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FORKLIFTS:
Safe Operation and Training

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Forklift safety has seen a renewed focus recently with the observance of National Forklift Safety Day, a revised ANSI lift truck industry standard, and a regulatory agenda item to revise the OSHA standard. The increased focus is with good reason: powered industrial trucks (PIT) continue to be in heavy use throughout industry, and continue to be a source of severe injuries to workers.

According to Bureau of Labor Statistics (BLS) data, there are nearly 758,290[1] forklift and similar PIT operators in the current workforce. From 2015-2021[1] there were an average of 78 PIT-related fatalities per year, and over 37,000 injuries that involved cases with days away from work.

Further, from Jan. 1, 2015, through May 31, 2022, employers made over 4,000 serious injury reports to Federal OSHA about cases where a forklift or other PIT was involved in a worker amputation, hospitalization, loss of eye, or fatality incident.

PITS are grouped into seven classes, covering equipment such as pallet jacks, order pickers, rough terrain lifts, and reach trucks.

WHAT ARE PITS?

PITs include several types of material handling equipment, including forklifts, powered pallet jacks, order pickers, reach trucks, and narrow-aisle trucks, to name a few. They can be used to raise, lower, or remove large objects or several smaller objects on pallets or in boxes, crates, or other containers. PITs can either be ridden by the operator or, in the case of pallet jacks, controlled by a walking operator.

1 https://www.bls.gov/oes/current/oes537051.htm

PITs may be powered by electricity, LP gas, diesel fuel, gasoline, and, increasingly, hydrogen. Some are approved for use in certain hazardous conditions (i.e., environments where dangerous or explosive substances may be present).

PITs are grouped into seven classes, covering equipment such as pallet jacks, order pickers, rough terrain lifts, and reach trucks.

PIT HAZARDS

The hazards commonly associated with PITs vary for different vehicle types, makes, and models. Each type of truck presents different operating hazards. For example, a sit-down, counterbalanced high lift rider truck is more likely than a motorized hand truck to be involved in a falling load accident, because the sit-down rider trucks can lift a load much higher than can a hand truck.

The method or means to prevent an accident and to protect employees from injury varies for different types of trucks. For example, operators of sit-down rider trucks are often injured in tipover accidents when they attempt to jump clear of the vehicle as it tips over. Because the operator's natural tendency is to jump downward, he or she lands on the floor or ground and is then crushed by the vehicle's overhead guard. Therefore, operators of sit-down trucks need to be trained to remain in the operator's position in a tip over accident and to lean away from the direction of fall to minimize the potential for injury. Wearing a seatbelt can also help prevent operators from instinctively jumping out from a tipping forklift.

On the other hand, when a stand-up rider truck tips over, the truck operator can exit the vehicle by simply stepping backward, perpendicular to the direction of the vehicle's fall, to avoid being crushed. In this situation, the operator usually should attempt to jump clear of the vehicle, and should be trained accordingly.

Driving a powered industrial truck at excessive speed can result in loss of control, causing the vehicle to skid, tip over, or fall off a loading dock or other elevated walking or working surface. This condition can be made more dangerous because the load being carried sometimes partially obscures the operator's vision. A vehicle that is out of control or being operated by a driver whose view in the direction of

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travel is restricted can strike an employee, run into a column or other part of the building, or strike stored material, causing the material to topple and injure workers in the area. Effective driver training teaches your operators to act properly to minimize these hazards to themselves and other employees.

Other characteristics of a forklift that affect safe truck operation are: the truck's tendency to become unstable, its ability to carry loads high off the ground, and its characteristic mode of steering, i.e., with the rear wheels while being powered by the front wheels. Moving loads upward, downward, forward, and backward causes a shift of the center of gravity and can adversely affect the vehicle's stability.

The workplaces where PITs are being used also present a variety of different hazards. The safety of industrial truck operations can be decreased by workplace conditions such as:

- rough, uneven, or sloped surfaces,
- unusual loads
- hazardous areas,
- narrow aisles, blind spots, or intersections, and
- pedestrian traffic or employees working close to the path of travel.

Finally, there are hazardous work practices that relate to all trucks, including driving at excessive speed, poor loading, and carrying unauthorized passengers. In addition, poor truck maintenance can contribute to accidents.

Many accidents have occurred because of unsafe truck operation. For example, employees have fallen from trucks while using them to change light bulbs on overhead fixtures or riding on the forks to manually retrieve items from high racks. Or, in some cases accidents have occurred when an operator has attempted to drive with an obstructed view in the direction of travel and has run into another employee. Improper truck maintenance has caused death from over exposure to carbon monoxide, loss of brakes, or rupture of hydraulic lines.

An often-overlooked hazard with forklift operation is that of amputation. If operators place their hands or feet outside the forklift frame, they can be caught

between stationary objects such as racks. In addition, while adjusting loads, workers can have their fingers amputated if the load shifts unexpectedly. Even the forks themselves can lead to amputation hazards if the worker is not careful while making adjustments.

SCOPE OF THE OSHA STANDARD

OSHA's Powered Industrial Truck standard, 29 CFR 1910.178, is intended to help prevent injuries to operators and pedestrians by laying out a framework for the safe design of PITs, proper operation principles, maintenance practices, and operator training. The standard applies to most types of material handling equipment that is powered for horizontal movement.

However, the standard does not cover over-the-road haulage trucks or earth-moving equipment that has been modified to accept forks. In addition, the standard does not apply to scissor lifts or aerial lifts (some of that equipment is covered by other OSHA standards, however).

Determining the best way to protect workers from injury largely depends on the type of truck operated and the worksite where it is being used.

NOTE: Even if equipment is not specifically covered by the OSHA PIT standard, as is the case with golf cars, scrubbers/sweepers, and all-terrain vehicles (ATVs), OSHA still requires employers to train workers on safe operation and keep equipment in safe condition. The Agency uses the General Duty Clause of the OSH Act in these situations where no specific standard covers a piece of equipment.

Many employers use the PIT standard as a model training program for even non-PIT equipment.

If it's powered for horizontal movement and designed to move materials, it's a PIT for purposes of the OSHA standard.

EQUIPMENT DESIGN

The most basic provision in OSHA's PIT standard is that equipment must be designed to meet certain safety standards. In doing this, the Agency requires that all new or acquired PIT equipment comply with the ANSI B56.1-1969 industry standard.

As you might imagine, the ANSI standard has undergone several revisions since 1969 — the most current being the 2020 edition — so most equipment you purchase probably will be made to a newer version of ANSI B56.1 than the OSHA standard references. OSHA generally has no issue with this, as typically the organizations updating ANSI standards take safety and OSHA compliance into consideration. In fact, often, the updated ANSI standards are more protective than their older editions.

This issue will continue to be a particularly important point as technology is rapidly changing. In fact, in this age of technology, the possibilities are virtually endless when it comes to safety devices and attachments for forklifts and other PITs. There are barcode scanners and RFID technology, so you control who operates and inspects the equipment; GPS systems that help you track equipment; attachments to lift anything from a drum to carpet roll; QR codes that can link to training videos with the snap of a smartphone; and numerous lights and alarms.

If these devices come already installed from the manufacturer, there is usually no issue regarding OSHA accepting the design, even though these devices may not have been available when the original standard was written.

MODIFICATIONS/ADDITIONS

When employers make modifications to forklifts or other PITs, OSHA is stringent. The Agency requires that employers obtain the manufacturer's prior written approval for modifications or additions that "affect capacity and safe operation." OSHA has interpreted this provision broadly, to include most lifting attachments as well as personnel platforms, baskets, and cages.

When these changes are allowed, capacity, operation, and maintenance instruction plates, tags, or decals must be changed accordingly.

OSHA has said that if no response or a negative response is received from the manufacturer, written approval of the modification/addition from a qualified registered professional engineer is acceptable. The engineer must perform a safety analysis and address any issues contained in the manufacturer's negative response before granting approval.

If the truck is equipped with front-end attachments other than factory installed attachments, employers must request the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

If you have questions about adding or replacing parts, it's best to check with the equipment manufacturer or your OSHA local area office to be on the safe side. Many variables can come into play that may not be obvious at first glance. For example, the addition of an after-market hours meter may seem (and may well be) perfectly harmless, but if the truck has been rated to operate in certain explosive/hazardous locations, the installation could potentially negate that rating if the meter is not rated for those environments.

SAFETY DEVICES, WARNINGS, LIGHTS

PITs can incorporate many warning and safety devices to help protect operators, pedestrians, and other PIT operators. Some are required, some recommended, and some required only in certain instances. OSHA specifically requires an operator-controlled horn for PITs.

OSHA also requires directional lighting where general lighting is less than 2 lumens per square foot. A good rule of thumb to use is: if it's too dark to read a newspaper, you probably need directional lighting.

As far as other beepers/lights (such as backup warnings and strobe lights), there is no specific requirement, but OSHA has said that if these warnings are needed based on the specific operating conditions, then the Agency could cite employers under the General Duty Clause of the OSH Act.

IF YOUR EQUIPMENT IS OUTFITTED WITH RESTRAINT DEVICES, SUCH AS SEAT BELTS, OPERATORS ARE REQUIRED TO WEAR THEM.

Federal OSHA's current enforcement policy is that employers must require operators of equipment that are equipped with operator restraint devices, including seat belts, to use the devices. In addition, OSHA may also cite employers who do not take advantage of a manufacturer operator restraint system or seat belt retrofit program.

This is explained in Federal OSHA's 10/09/1996 Seat Belt Policy (amended in 2007).

CAPACITY AND STABILITY

Perhaps the most critical operational elements for PITs are capacity and stability. The ability to move loads is the basic reason most PITs exist, but stability can be a hard concept to grasp and explain to workers.

Most PITs work on essentially the same principle as a teeter-totter — the weight of the load on the forks must be counterbalanced by the weight of the truck body. Simple enough, but how do you know how much of a load your lift can handle? The primary source of this information can be found on the nameplate, also known as a data plate, capacity plate, or ID plate.

The nameplate will state the capacity of the lift — in other words, the manufacturer's guideline for how much weight can be safely lifted and to what heights.

Trainers need to have a thorough understanding of load composition and impart this information to operators.

The capacity data on the nameplate is critical information. But, it was calculated using a load with a specific load center, commonly 24 inches. In reality, loads will not have the same load center, nor will they be placed under the same ideal conditions that the manufacturer used. In other words, the actual capacity will be lower than the amount shown on the nameplate.

THE CAPACITY DATA ON THE NAMEPLATE WAS CALCULATED USING A LOAD WITH A SPECIFIC LOAD CENTER, SO THE ACTUAL CAPACITY WILL LIKELY BE LOWER THAN THE AMOUNT SHOWN.

OPERATOR TRAINING

Even when you have properly designed equipment, if operators don't know how to operate safely, injuries will occur. That's why OSHA requires all PIT operators to undergo stringent initial training, evaluation, and certification, with a re-evaluation every three years. Further, when operators are involved in an incident or near-miss, or you change the equipment or the workplace, you must provide refresher training.

Training operators in safe operation and hazard recognition is obviously a key factor to a safe PIT program. But, because of the numerous types of trucks and working conditions, it is not possible to identify all the hazards that are encountered in all industrial truck operations. Accordingly, developing a single "generic" training program that covers in detail all hazards for all powered industrial trucks and all workplaces is not possible.

Four major areas of concern need to be addressed in an effective powered industrial truck training program:

(1) the general hazards that apply to the operation of all or most powered industrial trucks;

(2) the hazards associated with the operation of particular types of trucks;

(3) the hazards of workplaces generally; and

(4) the hazards of the particular workplace where the vehicle operates.

OSHA's requirements are therefore performance-oriented to permit employers to tailor a training program to the characteristics of their workplaces and the particular types of powered industrial trucks operated.

Some specific training provisions, however, must be in place.

PIT operators must receive a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material); practical training (demonstrations performed by the trainer and practical exercises performed by the trainee); and evaluation of the operator's performance in the workplace. Training must cover certain specific topics, at a minimum.

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WHEN OPERATORS ARE INVOLVED IN AN INCIDENT OR NEAR-MISS, OR YOU CHANGE THE EQUIPMENT OR THE WORKPLACE, YOU MUST PROVIDE REFRESHER TRAINING.

TRUCK-SPECIFIC TOPICS

The OSHA regulation outlines several PIT-related training topics:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate,
- Differences between the truck and the automobile,
- Truck controls and instrumentation: where they are located, what they do,
  and how they work,
- Engine and motor operation,
- Steering and maneuvering,
- Visibility (including restrictions due to loading),
- Fork and attachment adaptation, operation, and use limitations,
- Vehicle capacity,
- Vehicle stability,
- Any vehicle inspection and maintenance that the operator will be required to perform,
- Refueling and/or charging and recharging of batteries,
- Operating limitations, and
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

WORKPLACE-SPECIFIC TOPICS

The regulation also requires training in several workplace-related topics:

- Surface conditions where the vehicle will be operated,
- Ramps and other sloped surfaces that could affect the vehicle's stability,
- Composition of loads to be carried and load stability,
- Load manipulation, stacking, and unstacking,
- Pedestrian traffic in areas where the vehicle will be operated,
- Narrow aisles and other restricted areas where the vehicle will be operated,
- Hazardous (classified) locations where the vehicle will be operated,
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust, and
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

TRAINER QUALIFICATIONS

One of the great mysteries surrounding forklift training is what qualifications the trainer must possess. Do years of operating a forklift suffice? Must the trainer attend a "train-the-trainer" course? Must the trainer hold some specific certification … if so, what?

The answer, from the OSHA standpoint, is vague. The OSHA PIT regulation says only that the trainer must have the "knowledge, training, and

experience" necessary to conduct the training. OSHA has said they left this intentionally "performance-oriented," believing that the necessary qualification could be obtained in a variety of ways:

- Through years of operating a forklift and knowledge of safe practices and OSHA regulations pertaining to the operation;
- Going to a "train-the-trainer" or similar course; and/or
- Some combination of experience and training.

The only specific criteria OSHA lays out via a July 23, 2003, letter of interpretation, is that the trainer must have at some point operated the type of equipment they are training potential operators on, so that they can provide adequate instruction to trainees on how the equipment works, feels, etc. In other words, a worker may not simply watch a training video and read the forklift regulation and then be qualified to conduct training.

The employer is left to designate someone it feels comfortable can convey the safe operation principles in an understandable manner and will ensure that operators do in fact have the proper skill and knowledge before signing off on the certification. Employers should be prepared to state their case to OSHA as to why the person they've chosen is a suitable trainer.

CONCLUSION

Forklifts and other PITs are invaluable to most workplaces. They allow heavy and bulky items to be moved effortlessly. But, the equipment is dangerous by its nature. Only trained operators may use the equipment in the workplace. And, only equipment in safe operating condition is allowed. To keep workers, pedestrians, and others safe, as well as protect property and product, employers must make forklift safety a top priority!

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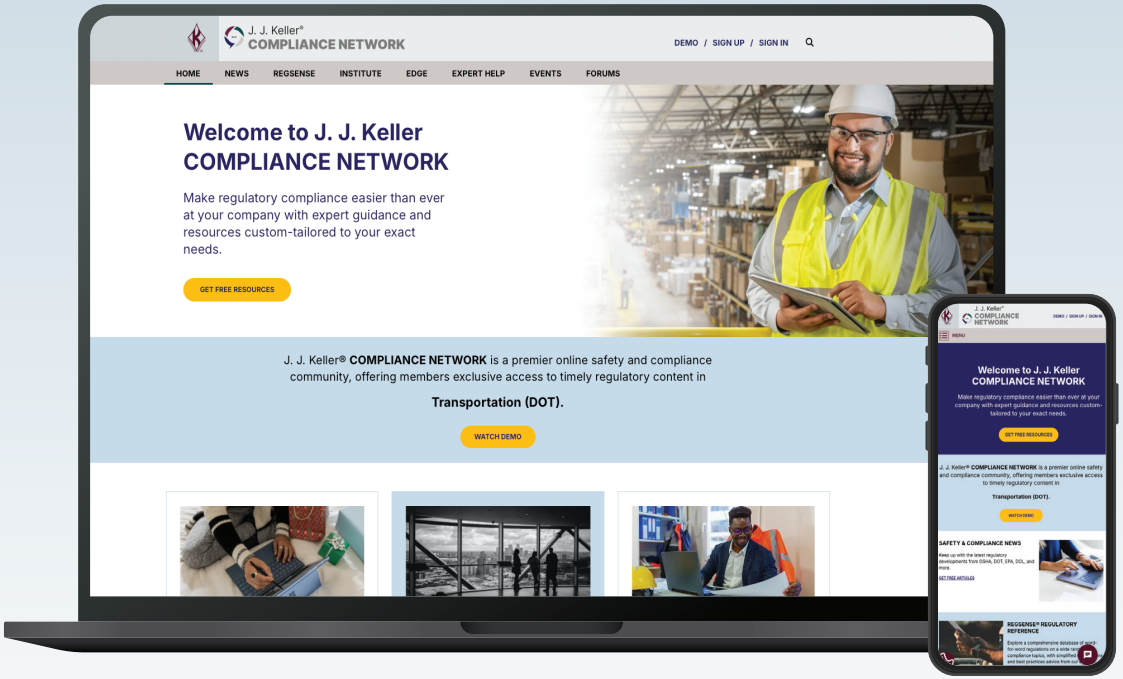

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She also has published works on OHS Online and EHS Today. Gina's commitment to safety and her ability to translate complex regulations into accessible content make her a valuable part of the J.J. Keller team.

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