SAFE OPERATION WITH FORK LIFT TRUCKS

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Prepared by the Safety Advisory Council

Disclaimer

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Amendments from 165/10

Section	Change
	Editorial to align style with EIGA Style Manual
3	Definitions added
11	References updates
12	References updated
	Re-write to reflect current practices

Note: Technical changes from the previous edition are underlined

1. Introduction

Forklift trucks and mechanically operated pallet trucks are becoming increasingly important elements in mechanical handling practices as the gases industry seeks to improve safe working conditions and reduce manual handling.

In recent years, the number of forklifts and mechanically operated pallet trucks has increased as a result of this search for greater efficiency and safer work practices.

Handling loads with forklift trucks and pallet trucks makes handling tasks easier, such as moving, lifting or handling loads. Particular attention to safety rules and standards is essential. The tasks carried out with mechanical handling equipment entail particular hazards. However, the use of this equipment should not entail a risk to the operator, to the persons present in the work area where mechanical handling equipment is operating or all other operators working around them.

Preventing accidents can only be achieved by making sure that all workers are aware of the risks of forklift truck use. This is so that they can react appropriately in case of an undesirable event, and through training workers to use the machinery they operate appropriately, to prevent unnecessary risks

Forklift trucks and pallet trucks shall only be operated by trained and qualified personnel. This is in addition to any statutory requirements.

2. Scope and Purpose

2.1. Scope

To describe the minimum safe practices required to operate forklift trucks and mechanically operated pallet trucks in the industrial gases industry.

2.2. Purpose

To help prevent and reduce the number of accidents that occur by providing recommendations on risk prevention, suitable maintenance practices and correct driver selection and training.

3. Definitions

3.1. Publication terminology

3.1.1. Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2. Should

Indicates that a procedure is recommended.

3.1.3. May

Indicates that the procedure is optional.

3.1.4. Will

Used only to indicate the future, not a degree of requirement.

3.1.5. Can

Indicates a possibility or ability.

3.2. Technical definitions

3.2.1. Centre of the Load

Distance from the centre of gravity of the load to the heels of the forks.

3.2.2. Cockpit or cabin (cab)

Position where the fork lift truck driver sits and controls the vehicle.

3.2.3. Forks

Pronged arms that are introduced under the load in order to move it. The forks are normally of fixed length but they may also be designed to be extended from the forklift cab by means of a mechanical or a hydraulic system

3.2.4. Forklift or forklift truck (FLT)

Small industrial vehicle with a power operated forked platform in front that can be inserted under loads to lift and move them. The driver of the forklift truck sits in a cabin mounted on the forklift truck.

3.2.5. Leverage

The stability of forklifts is based on the leverage principle. In a forklift, the point of support is the contact of the front wheels with the floor.

3.2.6. Mast

Mast supports and raises the forks. Movement of the mast and forks is operated hydraulically and supported by a chain or other mechanical element.

3.2.7. Motors

Forklift motors can be classified into two groups, internal combustion engines: with petrol, diesel or liquefied petroleum gas as fuel or electric motors: a group of batteries supplies electric current to a central motor or to several motors mounted on the driving wheels.

Both types of motors have specific safety requirements for refuelling or recharging and when they are to be used in zoned areas where there is a risk of flammable gases being present.

3.2.8. Pallet truck

Manually operated, mechanically assisted device for lifting and moving loads where the operator stands on the ground adjacent to the truck or on a small platform attached to the back of the truck. A pallet truck is power assisted to enable the operator to physically guide the forks into the opening on the pallet, lift the load on the forks and transport the load on the truck. A pallet truck generally has only a short lifting height.

4. Technical safety features

4.1. Forklift trucks

There are a number of features of fork lift trucks that are important for safe operations, and these include the items below.

Figure 1 Typical fork lift truck

4.1.1. Safety canopy

The safety canopy protects the driver from falling loads as well as providing protection in the event of the FLT turning over.

4.1.2. Shock-absorbing ergonomic seat

This is a seat is fitted with shock absorbing systems that absorb vibrations.

4.1.3. Exhaust pipe insulation

This is insulating material that wraps around the exhaust pipe preventing it from coming into contact with materials or persons thus avoiding potential burn injuries or fires. A catalytic converter is recommended for indoor handling activity.

4.1.4. Fork arms

The fork arms shall be sufficiently long to extend slightly from the load they are handling and shall be adjusted to suit the width of the load.

4.1.5. Emergency engine stop

The emergency stop, stops the engine automatically in an emergency or abnormal situation.

4.1.6. Immobilisation brake

The immobilisation brake protects against unintended movement.

4.1.7. Reversing acoustic and visual signals

Alerts others to the presence of a reversing fork lift truck, especially when the visibility of the driver could be impaired.
This includes warning devices to make pedestrians and other vehicles aware of the position of the FLT and can include flashing orange lights, rotating beacons and devices such as BlueSpot™.

4.1.8. Doors

Doors can assist in protecting the driver if the vehicle overturns, but are not a substitute for wearing a seatbelt.

4.1.9. Safety belt

A safety belt is fitted to ensure driver safety, especially in case the vehicle overturns, and is mandatory in some countries.

4.1.10. Reversing mirrors

Reversing mirrors allow the driver to have a good view of the area behind him before reversing. Some FLTs also use rear mounted cameras.

4.1.11. Load handling accessories:

These include equipment such as; clamps, lateral movement devices, buckets and hoists that aid load handling movements.

4.1.12. Speed limiters and load weight limiters

The use of both speed limiters and load weight limiters are recommended.

4.1.13. Tyres

There are two types of tyres in use, solid and pneumatic tyres. Both have different characteristics and the correct selection is appropriate. Solid tyres will cause more vibration and pneumatic tyres will handle differently when loading or unloading loads.

Tyres need to be regularly checked and changed when there are signs of wear in excess of manufacturers recommendations or damage.

4.1.14. Engine start limiter

A limiter that stops the FLT being started when the driver is not seated on the FLT seat recommended to prevent the FLT being started without a driver in place and in control.

4.1.15. FLT selection

To select the correct FLT a number of points need to be considered, and these include:

- height of doors and ceilings;
- width of doors and corridors;
- floor resistance; and
- workplace environment.

It is recommended to use, where possible, an electrically powered FLT indoors and an internal combustion engine FLT outdoors.

When a FLT is selected, an additional 100Kg should be added to maximum anticipated load of the FLT. This additional allowance is for accessories and unforeseen circumstances. An FLT should never be selected at the limit of the maximum load required.

If used on public roads, forklift trucks and/or pallet trucks shall be classified and operated in compliance with traffic rules.

4.2. Pallet trucks

Figure 2 Typical pallet truck and controls

4.2.1. Forks:

The forks on a pallet truck differ from those on a forklift truck in that support wheels are mounted at the front of the fork and that the forks can only be raised a short height. These forks are usually positioned manually.

4.2.2. Horn

The horn is a device to produce an acoustic signal to warn of any dangers.

4.2.3. Lifting/Lowering control

Located on the control column. Its function is to pick up, raise and lower the load.

4.2.4. Safety gear inverter

The safety gear invertor is a push button used to stop the pallet truck immediately and reverse a few centimetres.

4.2.5. Stand on platform (stand on rider)

There are two types of stand on platform (or stand on rider)

- A standing platform where the driver is not protected: and
- On board platform surrounded by side protection.

5. General safety instructions

The duties of the person who has site responsibility for FLT operations shall include:

- Ensuring that operators receive documented training and information for the safe operation of FLT and pallet trucks;

- Ensuring resources are available to maintain forklift trucks and pallet trucks in accordance with manufacturers' recommendations and operating company standards;
- Establishing traffic rules on the site and communicate them clearly to staff and visitors; and
- Ensuring the work tasks can be safely completed in the time allowed.

The driver of the FLT duties shall include:

- Ensuring that the daily pre-use inspection and condition monitoring of the FLT have been completed before using the FLT;
- Preventing use of the FLT and inform the manager in case of any problem with it;
- Checking correct operation of the acoustic and visual alarms and signals at all times;
- Ensuring that they have good visibility at all times, when reversing, either using a camera and/or mirrors and/or looking behind (over the shoulder);
- Paying full attention to the driving activity, especially when reversing;
- Respecting traffic rules including speed limits and pedestrian crossings;
- Travelling with caution, respecting pedestrian areas;
- Avoiding sudden manoeuvres or changes in direction;
- Slowing down and ensure a good view before turning;
- Respecting the FLT operating rules including load weight, distribution, stability, dimensions and handling rules;
- Checking the loading and unloading area for tidiness and cleanliness;
- Always driving with the load down, and never manoeuvre with the load raised;
- When travelling down a slope, always drive with the load behind and pay particular attention;
- When travelling up a slope, always drive with the load in front and pay particular attention;
- Avoiding travelling across a slope;
- Avoiding the edges of loading docks, potholes, trenches and road shoulders;
- Only adjusting or exchanging mobile elements such as; the fork arms or attachments if trained and authorised;
- Never handle mobile elements of the vehicle while the motor is running;
- Comply with good parking practices, never block emergency or safety equipment, park in a safe area and lower the fork arms; and
- Wear a seat belt, or if not fitted ensure that the cab doors are closed or side restraints are in position.
- When the FLT is not being used:

  - Ensuring the forklift is parked in the correct area, without obstructing doors, access, exits or any safety equipment;
  - Forks are at the floor level;
  - Immobilisation break is on;
  - Removing the keys;
  - Any imobilsation device that prevents the use of the forklift by unauthorized personnel is engaged; and
  - If there is a slope, ensuring a wedge (wheel chock) is place in front of a wheel.

- Not carrying passengers inside the cabin or outside and never transport people standing on the forks (or platform);
- Come to a complete stop at blind corners and sound horn when it is not sure if people are nearby;
- Never driving over straps, belts, planks or ropes;
- Not stopping abruptly as the load may slide off;
- No horse-play with a forklift;
- Never climbing on the mast;
- If operating in an ATEX[1][1] zones, ensure the FLTs are suitable for that zone;
- Not jumping out of the cabin. Using the steps, and only stepping down if knowing where to set the foot;
- Placing cones to create a warning zone if a person is working near a forklift truck. and not to drive in that zone;
- When loading a pallet on a pintle truck, lift the load high enough to see the underside of the pallet and place the pallet correctly on the pintle;
- Not to transport pallets or loads on the tip of the forks, take the load fully on the forks;
- Not to use a forklift as a working platform;
- When charging electric trucks ensure ventilation is sufficient and no heat generators are near the charging point. Also, ensure the charging point is clean and that the cables are in working condition;
- Never drive with a pallet with cylinders not strapped or secured, or generally with an unstable load; and
- Do not load/unload a fork lift truck when there are people on any side of or on the truck.

[1] References are shown by bracketed numbers and are listed in order of appearance in the reference section.

Figure 3 Warning sign

6. FLT operations – Example of incidents from the industrial gases industry

Incidents related to FLT use primarily occur in three circumstances. When driving or manoeuvring an FLT, particularly in the vicinity of pedestrians, getting into or out of an FLT and the unsafe loading and/or unloading of the forks.

The examples in 6.1 are incidents reported to EIGA and show how the improper use of forklift trucks has the potential for serious or even fatal injuries if not appropriately managed.

6.1. Examples of incidents involving unsafe driving or manoeuvring

- A plant foreman (on foot) engaged an FLT driver (in cab) in conversation and when finished both moved off at the same time. The rear of the FLT moved towards the foreman knocking him over and the left rear wheel ran over the right foot/big toe. The foreman was wearing protective shoes. The foreman's foot was badly bruised and big toe broken. The injuries are shown in Figure 4.

Figure 4 Injured foot

- An operator was struck by a reversing forklift truck while crossing a zone identified for forklift truck movements. The FLT was transferring cylinder pallets from storage to vehicles. The operator suffered a double fracture of the tibia with an open wound and was taken to hospital.

- A collision between a forklift and another vehicle not seen. The driver fractured his leg.

- A forklift tipped over around a corner and the forklift load was damaged as shown in Figure 5.

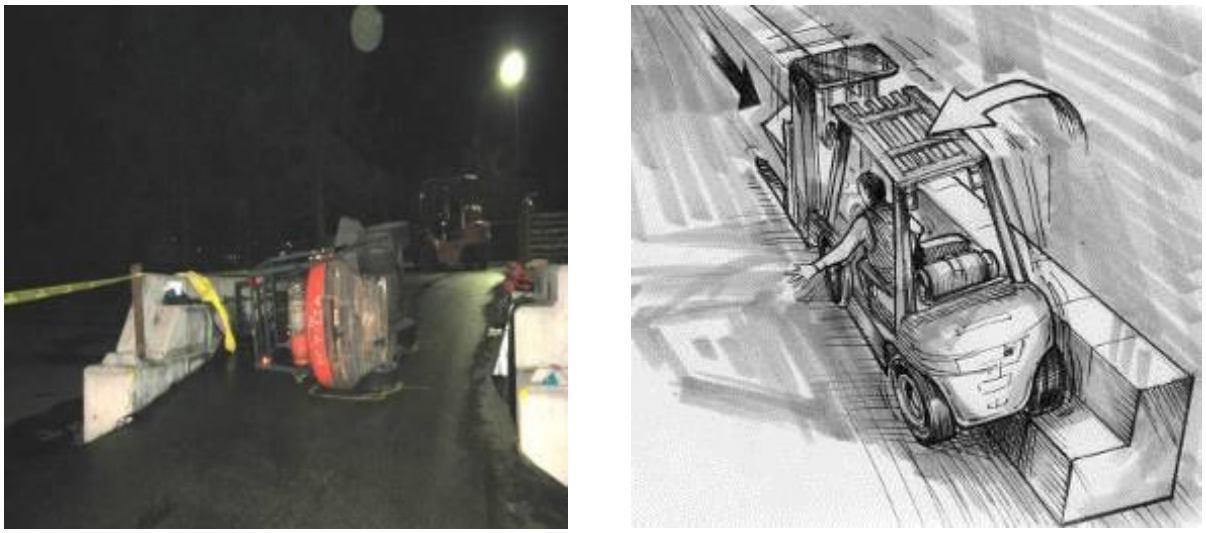

Figure 5 FLT turned over and simulation of accident

- An operator in a filling plant did not look both ways before crossing a forklift truck route in a warehouse. The forklift ran over his foot which caused a fracture.
- An FLT ran over and fractured a contractor's foot as the FLT was manoeuvring to pick up a pallet of cylinders from a truck.
- A contractor driver was delivering LOX at a customer site when an FLT lost control on slippery ground and collided with a tractor, fracturing the FLT driver's hand.
- An operator's toe was fractured when an FLT hit him from behind.
- After leaving a pallet in a sorting area the FLT was reversing in a curved path and a fork struck the foot of an operator inspecting a cylinder load, resulting in a sprain.
- While moving a cylinder pallet, a forklift truck struck an insufficiently marked fire water hydrant causing it to rupture, resulting in the loss of fire-fighting water.
- Whilst loading dry ice containers using an FLT, one of the containers started to roll on the lorry hydraulic lift platform. The FLT driver's reaction resulted in the container striking the truck driver who was standing on the platform, injuring his ankle.
- A stock controller approached a forklift truck to talk to the driver. The forklift truck had stopped with the engine running, whilst the driver checked the loading schedule. The driver didn't notice the controller walking behind the FLT as it moved forward. A wheel went over the controller's left leg and the back of the FLT hit his right leg which was broken. His left foot was not injured because he was wearing his safety shoes.
- While manoeuvring backwards with a hand pallet truck an operator crushed his foot between the pallet truck and a cylinder basket. This forced his foot to bend upward at the level of the toe guard in his safety shoe, causing fractures of four toes.
- A contractor driver walked across the yard with a company dispatcher to count cylinders. They took a shortcut route across an area where an FLT was operating. As they approached the FLT, it reversed and struck the contractor driver, breaking his leg.

6.2. Incidents due to unsafe access or egress from FLT

Examples of incidents due to unsafe access or egress from FLT reported to EIGA include:

- A forklift driver got out of his vehicle before it was not completely stopped. The driver twisted his ankle.

- A forklift driver got out of his vehicle without using the designated steps. He twisted his ankle.

6.3. Incidents due to unsafe loading or unloading from FLT

Examples of incidents due to unsafe loading or unloading from an FLT reported to EIGA include:

- An operator unloading a forklift dropped a gas cylinder on his foot, crushing his toes.

- A forklift driver manually unloaded a gas cylinder from a suspended lift as it was stuck in that position. The driver injured his back.

- A worker was handling a cylinder pallet, with a manually operated FLT, when the worker drove it over his own foot crushing it.

- An FLT had to brake abruptly for a pedestrian, causing the load to slide off the forks. The load toppled and resulted in a fatality.

6.4. Images of FLT incidents

Figures 6,7,8,9 and 10 show images of incidents involving FLT reported to EIGA.

Figure 6 Example of incorrect use of FLT for access

Figure 7 Example of unloading incident (1)

Figure 8 Example of unloading incident (2)

Figure 9 Illustration of FLT starting to turn over

Figure 10 Illustration of turned over FLT and trapped driver

7. FLT operations – Key hazards and preventative measures

As it can be seen from the previous sections, there are a number of significant hazards associated with FLT operations.

There are a number of well-established controls within industry which aim to reduce the risk of FLT incidents to a minimum. This section summarises the preventative measures that can be employed to prevent incident, injury including fatalities, permanent disability and property damage. Operators shall be trained and competent in the awareness of these hazards and controls, see Section 9.

7.1. Forklift trucks

7.1.1. Falling loads

In order to prevent falling loads, the following actions shall be taken:

- Secure the load appropriately, for example cylinders safely loaded in pallets;
- Position the loads safely on the forks;
- Maintain the forklift truck operating areas in good condition;

- Ensure good visibility and lighting;
- Only use containers such as boxes and pallets specifically designed for use with FLTs;
- Verify floor conditions and drive slowly and in diagonal when crossing any area with floor imperfections;
- Do not overfill containers; and
- Ensure the driver's cabin is equipped with mesh, guards or racks to protect the driver.

7.1.2. Falling driver

To protect the driver from falling from the driver's cabin:

- Ensure the driver fastens the seat belt (where fitted) or is otherwise protected against falling out of the cabin;

  NOTE Some countries have mandatory requirements for driver restraint.
- Ensure the driver never leans out from the vehicle or that any part of their body is outside the forklift's clearance area;
- Ensure the driver has been trained in ascending and descending the FLT;
- Ensure access steps have anti-slip treatment; and
- Ensure vertical handholds are suitably placed to help access to and from the cab.

7.1.3. FLT stability

To assist in FLT stability:

- Maintain solid, flat, horizontal and well-defined passageways for FLTs;
- Do not get too close to dock edges;
- Verify the position, stability, capacity and condition of any loading bridges; and
- Verify suitability and applicability of blocking mechanisms for vehicles such as trucks and wagons before loading or unloading.

7.1.4. Overturning FLT

To avoid overturning an FLT, measures include:

- Not driving too fast, particularly when turning as this can cause the FLT to overturn;
- Choosing an FLT that is laterally and longitudinally stable;
- Avoid sudden changes of direction, particularly when crossing slopes;
- Avoid short radius turns at excessive speed;
- Not travelling diagonally on a slope. It is safer to follow the line of the greater slope;
- When moving, travel with the fork lowered as far as possible and tilted forward;
- Not manoeuvring with the load elevated;

- Respecting the instructions and restrictions indicated on the load information plate;
- Not lifting a load weighing more than the allowed nominal capacity of the FLT as indicated in the load diagram.;
- Only load a vehicle which has a locking mechanism in place and which is visible to the FLT driver;
- Limit speed;
- Ensure floor conditions: no cutting/sharp elements, appropriate resistance, and use a ramp when having to cross steps or gradients;
- Identify and sign the limits of the loading dock;
- Immobilize forklift using wedges (wheel chocks);
- Not lifting loads in a manner that risks raising (unbalancing) the rear part of the FLT; and
- Lower loads slowly rather than suddenly.

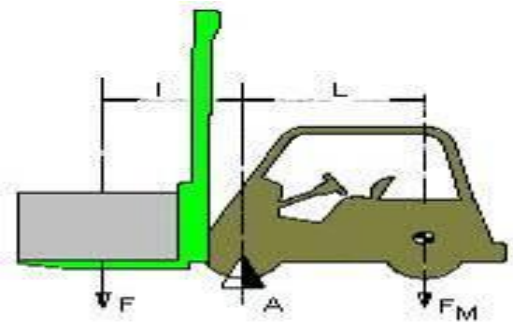

Figure 11 FLT Load diagram

7.1.5. Vehicle collisions and pedestrian injuries

To reduce the risk of vehicle collisions and pedestrian injuries measures taken shall include:

- Ensuring the forklift driver has maximum visibility in all directions;
- Maintaining visibility when carrying a load, for example, it could be necessary for the driver to reverse when carrying tall cylinder pallets;
- Maintaining good lighting that avoids blinding effects and exaggerated contrasts;
- Maintaining traffic lanes and ensure they are free of obstacles;
- Signalling fixed obstacles appropriately;
- Ensuring brakes are maintained in accordance with the manufacturers requirements;
- Ensuring floors are clean and are not slippery;
- Drive at an appropriate speed;
- Do not turn when driving on ramps;
- Allow a 30º turn in the driver seat;

- Ensure mirrors are clean;
- Ensure acoustic alarm is activated when reversing;
- Travelling with the fork lift truck forks set with minimum ground clearance (typically 15 cm above the ground/floor level) to avoid collision with raised surfaces;
    - Ensuring a traffic management system is implemented and should include at least:
        - Separating normal vehicle traffic lanes from those allocated to forklift truck traffic;
        - Ensuring traffic lanes are wide enough to avoid collisions, particularly two way corridors;
        - Reducing the number of intersections and optimize stops, one-ways and good markings/signage;
        - Establishing speed limits and make sure they are respected;
        - Using sound alarms before driving through a crossing and reduce speed when approaching hazardous intersections, corners or other areas;
        - Avoiding passing and keep a safe distance between moving vehicles;
        - Clear guidelines and training shall be in place that pedestrians shall only cross in front of an FLT after a clear signal from the FLT driver;
        - Zones shall be defined which shall be kept free of pedestrians whilst loading a truck;
        - Avoiding operating at night without sufficient lighting;
        - Being extra-vigilant when crossing railway lines and;
        - Being careful when manoeuvring between rows of pallets as there could be personnel who could appear in the FLT's path.

Figures 12 and 13 give examples of how visibility can be restricted by the FLT load.

Figure 12 Example of visibility reduced by FLT mast

Figure 13 Example of visibility reduced by when carrying a bundle of cylinders

7.1.6. Falling of transported personnel

The transport of a person other than the vehicle's driver is prohibited unless the vehicle is specially adapted for this use, for example has a passenger seat, in which case the second person shall comply with the same safety rules imposed on the operator such as wearing a seat belt. Figure 14 gives an extreme example of the misuse of an FLT for transporting personnel.

Figure 14 Example of misuse of FLT as a work platform

7.1.7. Machine guarding

FLTs contain many moving mechanical parts, and to prevent injuries the measures including the following shall be taken:

- Ensure that mechanical moving elements are protected (grills or transparent shields); and
- Only repair or inspect the engine while switched off and adequately isolated.

7.1.8. Climate

To avoid distractions through operator discomfort, the vehicle should be equipped with rain / sun protection roof that does not restrict visibility.

The risk of ice and snow in all aspects of operations shall be considered. This can mean for example the use of specific winter tyres.

7.1.9. Environmental and occupational noise

The forklift truck shall meet all legal requirements for noise restrictions for industrial equipment.

7.1.10. Vibrations and ergonomics

FLTs shall be assessed and meet the requirements set by the EU Directive 2002/44 concerning vibration [2]. In addition, the following should be considered:

- An ergonomic driver' seat, where height and distance from the steering wheel can be adjusted;
- To facilitate reversing the driver's seat should be able to rotate, typically about 30 degrees; and
- Depending on surface conditions, seat comfort and design, the driver may need to wear additional lumbar support.

7.1.11. Atmospheric pollution

Areas where combustion engine forklifts are used shall be well ventilated. Electrically powered fork lift truck should be used in areas that are poorly ventilated; and vehicles shall be maintained according to the manufacturer's instructions to reduce atmospheric pollution.

7.1.12. Fire and explosions

To reduce the risk of fire or explosions;

- Fuel systems shall be maintained to ensure their integrity;
- Daily visual inspection of engines and batteries for signs of damage;
- All pipe work and silencers shall be maintained in good operating condition;
- Forklift trucks intended to be used in areas with potentially explosive atmosphere shall comply with the ATEX Directive n°2014/34 [1]; and
- Fill the fuel tank outdoors and prohibit all potential ignition sources during refuelling or charging the batteries, for example, no smoking or use of cell phones, pagers and radios.

NOTE Fire extinguishers are not normally required for FLTs.

7.2. Pallet trucks

Pallet trucks are involved in a considerable number of work related accidents resulting in lower back injuries, hernias, leg and ankle wounds and incidents where hands and feet are caught or crushed.

These accidents can injure both the machine operators and those in the surrounding area. Figure 15 shows an example of a potential accident.

Figure 15 Example of potential incident

The most frequent risks encountered are:

- Overstraining due to:
  - Transporting loads too heavy for the machine and/or the operators moving them;
  - Trying to hoist an excessive load requiring over-pumping effort;
  - Work surface in bad condition; and
  - Driving or load bearing wheels obstructed by debris, such as small stones, litter.
- Lower and upper limbs getting trapped, crushed or impacted due to:
  - Falling or dislodged loads;
  - Inappropriate use of the pallet truck;
  - Collision between the pallet truck's traction bar and another object; and
  - Failure to have all guards in place and in good order.
- Slips, trips and falls;
- Collisions with other vehicles;
- Collisions with objects or installations because the working areas are too small or inadequate for proper operation, or because of poor visibility; and
- Pallet truck falling from an elevated working area. For example, working areas being too small or inadequate to be able to properly load or unload a truck from an elevated loading dock.
- Rider pallet trucks: when a certain distance needs to be covered, the recommended travel direction is to drive forwards and not reverse; as the user does not have a complete view of what is happening behind him. If a bundle obscures the drivers view, then the pallet truck should be driven backwards.

When assessing risks, it is important to determine the training and skills required of the operators.

8. Driver hiring and training

The competence of drivers operating forklift trucks and/or mechanically operated pallet trucks is essential and therefore all drivers shall receive specific training. The considerations when hiring drivers and operators for these machines have to reflect their responsibilities and skills.

The following points should be considered during the selection process:

- Physical and psychological characteristics;
  - Drivers should be physically fit in accordance with national legal standards for commercial vehicle drivers;
  - Sufficient vision to meet national legal standards for commercial vehicle drivers;
  - Hearing (able to hear audible warnings and signals);
  - No underlying medical conditions which may affect ability to perform the role; and

- Demonstrated ability to acquire relevant skills, for example, working knowledge of all the controls and functions of the FLT and ability to identify and report malfunctions.

FLT drivers shall hold a current proof of competence in accordance with relevant national standards, for example, certificate, license or permit. Legal requirements may vary in each country. Companies shall, as a minimum, implement specific, practical and theoretical training courses addressing the issues in this document. Completion should be documented. Competence should be reviewed periodically, ideally at an interval of no longer than five years.

9. Maintenance and inspection

As a minimum FLTs shall be maintained in accordance with manufacturers' recommendations and local regulations. A maintenance policy will contribute to safe operation of FLTs.

9.1. Daily inspection

At the beginning of each shift, nominated persons, preferably the FLT operators, should carry out pre-operating checks to ensure that the FLT is safe to use. An example of a daily check list is given in Appendix 1.

The pre-operating checks are made up of a visual inspection of the forklift and parts and an operational check of all equipment and controls (with the power on).

The daily inspection should include checking the FLT safety equipment.

This inspection should at least cover: brakes, tyres, steering wheel, fork condition, lights, flashing lights, reversing alarm, horn, hydraulic hoses and leaks, hour meter, fluid levels for combustion engines and battery condition for battery powered FLTs.

A typical inspection includes the following steps:

- Test the brakes which should depress smoothly and should not require excessive force to operate. If they make noise they need attention;
- Checking the parking brake;
- Looking for missing bolts, signs of wear;
- Damage to tyres. Check the air pressure in pneumatic tyres according to the maintenance schedule;
- Checking the free play in steering that should comply with manufacturer's recommendations in either direction when you turn the steering wheel;
- Checking the fork condition looking for any broken, worn or misaligned part in the chains, masts, hydraulic jacks, levers or forks;
- Testing the lights including the flashing light and reversing alarm as well as the horn;
- Ensuring the rear-view mirrors are in place and in good condition;
- Checking for leaks around fittings; make sure the hoses are in good condition. Brake fluid, transmission oil, fuel, battery electrolyte or radiator coolant can leak from the FLT. Do not work with a leaking FLT;
- In case of a combustion engine FLT, check oil level and pressure, water level, fan belt and fuel level;

- In case of battery powered FLT, check battery charge, battery pods condition and battery plug connection;

- In case of FLT equipped with seat belt, be sure the belt and securing mechanisms are in good condition;

- Note the reading FLT hour meter to determine if any preventive maintenance is required or needs to be planned; and.

- Check if the FLT is in conformance with any regulatory inspections.

The FLT driver shall report any defect found to the person responsible for the FLT operation so that appropriate rectification can take place.

Additional checks are required on flameproof forklifts to ensure that they remain safe to use at all times. Flameproof protection should be part of the condition monitoring checks carried out in accordance with the manufacturer recommendations.

9.2. Maintenance

FLTs shall be maintained so that they do not present a risk to the safety and health of the operator or other persons at any time. Before operating them all protection and operating elements shall be checked to ensure they are ready to be appropriately used and that connecting or operating them does not pose a danger for operators or third parties.

Whether the FLTs belong to the industrial gas company or are rented or leased, the responsible person for the operating site shall ensure maintenance operations are carried out on schedule.

The maintenance operations shall be performed according to manufacturer's recommendations. Additional or more frequent maintenance can be required based on internal experience, for example, incident reporting.

Maintenance operations shall check and if necessary repair, as a minimum the following items, see also 10.2.

- Brakes, steering system, warning signals for example, flashing lights or audible alerts, lights, regulators, valves and pipe work for the lifting circuit and tilting and lifting mechanisms. Maintenance routines shall be followed for all other hydraulic systems, particularly in terms of identifying internal or external leaks;

- Protection and safety devices;

- Batteries, engines, controls, limit switches, cable protection devices, connections and particularly the condition of the electrical system insulation should be checked periodically;

- Tyres shall be checked to detect any deterioration of the sides and rims; and

- Tyre pressure shall be checked and kept to manufacturer's specifications.

In case of a FLT with an internal combustion engine, the oil should be checked/changed, the water level and antifreeze product concentration checked, the fan belt and other drive belts, if any, checked or changed.

In case of battery powered FLT, the battery, its electrolyte and all cables and plug connections shall be verified.

During maintenance operations, make sure a suitable isolation procedure (e.g. Lock Out-Tag Out) is implemented.

9.2.1. Charging the battery

Batteries should be charged at regular intervals, preferably at the end of the work day, taking care to ensure they are not overcharged.

Hydrogen can be produced in battery-charging stations, and therefore the area shall be adequately ventilated and any type of ignition source shall be avoided, along with the storage of flammable materials.

Examples of controls to reduce or eliminate hazards include:

- A non-smoking sign and a warning against open flames in the battery-charging area;
- Avoiding contact of hoisting chains or their links or hooks with the battery cables or terminals;
- Checking the battery charging cable is disconnected before getting the forklift truck or pallet truck ready to work;
- Reporting immediately when the battery has not completed its charging cycle at the beginning of the work shift;
- Never operating forklift trucks and/or pallet trucks with the battery lid off or removed;
- The electrolyte contained inside the batteries is a highly corrosive substance. The worksite shall be equipped with water washing stations to neutralize any acid spill;
- All battery charging and handling stations shall be equipped with a multipurpose powder fire extinguisher and an emergency shower with an eye-washing station;

  NOTE The minimum size of fire extinguisher is recommended to be 6kg.
- All battery charging and handling stations shall have sufficient and suitable ventilation to prevent battery- produced smoke and gas from concentrating;
- The devices used to charge batteries shall be protected from any accidental collision with the forklift trucks;
- Personnel shall wear the required personal protective equipment (PPE) for protection against acid splashes and contact with falling batteries including for example, face shield, gloves, apron and safety footwear.
- Never place tools or metal parts on open batteries to prevent electric arcs from forming and igniting the hydrogen;
- Do not wear rings, watches or any other items of jewellery to prevent accidental contact with electric parts that may cause electrical arcs and severe burns; and
- Do not replace the FLT battery with one having weight, size or electric characteristics different from the one provided by the manufacturer without first consulting the manufacturer of the FLT.

9.2.2. Fuelling

The following precautions shall be taken whilst refuelling an FLT:

- Turn off the forklift truck motor before starting the fuelling operation;
- Never start or operate a motor while fuelling and prohibit smoking and the use of cell phones in the vicinity of the fuelling area.

NOTE Fuelling areas could require classification as an ATEX zoned area.

9.2.3. FLT fork inspection

- All FLT forks shall be subjected to periodic inspections in accordance with the manufacturer's recommendations. ISO 5057 *Industrial trucks. Inspection and repair of fork arms in service on fork-lift trucks* gives guidance [3].

10. Safety checklist

10.1. Daily inspection checklist

There should be in place a daily inspection check list. It is the responsibility of the site management to ensure that this check list is completed and these lists retained for validation of the checks.

Examples of daily inspection checklists are shown in Appendix 1.

10.2. Audit checklist

An audit should consist of an assessment of management system controls, equipment, driver competence and behaviour and physical conditions, and be regularly conducted.

10.2.1. The Management system and policy

- Is there a policy statement? Is it known by all the drivers?
- Are there specific action plans with targets?
- What are the requirements for recruiting and selecting drivers?
- What are the requirements for choosing contractors and hired drivers?
- Are the procedures applied?
- Are the detected defects recorded?
- Are the repairs recorded?
- Are the planned maintenance operations recorded?
- Do the worksite personnel walk under the suspended load?
- Is there a specific driving FLT training program for drivers?
- Is it an approved training course?
- Is medical ability to drive a FLT (mandatory in several countries) checked?
- Is driver behaviour evaluated?
- Is there training on products properties, hazards, marking?
- Is there training on site safety rules and emergency procedures?
- Are the pedestrians informed on the site safety rules?
- Is the driver qualified in written by the site manager?

- Is training and qualification renewed at a predetermined frequency?
- Is there a maintenance procedure?
- Is it compliant with local regulations?
- Is there a maintenance log book or a data base?

10.2.2. The FLT driver

- Does the driver have a forklift truck driver's license or permit?
- Does the driver have appropriate training?
- Does the driver receive refresher courses?
- Is the load being lifted well distributed between both fork arms?
- Are the forks centred in relation to the axis?
- Is the load properly distributed?
- Does the way the load has been placed block the fire extinguishers, wall mounted fire equipment boxes or emergency exits?
- Does the driver have visibility to manoeuvre in that position?
- Is the driver wearing the safety seat belt? (mandatory in some countries)
- Is the driver using the personal protective equipment?
- Is there anyone else on board the forklift truck besides the driver?
- Is the forklift truck parked at the assigned parking place? Is this place totally flat?
- Is the engine off, the keys off the ignition and the parking brake engaged?
    - Are the forks down at the lowest position?

10.2.3. The FLT

- Has the battery been disconnected from the battery charger? (electric forklift trucks)
- Are there stains under the forklift truck suggesting fluid leaks?
- Have the levels of fuel, water, anti-freeze, oil, etc., been checked? (thermal forklift trucks)
- Are the wheels in good operating condition (pressure and tread)?
- Is the battery charged properly? (electric forklift trucks)
- Are the tyres in good operating condition? (general condition and pressure)
- Is the lights system in good operating condition?
- Is there a fire extinguisher in the forklift truck?
- Has the maximum load indicator been verified?

- Does the acoustic back up signal work correctly?
- Is the forklift truck bearing a load above the manufacturer's limit?
- Are the keys taken out when the FLT is parked?

10.2.4. The premises

- Are there ramps at the worksite with slopes angles above 10%?
- Are the through ways and lanes suitably signalled?
- Do doors and corridors have sufficient width and clearance?
- Are there any obstacles preventing the forklift truck's passage?
- Are there forklift trucks in areas classified as at explosion risk?
- Are more than one forklift trucks and/or pallet trucks being used simultaneously to lift the same one load?

11. References

Unless otherwise state the latest edition shall apply.

[1] Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 *on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres* www.europa.eu

[2] Directive 2002/44/EC –of 25 June 2002 *on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)* www.europa.eu

[3] ISO 5057: Industrial trucks - Inspection and repair of fork arms in service on forklift trucks, www.iso.org

12. Additional references

Use lift trucks safely - Advice for operators www.hse.gov.uk

Rider-operated lift trucks Operator training and safe use. Approved Code of Practice and guidance www.hse.gov.uk

Lift-truck training - Advice for operators www.hse.gov.uk

Appendix 1: Example of daily forklift inspection checklists

DAILY FORKLIFT INSPECTION CHECKLIST FOR PETROL, DIESEL, LPG POWERED (Not electric)

Location: _____Unit No: _____

Mark box OK or NR (needs repair) before operation and initial bottom
In case of NR (needs repair) contact your supervisor for decision.

OPERATOR: Check before each shift:	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**
Date	/ /	/ /	/ /	/ /	/ /	/ /
Hour meter reading						
Oil level						
Coolant level						
Battery level						
Brakes						
Steering						
All hydraulics (limit switch) (lift & tilt mast to maximum)						
Check for leaks (oil, fuel, coolant, acid)						
Back up alarm						
Lights						
Horn						
Tyres/lug nuts						
Overhead protection						
Seat belt						
Cables/chains/pulleys						
Forks, (locking pins)						
Capacity sticker						
Other						
Inspector initials						
Remarks:						

(After completing place this form in the forklift file)

DAILY FORKLIFT INSPECTION CHECKLIST FOR ELECTRIC POWERED

Location: _____Unit No: _____

Mark box OK or NR (needs repair) before operation and initial bottom
In case of NR (needs repair) contact your supervisor for decision.

OPERATOR: Check before each shift:	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**	**Circle shift no 1 2 3**
Date	/ /	/ /	/ /	/ /	/ /	/ /
Hour meter reading						
Emergency disconnect						
Hydraulic oil level						
Battery level						
Brakes						
Steering						
All hydraulics (limit switch) (lift & tilt mast to maximum)						
Check for leaks (oil or acid)						
Back up alarm						
Lights						
Horn						
Tyres/lug nuts						
Overhead protection						
Seat belt						
Cables/chains/pulleys						
Forks, (locking pins)						
Capacity sticker						
Other						
Remarks:						

(After completing place this form in the forklift file)