ENVIRONMENTAL HEALTH & SAFETY

UNIVERSITY *of* WASHINGTON

POWERED INDUSTRIAL TRUCKS SAFETY MANUAL

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PURPOSE

This document represents the requirements of the University of Washington (UW) Powered Industrial Trucks (PIT) Program. The purpose of this manual is to establish requirements, including roles and responsibilities, for protecting University personnel from potential harm while operating a powered industrial truck. The requirements in this manual meet the requirements of the Washington Administrative Code (WAC) Section 296-863 and OSHA 1910.178 Powered Industrial Trucks standard.

Thousands of preventable deaths and injuries occur each year due to improper use and oversight of powered industrial trucks (PITs).

The University of Washington Environmental Health & Safety (EH&S) administers the Powered Industrial Trucks Program through coordination, oversight, and implementation of all elements of the program in compliance with state and federal law.

Specific requirements, guidelines, and procedures are outlined in this document to ensure the safety of UW personnel who operate and work with powered industrial trucks.

This manual:

- Defines a process for evaluating the hazards of operating a powered industrial truck and ways to control these hazards
- Identifies training requirements and processes for operating powered industrial trucks
- Provides guidance for UW personnel who oversee contractors that operate powered industrial trucks on UW property, owned or leased

SCOPE

The Powered Industrial Trucks (PIT) Program requirements apply to University personnel who operate powered industrial trucks that use electric motors or internal combustion engines in University locations, including all UW leased or owned locations that serve as assigned workplaces and educational settings.

PITs include, but are not limited to:

- Fork trucks
- Forklifts
- Tractors
- Platform lift trucks
- Motorized hand trucks/pallet jacks
- Other specialized industrial trucks

Excluded vehicles

This manual does **not** apply to industrial trucks that are powered by compressed air or other non-flammable compressed gases, vehicles covered by safety standards for agriculture, vehicles intended primarily for earth moving or over-the-road hauling, or small utility vehicles such as golf carts.

Additional procedures and guidelines

UW departments, units, and organizations can use the UW Powered Industrial Trucks Safety Manual to meet compliance requirements.

Departments/units/organizations may develop and require specific procedures, equipment, and documentation for managing their powered industrial trucks program. Department/unit/organization-specific information may be added to their Supplemental Accident Prevention Plan. The requirements must be equal to or more stringent and must not conflict with the information provided in this document.

For the purposes of this document, "employees" refers to University personnel (as defined in Administrative Policy Statement 40.1), including faculty, staff, and paid student workers.

ROLES AND RESPONSIBILITIES

Role	Responsibilities
Departments/Units/Organizations	**Supervisors in departments/units/organizations who operate powered industrial trucks (PITs) ensure the items below are completed**
	• Provide necessary resources to implement, maintain, and document department/unit-specific powered industrial truck procedures. • Ensure only authorized PIT operators operate and/or work on powered industrial trucks. • Designate a trainer (either a person within the department/unit or an external company) who has the knowledge, training, and experience to train and evaluate powered industrial truck (PIT) operators. • Ensure training is provided and documented for each authorized PIT operator by a person/company qualified to train powered industrial truck operators. • Provide PITs with directional lighting if the general lighting is less than 2 lumens per square foot, measured with a light meter. • Ensure personnel have and use the required safety and personal protective equipment. • Ensure contractors adhere to PIT safety requirements as outlined in this manual. • Ensure all PITs meet applicable codes and standards. • Report incidents to EH&S within 24 hours via the UW Online Accident Reporting System (OARS). Some incidents require immediate notification.
Environmental Health & Safety (EH&S)	• Develop, coordinate, and maintain the UW Powered Industrial Trucks Program in accordance with WAC 296-863 standard. • Assign a UW Powered Industrial Trucks Program Administrator to oversee the program. • Provide consultation and assistance to units and departments to comply with the requirements of the program. • Conduct periodic inspections, which include questions related to powered industrial trucks. • Perform periodic reviews of the Powered Industrial Trucks Program to ensure compliance with regulatory requirements and industry best practices. • Audit a representative sample of department/unit/organization procedures and documentation to monitor program compliance in accordance with this manual.

Role	Responsibilities
Authorized Powered Industrial Truck Operator	**An individual who completed an operator training program prior to operating a powered industrial truck.**
	• Ensure required documents are completed prior to operating and/or working on a powered industrial truck. • Complete required training(s) to maintain authorized operator status. • Perform work following approved procedures and use required safety and personal protective equipment. • Report all incidents to a supervisor immediately.
Project Managers (hiring managers)	• Coordinate, review, and authorize the use of powered industrial trucks with contractors. • Ensure any accidents or incidents related to powered industrial truck operations are reported to the UW Online Accident Reporting System (OARS).

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POWERED INDUSTRIAL TRUCKS

Powered industrial trucks (PITs) are used in many industries, primarily to move materials. They can be used to raise, lower, or remove large objects or a number of smaller objects on pallets or in boxes, crates, or other containers. PITs can either be ridden by the operator or controlled by a walking operator.

Potential hazards

Potential hazards of operating a PIT include:

- Tipping over
- Loss of steering control (improper weight distribution can raise the rear wheels)
- Falling load
- Collision

Operators refer to the Facility Design Considerations, PIT Design Requirements, and Operating Powered Industrial Trucks sections for required and recommended safety practices to control potential hazards.

FACILITY DESIGN CONSIDERATIONS

Keep safe design practices in mind when selecting the best type of powered industrial truck for a specific task.

Traffic flow

Determine the travel path of the equipment and ensure the design provides for the separation of PIT travel from pedestrian travel to eliminate the potential for injury to personnel. Barriers, guards, and floor markings are commonly used to control potential hazards. Mounted mirrors improve safety near blind corners.

Storage and charging or fueling

General safety practices apply to storage of **all** types of PITs in both indoor and outdoor locations.

- No-smoking signage
- Adequate ventilation
- Fire protection equipment and procedures aligned with local fire codes
- Adequate space for storing PITs and ancillary equipment
- Do not block exit pathways, egress doors, electrical panels, or other fire protection and/or safety equipment such as fire pull stations, fire extinguishers, and emergency showers.

Electric battery PITs

These vehicles are used indoors and require a designated storage area and a plan for battery disposal.

Lead acid battery

- Batteries are heavy and require charging and material handling equipment for maintenance activities.
- Ventilation is required in the charging area to reduce hydrogen emissions.
- An emergency eyewash/shower is required in the charging area in the event of an exposure to electrolyte during servicing.
- Electrical power is required for charging.
- No smoking signage is required.
- Fire protection appropriate to the types of hazards present

Lithium-ion battery

- Lithium-ion batteries are sealed and do *not* require an emergency washing device.
- The charging area requires ventilation to reduce hydrogen emissions.
- Store batteries separate from PIT in metal cabinets with less than 50% charge.
- Electrical power is required for charging.
- No smoking signage is required.
- Contact EH&S Environmental Programs for disposal.

Combustion fuel PITs

Propane

- Provide adequate ventilation for use of liquid propane cylinders.
- Dilute or treat exhaust emissions to a safe level when operating PIT indoors.
- Fire protection appropriate to the types of hazards present
- No smoking signage where liquid propane is in use or in storage

Gasoline (diesel)

- Refuel PIT in location designed in accordance with the local fire code.
- Fire protection appropriate to the types of hazards present
- No smoking signs where PIT is stored

Table 1: Summary of storage facility considerations

Type of PIT	Facility Considerations for storage and charging/fueling	Recommended Use (Indoor/Outdoor)
Electric – Lead Acid Battery	Designated area for storage and charging batteries: Batteries are heavy and require charging and material handling equipment for maintenance activities. The charging area will require ventilation to reduce hydrogen emissions and an emergency eyewash/shower in the event of an exposure to electrolyte during servicing Electrical power No smoking signage Fire protection appropriate to the types of hazards present Batteries are 100% recyclable	Indoor
Electric – Lithium-ion Battery	Designated area for storage and charging batteries: The Li-ion batteries are sealed and do not require an emergency washing device There should be adequate ventilation and fire protection recommended for lithium batteries Store batteries separate from PIT in metal cabinets with <50% charge Electrical power No smoking signage Battery disposal management	Indoor
Combustion Fuel-Propane	Provide adequate ventilation for use of LP gas cylinders. Dilute or treatment exhaust emissions for a safe level when operating PIT indoors Fire protection appropriate to the types of hazards present No smoking signage where LP gas is stored (on truck or spares)	Outdoor
Combustion Fuel – Diesel or gasoline	Refuel PIT in location designed in accordance with the local fire code Fire protection appropriate to the types of hazards present No smoking signs where PIT is stored	Outdoor

Flooring

Design floors with a floor load rating (capacity) sufficient to support the maximum weight of the PIT, taking into account both the PIT weight and the maximum weight of the load.

Other items to consider in floor design include allowing for turning radius of the PIT and designating pedestrian walkways.

Select flooring material with adequate traction and resistance properties to avoid slippage and excessive wear and tear.

Flooring surfaces must be compatible with hazardous materials present that may be related to the PIT or to the materials being handled.

Illumination

- **Indoor workspaces** must be designed, at a minimum, to provide illumination to meet 10 footcandle (1 fc = 1 lumen/square foot or 10.87 lux) measured at 30 inches above the floor or working surface of the task. A single measurement used to calculate an average light level cannot fall below 5 footcandles.
- **Outdoor workspaces** must, at a minimum, provide illumination to meet 5 footcandle (1 fc = 1 lumen/square foot or 10.87 lux) measured at 30 inches above the floor or working surface of the task. A single measurement used to calculate an average light level cannot fall below 3 footcandles.

Directional lighting from the PIT light can supplement the ambient lighting, if the workspace does not have adequate illumination.

PIT DESIGN REQUIREMENTS

PITs must meet American National Standards Institute (ANSI) design and construction requirements, which vary depending on manufacture date.

- PITs manufactured before March 1, 2000, must meet the requirements of ANSI B56.1-1969.
- PITs manufactured on or after March 1, 2000, must meet the requirements of ANSI B56.1-1993.
- Rough terrain forklift trucks manufactured on or after January 1, 2005, must meet the design and construction requirements of ANSI B56.6-1992.

TYPES OF POWERED INDUSTRIAL TRUCKS

Fork Truck/Forklift

Forklifts are user-operated machinery that pick up and transport heavy materials and loads in warehouses, construction sites, shipping facilities, and other material handling operations.

Tractor

A tractor is a vehicle that is designed to deliver a high tractive effort (or torque) at slow speeds for the purpose of hauling a trailer or machinery.

Tractors may be fitted with a pallet fork attachment to operate similar to a forklift. Uses of tractors at the UW may include grounds maintenance or materials handling.

Platform lift truck

Platform lift trucks, also known as platform stackers, have a stable, flat surface that supports smaller loads, bulk goods, or irregularly shaped items that are not stored on pallets or skids. A lifting mechanism is used to raise the loaded platform.

Platform lift trucks move and lift loads for stacking or placement onto storage racks or other high surfaces in warehouses, manufacturing plants, and other industrial areas. Unless noted otherwise, platform lifts are intended for use on firm, level surfaces because they may roll back if used on inclines.

- Platform lifts require less maintenance and can maneuver more easily in tight spaces than forklifts.
- Manual platform lifts require less maintenance than powered platform lifts.
- No certification is required to operate manual platform lifts.
- Fully or partially powered platform lifts demand less physical effort to operate than manual platform lifts.

Motorized hand truck/Pallet jack

A motorized hand truck/pallet jack is a PIT with wheeled forks designed to go under or between pallets. It is controlled by a walking or riding operator. This vehicle is available in varying lengths and widths to accommodate different environments and requirements.

LABELS

All nameplates (example shown below), as well as any stickers, stencils, or marks that relate to the stability and safety of the PIT must be in place and legible.

The **nameplate** must indicate

- The model and serial number;
- Approximate weight;
- Certification that the manufacturer has met the requirements of ANSI B56.1 Safety Standards for Powered Industrial Trucks; and
- Type of fuel (LP or E).

The nameplate has a **data table** with a diagram near the bottom that notes

- The vertical and horizontal load center distances;
- Maximum lifting height; and
- Maximum load capacity.

Do not operate a truck with an illegible or missing nameplate.

Maximum capacity

Operators check the nameplate for maximum capacity and maximum lifting height prior to operating a PIT, and do *not* exceed the capacity or height listed.

Attachments

The addition of a front-end attachment, including a fork extension, generally lowers the maximum load capacity of a PIT and requires written approval from the original PIT manufacturer, or from a qualified professional engineer if the manufacturer is no longer in business.

Users are responsible for ensuring the data plate is updated on any PIT with a front-end attachment to include:

- Identification of the attachment;
- Weight and capacity of the attachment; and
- Maximum capacity of the PIT with attachments at their highest elevation with a laterally centered load.

The weight of the attachment must be subtracted from the maximum load capacity listed on the original nameplate to determine the actual maximum load capacity of the PIT.

Hazardous locations

PITs approved for hazardous (classified) locations must be labeled with a permanent and legible mark or label from a recognized testing laboratory, indicating their suitability for the specific hazardous location.

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OPERATING POWERED INDUSTRIAL TRUCKS

PRE-USE INSPECTION

OSHA requires that all PITs are inspected by an authorized operator according to the manufacturer instructions **at least daily** before being placed in service. If a PIT is used continuously for 24 hours, another inspection must be performed after each shift.

The operator is required to document inspections using:

- The manufacturer's daily inspection form; **or**
- Powered Industrial Trucks Pre-Use Inspection Form (in Appendix B); **or**
- An equivalent form.

Any deficiencies or areas of noncompliance found during the inspection must be reported to a supervisor and the PIT tagged out of service until repairs are completed by authorized personnel.

OPERATION

PITs must be operated according to the manufacturer's instructions.

Operators must be trained prior to use and be 18 years of age or older. Restrict riders on a PIT to the operator unless a seat is designated for passenger use by the manufacturer.

Refer to the UW Fall Protection Program Manual to ensure safety in situations with fall hazards, such as when work platforms are used to lift personnel over a height of 4 feet.

Follow the requirements below while operating a PIT.

Safe travel practices

- Use available restraint devices, such as seatbelts or lapbars.
- Assess the situation before conducting a lift to determine if it is safe to continue.
- Carry the load as low as possible and watch for overhead obstructions such as sprinkler heads and light fixtures.
- Access to evacuation routes, stairways, and emergency equipment must be kept clear.
- Allow sufficient clearance for safe operation under overhead installations such as lights, pipes, and sprinkler systems.
- Operate PITs in areas with lighting of at least 2 lumens per square foot. Add directional lighting if necessary. Blue safety lights in high pedestrian areas are recommended.
- Obey all traffic regulations including posted speed limits.
- Yield the right-of-way to ambulances, fire trucks, and other vehicles in an emergency.

- Maintain a safe distance of approximately three truck lengths behind other PITs that may be traveling in front of you.
- Look in the direction of travel and keep a clear view of the travel path.
- Slow down, sound the horn, or call out at cross aisles and other locations where vision is obstructed.
- Keep a safe distance from the edge of ramps or platforms while driving on elevated docks, elevated platforms, and freight cars.
- Control the operation of the PIT while driving.
    - Drive at a speed that allows the PIT to be stopped safely.
    - Reduce speed on wet or slippery floors.
    - Slow down while turning.
    - Avoid driving over loose objects.
- Do **not**:
    - Allow personnel under the elevated part of the PIT, even if it is empty.
    - Place any part of the body between the uprights of the mast or outside the running lines of the PIT.
    - Engage in stunt driving or horseplay.
    - Drive up to anyone in front of a bench or other fixed object.
    - Pass other PITs traveling in the same direction at intersections, blind spots, or other potentially hazardous locations

When driving across **railroad tracks**, operators are required to drive the PIT diagonally (when possible) to prevent damage to wheels and reduce the probability of the load slipping.

When driving a PIT onto an **elevator**, you must approach slowly and enter the elevator squarely after the elevator car is level. Once positioned in the elevator you must neutralize the controls (put the controls into neutral), shut off the power, and set the brakes.

Operators are required to use **overhead guards** to protect operators from falling objects such as small packages, boxes, and bagged material. All high lift rider trucks must be equipped with overhead guards that meet the design and construction requirements of ANSI B56.1-1993, Safety Standards for Powered Industrial Trucks.

LOADING, UNLOADING, AND TRAVELING WITH A LOAD

Off-center loads and overloading may cause tipover or falling loads. Make sure loads are stable, safe, and within the rated load capacity. Use safe practices when loading, unloading and traveling with a load.

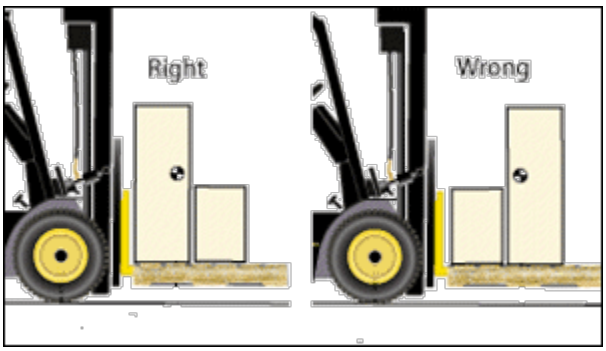
Weight, size, and position

Load weight, weight distribution, size, shape, and position are key factors affecting the stability of the PIT.

- Do not overload or exceed the capacity that appears on the PIT's nameplate.
- Center the load as nearly as possible.
- Use caution when handling off-center loads that cannot be centered. Refer to OSHA's safe load capacity instructions to calculate the reduction in maximum capacity when the load center is exceeded by an oversized load.
- Distribute the heaviest part of the load nearest the front wheels of the forklift.

A forklift's capacity is rated for a specified load center. If the load is off-center, improperly distributed, or oversized, it may exceed capacity and unbalance the forklift.

Load a large rectangular box widthwise across the forks because placing it lengthwise shifts the center forward, which can lift the wheels off the ground (shown at right).



Load as close to the front wheels as possible to minimize the distance from the front wheels to the load center. Load the heaviest part toward the mast (shown at left).

Preparing a load

- Arrange the load taking into account to its weight, size, and position.
- Use shrink wrap or tape as needed to secure items stacked on a pallet before loading.
- Check all items prior to lifting to ensure they are not damaged in a way that would affect the safety of the lift.
- Adjust forks as wide as possible for increased support when carrying wide loads such as lumber or steel.

Free rigging

Free rigging is the direct attachment to or placement of rigging equipment, such as slings, shackles, and rings, onto the forks of a PIT for a below-the-forks lift. This type of lift does

not use an approved lifting attachment. Although free rigging is a common practice, it could affect the capacity and safe operation of a PIT.

- Free rigging is *not* allowed unless written approval is obtained by the equipment manufacturer when the modifications and additions affect the capacity and safe operation of a PIT.
- If the manufacturer does not grant approval, you must get written approval from a Qualified Registered Professional Engineer (QRPE). The engineer is required to perform a safety analysis and address any structural or safety issues raised in the manufacturer's negative response.

Comply with the UW **Crane, Hoist and Rigging Safety Manual** when using a PIT for lift loads with rigging equipment.

Picking up a load

Place the load-engaging means (e.g., forks) under the load as far as possible; and tilt the mast carefully backwards and position the heaviest part of the load against the carriage.

Do *not* tilt the load engaging means (e.g., forks) forward when it is elevated, unless picking up or depositing a load on a rack or stack.

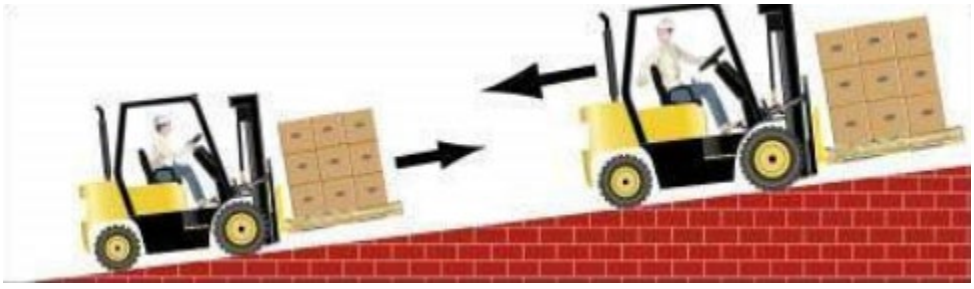
Traveling with a load

- Make sure personnel do not walk in front of the PIT while it is being driven.
- Keep the load trailing if it obstructs the operator's forward view.
- Carry the load at the lowest position possible, 4 to 6 inches from the ground. Never travel with the load elevated (shown at right).
- Travel with the mast tilted back to stabilize the load.

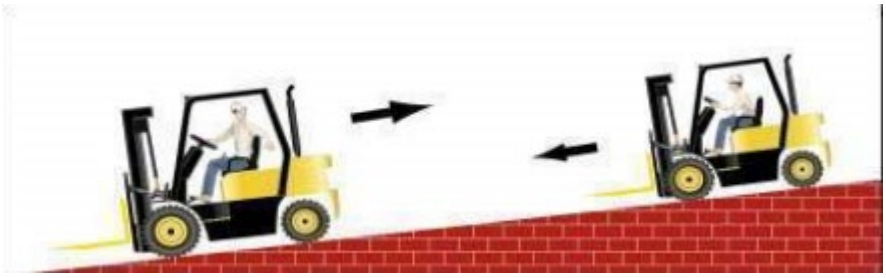
Driving on an incline or decline

Travel with the load upslope when climbing or descending slopes of more than 10 percent.

Go backwards while driving downhill and go frontwards while driving uphill with a load to prevent tipping (shown below).



When driving on an incline or decline *without a load*, always operate the PIT with the forks pointing downhill (shown below).



- Tilt the load and load-engaging means (e.g., forks) backwards if necessary to stabilize the load; and raise the load and load-engaging means only as far as necessary to clear the surface.
- Make sure all PITs with attachments are operated as partially loaded trucks, even if they are not carrying a load.
- Operators operating motorized hand trucks are required to enter elevators and other confining areas with the load end forward.
- Place the load, especially the largest and heaviest part, as close as possible to the backrest for stability.
- Never turn on a grade or ramp. Even a 10 percent grade may shift the combined center of gravity outside the stability triangle and cause the vehicle to roll over laterally.
- Operators are required to use a vertical load backrest extension to keep all or any part of the load from falling backwards towards the operator if the load presents a hazard.

Using dock-boards (bridge plates) for loading and unloading

Dock-boards are devices used to span the distance between rail cars or highway vehicles and loading platforms.

Dock-boards must be sufficiently strong to carry the loads imposed on them and not exceed their rating capacity. Powered dock-boards must meet the design and construction requirements of U.S. Department of Commerce Commercial Standards CS 202-56 (1961), Industrial Lifts and Hinged Loading Ramps.

- Secure dock-boards properly in advance and drive slowly and carefully over them.
- Use anchors or other devices that prevent slipping when using portable dock-boards.
- Make sure dock-boards are equipped with handholds or another method that ensures safe handling.

Lifting a work platform

A work platform is a unit or cage that is integrated (built in) or designed to be supported on the forks of a PIT. Work platforms that are used to elevate (lift or raise) workers must provide appropriate support and safety measures.

- Ensure platforms are securely fastened to the lifting carriage or forks.
- Use a platform with standard guardrails and toeboards on all sides.
- A screen or guard exists between the platform and the PIT mast to prevent physical contact with chains or other shear points.
- PITs used to elevate a work platform must have a lift mechanism that cannot drop faster than 135 feet per minute in the event of a system failure.
- Prevent the lifting carriages or forks from tilting.
- Ensure that a method exists for people on the platform to shut off the power of a PIT with controls (vertical only or horizontal and vertical) that can be elevated with the lifting carriage or forks.
- Operators are required to monitor lift equipment when personnel are on an elevated platform and ensure the vehicle does not move.

FUELING

- Do not fill fuel tanks while the engine is running.
- Do not operate PITs if a leak in the fuel system is found.
- **Avoid open flames** when checking electrolyte levels in storage batteries or gasoline levels in fuel tanks.
- **Safely store fuel** in accordance with the safety data sheet (SDS).
- **Enter fuel quantities** into your UW MyChem chemical inventory.

Fuel spills

Follow spill response procedures for cleaning oil or fuel spills.

Report the spill to the EH&S Spill Line at 206.543.0467.

Liquefied petroleum gas (LPG)

- A permit must be obtained from the local fire department for storage of more than three LPG 10-gallon containers. Store spare cylinders in a secured area outside.
- Fuel containers must meet the minimum requirements of either:
    - U.S. Department of Transportation (DOT)-approved container authorized for LPG service that has a minimum service pressure of 240 pounds per square inch gage (PSIG); **or**
    - Container type 250 with a design pressure of 312.5 PSIG (OSHA 1910.110(e)(3)(i)).
- Fuel containers must *not* use variable liquid-level gauges that require venting fuel to the atmosphere.
- Fuel systems of PITs used **inside buildings** must:
    - Have an approved automatic shutoff valve, located ahead of the inlet of the gas-air mixer, that will stop the flow of fuel to the mixer if the engine stops; **and**
    - Use not more than two LPG fuel containers.
- Fuel systems of PITs **used outdoors** must:
    - Have an approved automatic shutoff valve, located ahead of the inlet of the gas-air mixer, which will stop the flow of fuel to the mixer if the ignition is off and the engine is not running.

Battery charging and storage

Charging areas must be designated and provide:

- A way to flush and neutralize spilled electrolyte;
- Fire protection equipment such as sprinklers and extinguishers;
- Emergency washing equipment; **and**
- Adequate ventilation to disperse vapors from off-gassing batteries.

Additional actions are required in location(s) where batteries are stored and handled:

- Prohibit smoking.
- Take precautions to prevent open flames, sparks, or electric arcs.
- Protect battery charging equipment from damage by PITs.

Provide at least one of the following to handle batteries:

- Conveyor; or
- Overhead hoist; or
- Other equivalent material handling equipment.

PARKING

When exiting the PIT, the operator must:

1. Fully lower the load-engaging means (e.g., forks);
2. Place the controls in neutral; and
3. Set the brakes.

When leaving a PIT unattended, the operator must:

1. Fully lower the load-engaging means (e.g., forks);
2. Set levers and switches to neutral;
3. Shut off power;
4. Set the brakes; and
5. Block the wheels if parked on an incline.

PITs must be parked eight (8) feet six (6) inches or more from the center of any railroad tracks.

Parking PITs that use LPG fuel

- Do not park PITs that use LPG fuel near sources of heat, open flames, or similar ignition sources.
- Avoid parking near open pits, such as service pits, which lack adequate ventilation.
- LPG fueled PITs stored in a garage must not have leaks in the fuel system, or fuel containers filled beyond the maximum filling capacity. If any leaks or spills are noted, they must be collected, contained, and managed as hazardous waste.

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HAZARDOUS (CLASSIFIED) LOCATIONS

Locations are designated as classified or unclassified based on the hazards present.

CLASSIFIED LOCATIONS

Hazardous (classified) locations are areas that pose a risk due to explosive or flammable atmospheres. PITs used in the following locations must be an approved PIT type designation. View the PIT type designations in Appendix C.

Approved PIT for use in Class I locations

Locations where flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures

Division 1: Class I conditions exist continuously, intermittently, or periodically under normal operating conditions.

Group	Chemical(s)	Approved PIT Type
A	Acetylene	None
B	Hydrogen	None
C	Ethyl ether	None
D	Acetone Alcohols Benzene Gasoline Lacquer Solvent	**EX**

Division 2: Class I conditions may occur accidentally, for example, due to a puncture of a storage bin.

Group	Chemical(s)	Approved PIT Type
A	Acetylene	None
B	Hydrogen	None
C	Ethyl ether	None
D	Acetone Alcohols Benzene Gasoline Lacquer Solvent	**DS** **DY** **ES** **EE** **EX** **GS** **LPS**

Approved PIT for use in Class II locations

Locations where the presence of combustible dust could be sufficient to produce explosions

Division 1: Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking of electrical equipment, or where dust of an electrically conducting nature may be present.

Group	Chemical(s)	Approved PIT Type
E	Metal dust	None
F	Carbon black Coal dust Coke dust	**EX**
G	Grain dust Flour dust Starch dust Organic dust	**EX**

Division 2: Explosive mixture *not* normally present, but where deposits of dust may cause heat rise in electrical equipment, or where such deposits may be ignited by arcs or sparks from electrical equipment.

Group	Chemical(s)	Approved PIT Type
E	Metal dust	None
F	Carbon black Coal dust Coke dust	**EX** **DY** **EE**
G	Grain dust Flour dust Starch dust Organic dust	**DS** **DY** **ES** **EE** **EX** **GS** **LPS**

Approved PIT Use in Class III Locations

Where easily ignitable fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures

Division	Definition	Approved PIT type
1	Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used	**DY** **EE** **EX**
2	Locations in which easily ignitable fibers are stored or handled (except in the process of manufacture).	**DS** **DY** **E** **ES** **EE** **EX** **GS** **LPS**

UNCLASSIFIED LOCATIONS

PITs authorized to be used in unclassified locations must either be designated Types D, E, G, or LP, or they must be PITs that meet the requirements for a Type D, E, G, or LP PIT.

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MAINTENANCE/MODIFICATION

MAINTENANCE

Powered industrial trucks must be maintained according to the manufacturer's instructions and remain clean and free of excess lint, oil, and grease.

- Appropriate precautions must be taken to protect personnel from hazards associated with cleaning agents or solvents.
- Solvents used for cleaning PITs must have a flash point of 100 degrees F or more.
- Smoking or open flames are prohibited within 50 feet of flammable liquid handling operations.

Gasoline-fueled PITs

- Handle and store liquid fuels, such as gasoline and diesel fuel, according to the National Fire Protection Association Flammable and Combustible Liquids Code (NFPA 30-1996).
- Turn off the engine before filling the fuel tank.
- Avoid spilling fuel during servicing.
- Do not use open flames to check the gasoline level in the fuel tank.

  Restarting Engine: Close the fuel tank cap and make sure spilled oil or fuel is collected and managed in keeping with hazardous waste procedures. Fumes must be completely dissipated.

Liquefied petroleum gas (LPG)-fueled PITs

- Handle and store liquefied petroleum gas fuel according to the National Fire Protection Association Storage and Handling of Liquefied Petroleum Gases (NFPA 58-1998).
- Shut down the engine while fueling.
- Fuel PITs equipped with permanently mounted fuel containers outdoors.
- Fill fuel containers from industrial bulk storage containers at a minimum distance of:
  - 10 feet from the nearest masonry-walled building;
  - 25 feet from the nearest building or other construction; and
  - 25 feet from any building opening.
- Store or service PITs inside garages only after confirming there are no leaks in the fuel system and the fuel tanks are not filled beyond the maximum filling density (as specified in WAC 296-24-47505).
- If a spill is observed, it must be collected, contained, and managed as hazardous waste.

Electric PITs with lead acid batteries

- Properly position and secure the PIT in the designated battery charging area with the brake on to prevent accidents before charging or changing batteries.
- Do not use open flames to check the electrolyte level in storage batteries.
- When charging a battery, be sure to:
    - Confirm the vent caps are functioning;
    - Open the battery or compartment covers to dissipate heat; and
    - Pour acid into water rather than pouring water into acid. If this is not possible, use a single-point watering system if available.
- Provide a carboy tilter or siphon to handle electrolytes.
- Keep tools and other metallic objects away from the top of uncovered batteries.
- Make sure reinstalled batteries are properly positioned and secured.

Removal from service

A PIT in an unsafe operating condition must be removed from service and not returned to service until the underlying problem is identified and eliminated.

Remove PITs from service for any of these suspected or confirmed problems:

- Fuel system leak
- Clogged water muffler screen or other muffler part
- Sparks or flames are emitted from the exhaust system
- A part that is hotter than its normal operating temperature

Repairs

- All repairs must be made by an authorized person.
- All replacement parts must be equivalent to the parts used in the original design.
- Repairs must not be made in Class I, II, or III designated locations.
- Repairs made to fuel and ignition systems that involve fire hazards must occur in locations designated for such repairs.
- Disconnect the battery before starting any repairs to the electrical system.
- Close the fuel container shutoff valve before repairing an LP-gas fueled PIT in a garage.

MODIFICATION

Approval from the PIT manufacturer must be obtained in writing before any modifications are made to the PIT that:

- Change the relative position of the various parts of the PIT from their original placement when received from the manufacturer;

- Add extra parts not provided by the PIT manufacturer;
- Eliminate any parts; or
- Affect capacity or safe operation.

Any modifications or additions to a PIT must be reflected on the plates, tags, or decals to indicate changes in the PIT's:

1. Capacity;
2. Operation; and
3. Maintenance instructions.

Converting gasoline fuel PIT to LPG fuel

A PIT originally approved to use gasoline fuel that is converted to use LPG fuel must meet the requirements for the LP or LPS designation to operate in classified areas and are converted using only approved equipment.

CONTRACTORS

A UW organization/unit/department that wishes to use a powered industrial truck (PIT) through a contractor must ensure their program complies with state and federal law and the requirements of this manual.

Contractors must *not* utilize University owned, leased, or managed powered industrial trucks unless approved by the UW organization/unit/department.

Contractors working on UW property (leased or owned) must follow their own Powered Industrial Truck Program in accordance with the Washington Administrative Code (WAC) Section 296-863 Forklifts and Other Powered Industrial Trucks, and the requirements of this manual, where applicable.

UW hiring managers must receive, and review the following documents from contractors prior to work commencing:

1. Job Hazard Analysis
2. Powered Industrial Truck Program Manual
3. PIT safety training records

Any gaps that are identified must be addressed and resolved by the contractor before work is performed.

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EMERGENCY PROCEDURES

INJURIES

If an injury requiring medical care occurs while operating a powered industrial truck:

1. **Call 9-1-1**.
2. **Provide first aid** according to your unit's First Aid Plan**.**
    a. If CPR is needed, begin CPR if certified and it's safe to do so.
    b. If there was an exposure to a hazardous material, follow EH&S exposure response procedures while awaiting medical follow up.
3. **Notify a supervisor** and Environmental Health & Safety immediately after providing first aid/medical care.
    - **During EH&S business hours** (8:00 a.m. to 5:00 p.m., Monday to Friday) call (206) 543-7262.
    - **Outside of EH&S business hours**, call the UW Police Department at (206) 685-8973 to reach EH&S on-call staff.

FIRES

In the event of a fire:

1. Use the **nearest pull station to activate the fire alarm.**
2. **Call 9-1-1.** Communicate the details you know.
3. Use a fire extinguisher for small fires only.

    Before you fight a fire, make sure that you:
    - Have **called 9-1-1** or pulled the fire alarm
    - **Have been trained** to use an extinguisher
    - Have an evacuation **route planned**

INCIDENT REPORTING

After reporting an incident to a supervisor, UW personnel are required to submit an incident report to Environmental Health & Safety (EH&S) for any work-related incident that results in an injury, illness, exposure to hazardous materials, damage to property where there was a potential for personal injury, or fire, regardless of the work location.

- Submit an incident report within 24 hours via the UW Online Accident Reporting System (OARS) unless immediate notification is required.
- Visit the Incident Reporting webpage on the EH&S website for more information.

Near-miss events

Document all violations of program requirements, including incidents that did not result in an accident or injury, as a "near-miss" event using the UW EH&S Online Accident Reporting System (OARS).

Accountability

UW organizations, units, and departments must hold personnel accountable for following all safety policies and protocols and ensure they understand the consequences and risks associated with non-adherence to safety requirements.

Failure to follow the guidance in the UW Powered Industrial Trucks Safety Manual may result in serious injuries or death, as well as fines from regulatory agencies.

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TRAINING AND EVALUATION

OPERATOR SAFETY TRAINING

All personnel who will operate a powered industrial truck at a UW location must first complete an operator training course for the specific PIT type they will be operating. Operators are required to complete the course before operating a PIT.

The course must be provided by a person or company with the knowledge, training, and experience to train and evaluate PIT operators.

Course content must include instruction on inspection and safe operation of the specific PIT they will be operating, including formal instruction, hands-on training, and a performance evaluation of trainee competence.

REFRESHER TRAINING

Refresher training is required:

- Following an accident, incident, or near-miss event;
- After observation of an unsafe operation;
- After a deficiency related to safe operation is identified during an inspection or audit;
- When the operator is assigned to operate a different type of PIT than they were trained to use;
- When a condition in the workplace changes that could affect safe operation of the PIT; and
- After a trainer notes a deficiency during a performance evaluation.

EVALUATIONS

Performance evaluations must occur after initial and refresher trainings, and at least once every three years.

RECORDS

Written records of each employee's most recent operator training and evaluations, including the name of the trainee, training date, evaluation date, and the name of the person providing the training or evaluation, must be kept by the organization/unit/department, in accordance with UW records retention policies.

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AUDITS AND INSPECTIONS

SELF-AUDITS

PIT operators must complete the Pre-Use Inspection Form at the start of each shift for each PIT before placing it in service. Completed Pre-Use Inspection Forms must be retained for six years.

Departments/units/organizations must assign a designated person the responsibility of reviewing their powered industrial truck program for compliance with this document at least annually.

SHOP INSPECTIONS BY EH&S

Environmental Health & Safety conducts limited inspections of powered industrial trucks during shop inspections as applicable; the frequency of the inspections is every two (2) years.

PIT PROGRAM AUDIT

The program audits and inspections performed by EH&S are to be documented and any deficiency assigned a corrective action and communicated to management. Corrective actions must be tracked to completion.

RECORDKEEPING

The following records must be retained according to UW policy and regulatory record retention requirements:

Record	Retention Requirement
Powered Industrial Trucks Pre-Use Inspection Form	6 years

REFERENCES

WAC 296-863 Forklifts and Other Powered Industrial Trucks

OSHA 1910.178 Powered Industrial Trucks standard

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APPENDIX A: DEFINITIONS

Authorized Person (maintenance) – A person who has been designated to perform maintenance on a powered industrial truck.

Authorized Person (training) – A person approved or assigned by the employer to perform training for powered industrial truck operators.

Approved – Listed or approved by a nationally recognized testing laboratory or a federal agency that issues approvals for equipment such as the Mine Safety and Health Administration (MSHA); the National Institute for Occupational Safety and Health (NIOSH); Department of Transportation (DOT); or U.S. Coast Guard, which issue approvals for such equipment.

Bridge Plate (dock-board) – A device used to span the distance between rail cars or highway vehicles and loading platforms.

Classified Location or Hazardous Location – Areas that could be hazardous because of explosive or flammable atmospheres. The locations are broken down into the following categories:

a) Class I locations are areas where flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

b) Class II locations are areas where the presence of combustible dust could be sufficient to produce explosions.

c) **Class** III locations are areas where the presence of easily ignitable fibers are suspended in the air but are not in large enough quantities to produce ignitable mixtures.

Counterweight – A weight used to counteract the load being carried by the truck, or to increase the load carrying capacity of a truck.

Designations – A code used to show the different types of hazardous (classified) locations where powered industrial trucks can be safely used:

a) **D** refers to trucks that are diesel engine powered that have minimum safeguards against inherent fire hazards.

b) **DS** refers to diesel powered trucks that, in addition to meeting all the requirements for type D trucks, are provided with additional safeguards to the exhaust, fuel and electrical systems.

c) **DY** refers to diesel powered trucks that have all the safeguards of the DS trucks and, in addition, any electrical equipment is completely enclosed. They are equipped with temperature limitation features.

d) **E** refers to electrically powered trucks that have minimum acceptable safeguards against inherent fire hazards.

e) **ES** refers to electrically powered trucks that, in addition to all of the requirements for the E trucks, have additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures.

f) **EE** refers to electrically powered trucks that have, in addition to all of the requirements for the E and ES type trucks, have their electric motors and all other electrical equipment completely enclosed.

g) **EX** refers to electrically powered trucks that differ from E, ES, or EE type trucks in that the electrical fittings and equipment are designed, constructed and assembled to be used in atmospheres containing flammable vapors or dusts.

h) **G** refers to gasoline powered trucks that have minimum acceptable safeguards against inherent fire hazards.

i) **GS** refers to gasoline powered trucks that are provided with additional exhaust, fuel, and electrical systems safeguards.

j) **LP** refers to liquefied petroleum gas-powered trucks that, in addition to meeting all the requirements for type G trucks, have minimum acceptable safeguards against inherent fire hazards.

k) **LPS** refers to liquefied petroleum gas powered trucks that in addition to meeting the requirements for LP type trucks, have additional exhaust, fuel, and electrical systems safeguards.

Electrolyte – A chemical, usually acid, that is mixed with water to produce electricity.

Flammable Liquid – Any liquid having a flashpoint at or below 199.4°F (93°C). Flammable liquids are divided into four categories as follows:

a) Category 1 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point at or below 95°F (35°C).

b) Category 2 includes liquids having flashpoints below 73.4°F (23°C) and having a boiling point above 95°F (35°C).

c) Category 3 includes liquids having flashpoints at or above 73.4°F (23°C) and at or below 140°F (60°C). When a Category 3 liquid with a flashpoint at or above 100°F (37.8°C) is heated for use to within 30°F (16.7°C) of its flashpoint, it must be handled in accordance with the requirements for a Category 3 liquid with a flashpoint below 100°F (37.8°C).

d) Category 4 includes liquids having flashpoints above 140°F (60°C) and at or below 199.4°F (93°C). When a Category 4 flammable liquid is heated for use to within 30°F (16.7°C) of its flashpoint, it must be handled in accordance with the requirements for a Category 3 liquid with a flashpoint at or above 100°F (37.8°C).

e) When liquid with a flashpoint greater than 199.4°F (93°C) is heated for use to within 30°F (16.7°C) of its flashpoint, it must be handled in accordance with the requirements for a Category 4 flammable liquid.

Flashpoint – The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid, and shall be determined as follows:

a) For a liquid which has a viscosity of less than 45 SUS at 100°F (37.8°C), does not contain suspended solids, and does not have a tendency to form a surface film while under test, the procedure specified in the Standard Method of Test for Flashpoint by Tag Closed Tester (ASTM D-56-70), WAC 296-901-14024 Appendix B—Physical hazard criteria shall be used.

b) For a liquid which has a viscosity of 45 SUS or more at 100°F (37.8°C), or contains suspended solids, or has a tendency to form a surface film while under test, the Standard Method of Test for Flashpoint by Pensky-Martens Closed Tester (ASTM D-93-71) or an equivalent method as defined by WAC 296-901-14024 Appendix B—Physical hazard criteria, shall be used, except that the methods specified in Note 1 to section 1.1 of ASTM D-93-71 may be used for the respective materials specified in the note.

c) For a liquid that is a mixture of compounds that have different volatilities and flashpoints, its flashpoint shall be determined by using the procedure specified in (a) or (b) of this subsection on the liquid in the form it is shipped.

d) Organic peroxides, which undergo auto-accelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified in this section.

Front-end Attachment – A device that is attached to the forks or lifting device of the truck.

Liquefied Petroleum Gas – Any gas that is composed predominantly of the following hydrocarbons, or mixtures of them; propane, propylene, butanes (normal butane or iso-butane), and butylenes.

Listed by Report – A report listing the field assembly, installation procedures, or both, for a UL listed product that does not have generally recognized installation requirements.

Load Engaging – A device attached to a powered industrial truck and used to manipulate or carry a load.

Motorized Hand Truck / Pallet Jack – A powered truck with wheeled forks designed to go under or between pallets and is controlled by a walking or riding operator.

Nationally Recognized Testing Laboratory – An organization recognized by the Occupational Safety and Health Administration that conducts safety tests on equipment and materials.

Order Picker – A truck controlled by an operator who is stationed on a platform that moves with the load engaging means.

Powered Industrial Truck (PIT) – A mobile, power-driven vehicle used to carry, push, pull, lift, stack, or tier material.

Rough Terrain Forklift Truck – A truck intended to be used on unimproved natural terrain and at construction sites.

Vertical Load Backrest Extension – A device that extends vertically from the fork carriage frame.

APPENDIX B: POWERED INDUSTRIAL TRUCKS PRE-USE INSPECTION FORM

Instructions: The operator must inspect the powered industrial truck prior to placing it in service at the beginning of each work shift. Any item noted as out of compliance on the inspection form must be corrected prior to operating the machine. If a deficiency cannot be corrected, the machine must *not* be used; it must be tagged out of service until repair(s) are completed by a Qualified Person.

Machine Make:_____ Machine Model:_____
Machine S/N:_____

Type (LPG/Electric):_____Date Completed:_____ Inspected By:_____

Visual Checks	In Compliance	Out of Compliance	N/A	Operations Checks	In Compliance	Out of Compliance	N/A
Tire Condition				Horn			
Head/Tail Lights				Steering			
Warning Lights				Service Brake			
Fluid Levels/Battery				Parking Brake			
Battery Plug Condition				Hydraulic Controls			
Battery Indicator				Hose Reel			
Seatbelts				Engine			
Forks				Mast			
Fuel System (Tanks, hoses, fittings, etc.)				Attachment Parts			
Mirrors							

The powered industrial truck is in compliance (circle one):

Yes.

No, it has been tagged out of service.

Inspector Signature:_____

APPENDIX C: POWERED INDUSTRIAL TRUCK DESIGNATIONS

A powered industrial truck (PIT) designation is a code that indicates the type of PIT.

CODE	DESCRIPTION
D	Diesel engine powered trucks that have minimum safeguards against inherent fire hazards
DS	Diesel powered trucks with additional safeguards to the exhaust, fuel, and electrical systems
DY	Diesel powered trucks with all the safeguards of the DS trucks, plus any electrical equipment is completely enclosed. They are equipped with temperature limitation features
E	Electrically powered trucks that meet minimum acceptable safeguards against inherent fire hazards.
ES	Electrically powered trucks that, in addition to meeting requirements for the E trucks, have additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures
EE	Electrically powered trucks that, in addition to meeting requirements for the E and ES type trucks, have enclosed electric motors and equipment.
EX	Electrically powered trucks that differ from E, ES, or EE type trucks in that the electrical fittings and equipment are designed, constructed, and assembled for use in atmospheres containing flammable vapors or dusts
G	Gasoline powered trucks with minimum acceptable safeguards against inherent fire hazards
GS	Gasoline powered trucks with additional safeguards to the exhaust, fuel, and electrical systems
LP	Liquefied petroleum gas-powered trucks that, in addition to meeting the requirements for type G trucks, have minimum acceptable safeguards against inherent fire hazards
LPS	Liquefied petroleum gas powered trucks that, in addition to meeting the requirements for LP type trucks, have additional safeguards to exhaust, fuel, and electrical systems

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