

SECTION 5

# Mechanical Materials Handling

## SECTION 5: MECHANICAL MATERIALS HANDLING

Often times, individual workers benefit from using specialized materials handling equipment to complete tasks which otherwise require many workers. Powered industrial trucks and cranes are examples of these types of equipment. Operators should be trained and certain precautions should be taken as outlined in the section below.

### Powered Industrial Trucks

A powered industrial truck, or (PIT) is defined as “an industrial vehicle used to carry, push, pull, lift or stack material that is powered by an electric motor or an internal combustion engine. Included are vehicles that are commonly referred to as forklift trucks, rider-trucks, motorized or powered hand trucks, pallet trucks and tugs.” Cal/OSHA Title 8 CCR 3668 requires that every operator be trained and certified to operate powered industrial trucks in the workplace, and that the operator’s performance be evaluated every three years (Note: Not all PITs are considered forklifts but all forklifts are PITs). Contact the Campus EH&S Office to discuss options for receiving powered industrial truck training.

As best practice, electric PITs should be used anytime work is being performed indoors, as gas powered vehicles/equipment produce exhaust and toxic gases that present indoor air quality hazards. An example of a dangerous by-product produced by an internal combustion engine is carbon monoxide gas, which can be detrimental to safety and health at certain levels of exposure. See the “Gas Powered Equipment” subsection below for more details.

### Forklifts

When driving a forklift, it is imperative to keep the combined center of gravity (CG) inside the stability triangle (the area inside the two front wheels and the pivot point of the rear axle). If the combined center of gravity moves outside the stability triangle, the forklift tends to tip sideways. Factors that can cause a forklift to tip include excessive speed while turning and driving on uneven surfaces. Special care should also be taken when ascending or descending an incline or decline plane to maintain center of gravity and prevent tipping of the vehicle.

Other potential dangers may include but are not limited to the following:

- lift trucks being inadvertently driven off loading docks;
- lifts falling between docks and unsecured trailers;
- workers being struck by a lift truck; or
- workers falling while on elevated pallets and tines.

The following excerpts are some applicable rules and regulations from the California Code of Regulations pertaining to Industrial Trucks:

- Loads shall be so balanced, braced, or secured as to prevent tipping and falling. Only stable or safely arranged loads shall be handled.
- Employees shall not ride on the forks of lift trucks.
- The forks on a forklift shall always be carried as low as possible, consistent with safe operations.
- A loaded vehicle shall not be moved until the load is safe and secure.
- When provided by the industrial truck manufacturer, an operator restraint system such as a seat belt shall be used.

Drivers shall check the vehicle at the beginning of each shift using the Forklift Pre-Shift Inspection Checklist ([Appendix F](#)) or equivalent form. If it is found to be unsafe, the matter shall be reported immediately to a supervisor, and the vehicle shall not be put in service again until it has been made safe. Attention shall be given to the proper functioning of tires, horn, lights, battery, controller, brakes, steering mechanism, cooling system, and the lift system for fork lifts (forks, chains, cable, and limit switches).

## Cranes, Hoists And Slings

There are two classes of cranes/hoists defined according to rated load capacities: “Three Tons and Under ( $\leq 3$  Ton)” and “Over Three Tons ( $>3$  Ton)”. The larger cranes are subject to more stringent inspections, load tests and scheduled maintenance. Smaller cranes/hoists must have initial load tests, documented inspections and routine maintenance. Inspection requirements are outlined under Cal/OSHA Title 8 CCR 5021 and 5031.

Each shop in possession of cranes or hoists shall:

- Identify all cranes, hoists and rigging owned by the shop
- Identify cranes rated over three tons and manage load testing every four years
- Identify cranes rated three tons or less and manage their annual inspections
- Designate one or more “Qualified Person(s)” to operate the crane or hoist
- Provide for and document each Qualified Person’s “operator training” prior to allowing them to inspect, maintain and/or operate specific department crane equipment (Retain all training records)
- Conduct documented quarterly inspections of all crane and hoist equipment
- Coordinate the completion of annual inspections of cranes/hoists/lift gear over three tons by a certifying agency, and a documented quadrennial load test conducted by a certifying agency
- Use of mobile vehicle cranes should be cleared with the appropriate campus department before work begins. You may contact the Campus EH&S Office for further information

### Load Test Requirements

Upon initial equipment installation, or when conducting load tests every four years, the shop’s designated responsible person must:

- Assure that all crane and hoist components and their attachments to a structure are engineered to support 125% of maximum load capacity of the equipment component with the lowest load rating
- Arrange for an initial load test of 125% rated capacity and performed by a certifying agency
- Arrange for initial testing of rigging at 110% - 125% maximum load capacity (to be determined by the certifying agency based upon type and use of crane)
- Ensure rigging is tagged or otherwise marked with load capacities
- Work with the appropriate department on campus and certifying agency to coordinate timing, space required, and access to the site. You may contact the Campus EH&S Office for further information

## Gas-Powered Equipment

Using gas-powered tools such as high-pressure washers, concrete cutting saws, welders, compressors, and generators inside buildings or in semi-enclosed spaces can lead to a potentially dangerous concentration of Carbon Monoxide (CO) in the air. CO can rapidly accumulate, even in areas that appear to be well ventilated, and build up to dangerous or fatal concentrations within minutes.

Carbon Monoxide incidents can be avoided by following the recommendations below:

- Do not allow the use or operation of gas-powered engines or tools inside buildings or in partially enclosed areas
- Learn to recognize the symptoms and signs of CO exposure: headache, nausea, weakness, dizziness, visual disturbances, changes in personality, and loss of consciousness. Any of these symptoms and signs can occur within minutes of exposure
- Always place the pump/power unit of high-pressure washers and other tools outdoors and away from air intakes so that engine exhaust is not drawn indoors where the work is being done
- Consider the use of tools powered by electricity or compressed air if they are available and can be used safely
- Use personal CO monitors where potential sources of CO exist. These monitors should be equipped with audible alarms to warn workers when CO concentrations are too high



Contact EH&S with any concerns regarding gas-powered equipment or Carbon Monoxide.