate power-driven mechanical devices to lift or move objects of any weight.

Heavy objects that require special handling or rigging must be moved only by riggers or under the guidance of employees specifically trained and certified to move heavy objects.

Clean Work Areas

All areas controlled by S.C. Swiderski, LLC must be kept in orderly and clean condition and used only for activities or operations for which they have been approved. The following specific rules must also be followed: Keep stairs, corridors, and aisles clear. Traffic lanes and loading areas must be kept clear and marked appropriately. Store materials in workrooms or designated storage areas only. Do not use hallways, fan lofts, or boiler and equipment rooms as storage areas. Do not allow exits, passageways, or access to equipment to become obstructed by either stored materials or materials and equipment that is being used.

Arrange stored materials safely to prevent tipping, falling, collapsing, rolling, or spreading - that is, any undesired and unsafe motion. Do not exceed the rated floor capacity of stored material for the area. The load limit and the maximum height to which material may be stacked must be posted. Place materials such as cartons, boxes, drums, lumber, pipe, and bar stock in racks or in stable piles as appropriate for the type of material.

Store materials that are radioactive, fissile, flammable, explosive, oxidizing, corrosive, or pyrophoric only under conditions approved for specific use by the Safety & Compliance Manager. Segregate and store incompatible materials in separate locations. Remove items that will not be required for extended periods from work areas and put them in warehouse storage. Call for assistance.

Temporary equipment required for special projects or support activities must be installed so that it will not constitute a hazard. A minimum clearance of 36 inches must be maintained around electrical power panels. Wiring and cables must be installed in a safe and orderly manner, preferably in cable trays. Machinery and possible contact points with electrical power must have appropriate guarding.

The controls for temporary equipment must be located to prevent inadvertent actuation or awkward manipulation. When heat-producing equipment must be installed, avoid accidental ignition of combustible materials or touching of surfaces above 60 degrees C (140 F). Every work location must be provided with illumination that meets OSHA requirements. Evaluation of illumination quality and requirements is made by the Safety & Compliance Manager, but the supervisor of an area is responsible for obtaining and maintaining suitable illumination. Areas without natural lighting and areas where hazardous operations are conducted must be provided with enough automatically activated emergency lighting to permit exit or entry of personnel if the primary lighting fails.

Forklifts

Maintenance records are available so that a driver can check on the servicing of the truck in case of questions. When an industrial truck operates in areas where flammable gases, vapors, combustible dust, or ignitable fibers may be present in the atmosphere, the vehicle must be approved for such locations with a tag showing such approval posted on the vehicle itself. Industrial trucks with internal combustion engines, operated in buildings or enclosed areas, should be carefully checked to ensure that the operation of the vehicle does not cause a harmful concentration of dangerous gases or fumes.

Forklift Extension

Maximum efficiency, reliability, and safety require that the use of fork extensions be guided by principles of proper application, design, fabrication, use, inspection, and maintenance. The user must notify the Safety & Compliance Manager before purchasing extensions or having them fabricated. Fork extensions are only appropriate for occasional use. When longer forks are needed on a regular basis, the truck should be equipped with standard forks of a longer length. Routine on-the-job inspections of the fork extension must be made by the forklift operator before each use unless, in the judgment of the supervisor, less frequent inspections are reasonable because of his or her knowledge of its use since the last inspection. Extensions must be inspected for evidence of bending, overload, excess corrosion, cracks, and any other deterioration likely to affect their safe use.

All fork extensions must be proof load tested to establish or verify their rated capacities, whether they were supplied commercially or fabricated at S.C. Swiderski, LLC. A load equal to the rated capacity of the pair at a particular load center multiplied by 1.15, must be placed on each fork extension pair and fork assembly and supported for a period of five minutes without any significant deformation. Rated capacity must be determined at significant load centers, including the midpoint of the extension and at the tip. Once determined, the rated capacity and load center information must be shown by stamping or tagging the extensions in a protected location of low stress. The proof load test must be witnessed by a mechanical engineer or designer. Whenever evidence of deterioration is detected or whenever the extensions have been overloaded, magnetic particle inspection must be performed.

- OSHA's [Powered Industrial Trucks](#) page provides detailed information on hazards, safeguards, training, and safe operation of forklifts.

Hoists & Auxiliary Equipment

Every overhead hoist shall be equipped with a limit device to stop the hook travel at its highest and lowest points of safe travel. Check these limits without a load to ensure the

Lifting Fixtures

The Safety & Compliance Manager is responsible for approving the design, fabrication, and testing of lifting fixtures. The design stress for lifting fixtures must not exceed one-fifth (1/5) of the ultimate strength of the material at the operating temperature. If welded fabrication is used, the design stress must take into consideration any weakening effects of welding, such as those that occur in aluminum alloys. If practical, avoid welding in the fabrication of lifting fixtures; however, if welding is used, design and fabrication must conform to the latest standards of the American Welding Society (AWS). Careful, thoughtful design and follow-up are required. The following rules apply when designing welded units: There must be no possibility of subjecting welds to tearing loads. Stresses in welds must be substantially uniform.

Where possible, design lifting fixtures so that the main loads are carried only by structural members, plates, or shear pins rather than by welds. Examine this possibility carefully. Welded fabrications must be proof tested to twice the maximum rated load followed by a magnetic particle inspection or other appropriate crack inspection method. Primary load-carrying welds and welds in tension must be x-rayed. The screw-thread engagement required for conservative development of the full strength of a screw fastener depends upon the screw fastener material and the material of the threaded member. If the fastener is made of the same material as the female threaded member, e.g., a low-carbon steel bolt and a hole threaded into low-carbon steel, an engagement of at least 1-1/2 diameters is required. A hardened steel screw (Allen screw) in mild steel requires at least 2-diameters engagement. A low-carbon screw fastener, threaded into a tapped hole in aluminum alloy, copper, or cast iron must have a threaded engagement of 1-1/2 diameters. Other material combinations must be approved by the Safety & Compliance Manager.

Safety hoist rings may be used to make lifts up to their rated load when screwed 2 hoist ring bolt diameters into materials such as aluminum alloy, copper, or cast iron. When special high-strength bolts are required, consider the use of nonstandard pitch threads to avoid the possibility of using the wrong bolt in the lifting device. Any bolt used as part of S.C. Swiderski, LLC-designed lifting fixtures or pickup devices must be tested to two (2) times its rated load. A crack detection inspection must be performed after the load test to ensure soundness. It is desirable to maintain a supply of tested bolts in the event that one is lost. Once a lifting device or fixture is in the hands of the user, it is the user's responsibility to ensure that the proper bolt is inserted to the proper depth and correctly torqued.

Mobile Cranes

Purpose

To provide guidance for the protection of personnel operating mobile cranes or working in the area of operation.

References

29 CFR 1926.1400

Policy

Equipment Inspection and Testing

Upon its arrival and before its use on the project and at 30-day intervals thereafter, a competent person will inspect each mobile crane for mechanical defects. Maintenance records will be completed and retained. A third-party inspector approved by the Department of Labor will perform all annual crane inspections. When a crane has been dismantled or has had major repairs, a third-party inspector approved by the Department of Labor will inspect it.

It is recommended that the equipment be load-tested only in accordance with the manufacturer's specifications and limitations and American National Standard Institute (ANSI) B30.5 Current, Mobile and Locomotive Cranes.

No modifications or alterations that affect the capacity or safe operation of the equipment will be made by the project or an individual without the manufacturer's written approval.

Operator Authorization

All mobile crane operators must be instructed in or given the opportunity to read and understand the manufacturer's Operators Manual for assigned make and model machine, and applicable OSHA and ANSI standards. The mobile crane operator must be trained and authorized to operate the specific make and model crane assigned.

Operations

Each day, the operator, prior to starting work, will check all safety features of the cranes. These include but are not limited to:

- Fire extinguisher.

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- Seat belts
- Tire pressure
- Window glass.
- Horn
- Back-up alarm

Electrical Hazards

A crane will not be operated, under any circumstances, wherein any part of the crane or load will come within 10 feet of energized distribution lines rated 50 kV or below unless the following conditions are met:

- The lines have been de-energized and are grounded at the point of work.
- Insulating barriers that are not part of the hoisting equipment have been erected.

For lines rated over 50 kV, see Table A

Table A – Minimum Clearance Distances

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45

Over 1,000 *** (as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

All lines will be considered energized unless the person or utility owning the lines indicates that they are not energized and that the lines are grounded at the point of operation.

Traveling With a Load (Pick and Carry)

Traveling with a load (pick and carry) is not recommended as a means of transporting loads from one location to another on the project and should be used as a last resort. The use of farm wagons, forklifts, boom trucks, and flatbed trucks should be used to transport these loads rather than “pick and carry” operations.

Traveling with suspended loads entails many variables, i.e., the type of terrain, boom length, momentum in starting and stopping, etc. Therefore, it is impossible to

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formulate a single standard procedure with any assurance of safety. Thus, when traveling with a load, the operator must evaluate the prevailing conditions and determine the applicable safety precautions. No matter what, manufacturer guidelines shall not be exceeded.

Notices and Posting

Rated load capacities recommended operating speeds, special hazards warnings, operating notes, and special instructions will be posted on all equipment and will be visible to the operator while he is at the control station. Illustrations of the hand signals used in connection with the operation of equipment will be posted at the project site.

RECORDS

Maintenance records shall be maintained at the project.

SIGNALING

Each person that provides signals for the crane operator must:

- Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.
- Be competent in the application of the type of signals used.
- Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.
- Know and understand the relevant requirements of §§ 1926.1419 through 1926.1422 and 1926.1428.
- Demonstrate that he/she meets the requirements in paragraphs (c)(1) through (4) of this section through an oral or written test, and through a practical test.

Lattice Boom Inspection Form

Mfg:		Model #			Serial #	Date:
Check the appropriate box:		S = Satisfactory			U = Unsatisfactory	NA = Not Applicable
Condition		S	U	A	Number item for reference remarks below:	
FLUID LEVELS	1. Crank Case					
	2. Coolant					
	3. Hydraulic Oil					
CAB (S)	4. Electrical System					
	5. House Lock					
	6. Service/Parking Break					
	7. Swing Break/House Lock					
	8. Gauges					
	9. Housekeeping					
	10. Fire Extinguisher(s)					
	11. Load Chart					
	12. Windows/Mirrors					
	13. Travel					
	14. Steering					
FUNCTIONS	15. Outriggers					
	16. Boom Up / Down					
	17. Hoist(s) Up / Down					
	18. Swing					
OPERATIONAL AIDS	19. Anti-Two Block					
	20. LMI / Load Wt. Indicator					
	21. Boom Length Indicator					
	22. Boom Angle Indicator					
	23. Lights/ Locks/ Buzzers					
	24. Back-Up Alarm / Horn					
	25. Boom Kick-Out					
BOOMS, JIBS, & ACCESSORIES	26. Load Block / Ball/ Hook (s)					
	27. Safety Latches					
	28. Wedge Socket(s)					
	29. Sheaves					
	30. Wire Rope Retainers					
	31. Main Boom					
	32. Jib / Extension					
LOWER WORKS	33. Tires / Inflation					
	34. Carrier / Car Body					
	35. Shoes / Tracks / Chain					
	36. Outriggers					
	37. Machine Guards					
	38. Hoist Brake (s) / Clutches					
UPPER WORKS	39. Hoses / Tubing					
	40. Hoist (s)					
	41. Wrapping on Drum (s)					
	42. Rope Reeving					
	43. Wire Rope					
	44. Gentries / Bridles					

- Consult operator's manual for additional inspection items.
- Do not operate crane until unsafe conditions are corrected.

Operator Signature

Supervisor Signature

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Telescoping Boom Inspection Form

Mfg:		Model #			Serial #	Date:
Check the appropriate box:		S = Satisfactory			U = Unsatisfactory	NA = Not Applicable
Condition		S	U	A	Number item for reference remarks below:	
	1. Crank Case					

OSHA Requirements for Temporary Heaters

Purpose

Construction projects may utilize temporary heaters when the temperature gets cold. It's crucial to keep a project moving and temporary heaters can be an asset for staying on schedule. They are particularly beneficial in the winter months for thawing ground, curing concrete, and general drying/warming purposes within the buildings as well as the job trailers / remote offices. However, while temporary heaters are helpful, they can quickly become hazardous, and potentially lead to fire if improperly installed and maintained.

Fires are the main reason to take temporary heater safety precautions. Unvented and self-contained heaters are used most often on jobsites. Proper venting is an important consideration when using temporary heaters. Additionally, improper installation and clearance are the main causes of accidents.

Policy

According to OSHA (1926.154), when implementing a temporary heating device, there are five standards that one must adhere to:

1. **Ventilation.** Fresh air or mechanical ventilation must be provided for safety, proper combustion, and temperature management.
2. **Clearance and mounting.**
 - At a minimum, circulating heaters must be placed 12" from a room's sides and rear, and 18" from its chimney connector.
 - Radiant heaters must be placed at least 36" from a room's sides and rear, and 18" from its chimney connector. Temporary heaters with shorter clearances may be installed accordingly.
 - Heaters which are not safe for direct placement on the floor must rest on heat-insulating material, at least 1 in. of concrete, or its equivalent. The heat-insulating material must extend 2 ft. beyond the heater in all directions.
 - Heaters must be located at least 10 ft. from any coverings (ex. tarpaulins, canvas) and these coverings must be severely fastened to avoid becoming ignited or knocking away the heater.
3. **Stability.** Unless the manufacturer's markings permit otherwise, heaters in use must be set horizontally level.

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4. **Solid fuel salamanders.** Solid fuel salamanders are prohibited in buildings and on scaffolds.
5. **Oil-fired heaters.** Flammable, liquid-fired heaters must have a primary safety control, neither barometric nor gravity oil feed, that stops fuel in the event of flame failure. Barometric or gravity oil feed heaters can only be used with integral

be used in small or tightly sealed spaces for this reason. Additionally, because you're dealing with an open flame, take care when sweeping dust or sawdust that could catch fire near a direct fired heater.

Indirect Fired Heaters

An indirect fired heater is very similar to a direct fired unit in that it burns propane, natural gas, or diesel fuel to create heat. The main difference is what makes an indirect unit a better choice in terms of safety – the combustion takes place inside a burn chamber and releases the exhaust outdoors. This means the indoor air is safe to breathe for your employees and subcontractors. The air blown into the space is also dry which makes this a good option for dry out applications. The units are usually larger and placed outside with ducting used to bring the warm air into the space.

Temporary Heater Safety Tips

- Always read the instructions on the side of the heating unit, which will vary from unit to unit.
- Inspect units prior to use daily and never use a heater that appears to be damaged.
- Keep heaters away from any combustible material.
- Choose a heater size that's appropriate for the square footage.
- Use heaters certified by a national testing laboratory.
- Propane tanks must be secured to prevent tip-over.
- Keep propane cylinders at least 10 feet away from the heater.
- Replacement LP gas cylinders in storage cannot be kept inside of buildings.
- Don't use any below grade LPG or LP. Propane settles in low areas. For example, in a basement without an exit, any spark or flame could ignite the gas concentration to create a damaging explosion.
- ***When using direct fired heaters, install CO detectors in the area to monitor carbon monoxide buildup.***
- In case of an emergency, place a fully charged and inspected fire extinguisher within 50 feet of an active unit.
- Never leave a heater running unattended. A fire watch is required for overnight activity.
- Turn off the heater and allow it to cool down before refueling.
- Turn off the gas supply when heaters are not in use.
- Keep gas lines and ducting out of walkways to avoid tripping hazards.

Office Safety

Purpose

required, they must be secured and covered to eliminate tripping hazards. Extension cords shall be capable of carrying intended power loads.

- Circuits providing power to office machines must be adequately sized.
- Do no overload wall outlets.

Material Storage

- Materials should be stored so that in gaining access to these materials, normal office traffic does not have to be crossed.
- Materials should be stored neatly so that they will not fall or cause a tripping hazard.
- Flammable or hazardous liquids used in offices must be stored and dispensed from approved safety containers. Bulk storage must be in a properly constructed fireproof room or cabinet.

Lighting and Ventilation

Adequate lighting and ventilation must be provided in accordance with applicable standards.

Ladders/Stools

Ladders and stools used for reaching high storage should have either non-skid safety feet attached or be equipped with brakes that automatically lock when weight is applied.

Fire Protection, Prevention, and Emergencies

Good housekeeping is essential in preventing fires. No open flame in the office (candles, oil lamps, etc.) as this presents a serious fire hazard.

Portable fire extinguishers must be conspicuously located and labeled. Extinguishers must be inspected and tagged annually and maintained in a fully charged condition.

Smoke detectors and/or alarm systems should be checked once a month for proper operation.

A fire emergency procedure and a basic emergency plan must be developed for each office complex. Emergency phone numbers for fire, police or medical emergencies must be posted at each phone.

ERGONOMICS – OFFICE WORKSTATION

Chair

- Adjust the height of the chair so that the employee's feet are flat on the floor, with

- Employees should move their eyes in a different direction periodically throughout the day to relieve eye strain. Look into the distance periodically. Try to blink often and close eyes from time to time.

Telephone

- If the employee is required to type on a computer while speaking on the phone for the majority of the workday, the use of a headset will eliminate the need to cradle the phone between the neck and shoulder.

Work Surface Layout

- Employees need to minimize reaching. Employees should position equipment so frequently used items are within comfortable arm's reach and less used items are located further away.

Pesticides

Each person performing pest control shall:

- Use only pest control equipment which is in good repair and safe to operate.
- Perform all pest control in a careful and effective manner.
- Use only methods and equipment suitable to ensure the proper application of pesticides.
- Perform all pest control under climatic conditions suitable to ensure proper application of pesticides.
- Exercise reasonable precautions to avoid contamination of the environment. A copy of the registered labeling that allows the manner in which the pesticide is being used shall be available at each use site.
- Concentrate pesticides shall be weighed or measured accurately using devices that are calibrated to the smallest unit in which the pesticide is being weighed or measured. A uniform mixture shall be maintained in both application and service rigs.
- Pest control equipment shall be thoroughly cleaned when necessary to prevent illness or damage to persons, plants, or animals from residues of pesticides previously used in the equipment.
- Each service rig and piece of application equipment that handles pesticides and draws water from an outside source shall be equipped with air-gas separations, reduced pressure principle backflow prevention device, or double-check valve assembly.
- Backflow protection must be acceptable to both the water purveyor and the local health department.

Age of Operator

Minors under 18 years of age shall not be permitted to mix or load a pesticide that, in any use situation, requires either air-supplied respiratory protection; closed systems; or full

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