Risktopics

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Fork-Lift Trucks – Fire and Property related Guidance

Introduction

A number of major fires in commercial premises have been caused, either directly or indirectly, by fork-lift truck operations. This type of claim is low in frequency but the claims cost per incident tends to be high. Fires are not the only cause of loss associated with the use of fork-lift trucks. Claims attributed to lifting operations arise more often from impact damage to buildings, racking and stock. Impact damage can also be caused to water pipes, especially where sprinkler systems are installed. While the frequency of these types of claim tend to be higher than that for fire, the claims cost per incident tends to be lower but can still cause significant disruption to the business. While it is noted that workplace injuries can also occur from the use of fork-lift trucks, this document only focuses on the property related risks concerned with the use of lift trucks.

Fork-lifts and other lift trucks are important pieces of equipment for many businesses, allowing goods to be moved quickly and easily around premises. Fork-lift trucks are generally powered in one of two ways, either by electricity or by an internal combustion engine, fuelled with either diesel or liquid propane gas (LPG). This document will look at general recommendations for the safe use of all types of fork-lift and will also provide specific advice for the different fuel options. This Risktopic refers to fork-lift trucks but the advice in this document could equally apply to all lift trucks and other mobile plant items, such as: sweepers, platform hoists and other specialist equipment.

Choosing a Suitable Fork-lift Truck

There are many different designs of fork-lift trucks with some types being more suitable for different sets of circumstances. For example, there are three different types of tyres that can be fitted to a fork-lift truck and the correct type of tyre depends on whether the appliance will be used indoors, outdoors or on rough terrain. An initial assessment should therefore be undertaken to decide which type of fork-lift truck is suitable for the intended tasks involved. This assessment should include answers to the following questions:

- What types of load are to be transported? This should take the size and maximum weight of the load into account.
- Does the load have an irregular shape? If so, different attachments may be required. For example, large rolls of paper, which are not stored on pallets, may need to be picked up by paper reel clamps, as opposed to the standard forks.
- How much room is there to manoeuvre the truck? The width of the narrowest aisle will need to be considered.
- How high is the lowest access point to the storage area? Impact damage claims often result from contact between the top of the doorway and the mast of the fork-lift.
- What does the maximum reach need to be? This will depend on how high the stock is stored.
- What environment will the fork-lift be used in? If the area of use contains flammable vapours, specialist intrinsically safe equipment may be required.
- Will the truck be used indoors, outdoors or both? Diesel powered fork-lifts are not suitable for indoor use.
- How many hours per day will the truck be in use? This may have an effect on what type of fuel is used, as battery powered fork-lifts may run out of charge and take time to either recharge or replace the battery.

By discussing the answers to these questions with a fork-lift truck supplier, the correct fork-lift can be specified. This is an important step to minimising the risk.

Risk Assessment

In addition to the initial design assessment, Zurich recommend that a thorough risk assessment is undertaken, covering the nature and type of environment in which the fork-lift truck is to be used. The assessment should consider the risk of damage being caused to people and property through the use of the fork-lift. The use and storage of fuel (i.e. diesel, LPG and battery charging facilities) should also be taken into account by the risk assessment.

Only by conducting such an assessment will the risks be fully identified, leading to the implementation of appropriate control measures. The recommendations in this document are types of control measures which can be used to minimise the risks to property.

General Recommendations

The following recommendations apply to all types of equipment.

- All fork-lift trucks should be serviced and maintained by a competent person, in line with the manufacturers' schedules.

- While fork-lift trucks do not generally require MOTs, in the United Kingdom all lifting equipment must be given a 'thorough examination' under the requirements of the *Lifting Operations and Lifting Equipment Regulations 1998*. The operator of the equipment is responsible for ensuring that this examination is undertaken (by a suitably qualified, competent person), except where the lifting equipment is hired in on a short term lease. However, it should be noted that, as the operator of the equipment in this scenario, it is your responsibility to ensure that the thorough examination has been completed by the leasing company and Zurich recommends that you obtain a copy of the up to date report/certificate for each piece of hired in equipment. For equipment or accessories that are being used to lift people, the regulations state that a thorough examination should be undertaken at least once every six months. All other lifting equipment should be examined at least once every twelve months.

- A responsible person should undertake a daily pre-use inspection, to check for hydraulic or other oil leaks, the integrity of fuel hoses, electric cable installation, battery connections and that protected covers are correctly in place. The check should also ensure that all safety devices are operational and that wheels, tyres, lifting chains, forks, steering and brakes are all in good working condition. Zurich recommends that the check is documented and that there should be a formal procedure for reporting defects to management. All reported defects should be corrected before the fork-lift truck is returned to operational status.

- Vehicles should only be driven by authorised persons, who have received the appropriate training. Driving performance should be monitored and action taken if vehicles are not operated in a safe manner.

- Adequate gangways and aisles should be maintained to facilitate safe truck operations. It is also recommended that pedestrian routes are separated from vehicular routes. Separation can be by means of demarcation lines but more substantial barrier rails, which prevent pedestrians from wandering onto vehicle access routes, are preferable.

- Particular attention should be given to avoiding impact damage to fire doors, compartment walls and other elements of passive fire protection. With regards to fire doors, the provision of suitable impact protection barriers should be considered.

- The fitting of storage racking protection barriers can prevent costly downtime and disruption to the business following impact damage.

- Where premises are sprinkler protected, Zurich recommend that a detailed assessment is carried out, taking into account the risk of impact damage to sprinkler heads, particularly those situated within storage racks, range pipes and the main installation control valves. Where necessary, suitable impact protection can be provided to limit the impact risk. In the event that a component of the sprinkler system suffers impact damage, emergency plans should be in place to ensure that the installation can be immediately isolated. A sprinkler *impairment* process should then be invoked.

- All fork-lift trucks and similar equipment should carry a suitable fire extinguisher and all drivers should be trained in the use of the fire extinguisher.

- Full recognition should be given to the inherent fire hazards of the materials being conveyed and special care should be taken as appropriate.

- Attention should be given to ensuring the effective security of fork-lift trucks out of business hours. All equipment can be isolated when not in use by removing ignition keys and keeping them in a secure place, away from the fork-lift truck (e.g. in a locked office drawer, cabinet or preferably, a wall mounted key safe). This will help to prevent the fork-lift truck being used during any break-in and may help to limit the loss of stock and contents, especially where the stock or contents are bulky items.

The following sets of recommendations are designed to give more specific advice for each fuel type and for fork-lift trucks which are to be used in hazardous atmospheres.

Battery Powered Appliances

- Ideally, the charging of batteries should be carried out in a separate building of non-combustible construction, reserved for this purpose, or in a specially designed charging area comprising a separate compartment of 120 minutes fire resistance. If this is impractical, charging can be confined to a designated area of a building which is devoid of combustible materials. A clearance of at least 2 metres should be achieved between the charging unit and any adjacent combustible materials. This clear area can be defined with barrier rails or, at the very least, demarcation lines.

- Battery chargers should be installed on a concrete floor or securely wall mounted against a non-combustible structure. They should not be installed within storage racking, as any sparks given off by the charger could ignite combustible packaging. Where, due to space restrictions, a battery charger has to be sited immediately adjacent to racking, 10mm thick plasterboard (or similar 30 minute fire rated material) should be fixed to the side of the racking, in order to separate the charger from any combustible stock or packaging materials contained within the racking.

- All electrical connection leads should be kept at short as possible. Leads and connectors should be maintained in sound condition via frequent inspection. Suitable precautions should be taken to prevent mechanical damage of the cables when not in use.

- Where batteries need to be removed from the fork-lift truck to be charged, a suitable hoist should be provided to limit the risk of the battery being dropped and damaged.

- Whilst being charged, it is possible for batteries to give off hydrogen gas, which is highly flammable. For this reason, Zurich recommends that smoking and any naked flames should not be allowed in any areas where battery charging is taking place. This rule should also apply to refuelling areas for LPG and Diesel powered units.

- The charging area should be kept clean, tidy and free from rubbish or other combustible materials.

- Where charging is carried out in a confined enclosure, consideration should be given to providing adequate natural or mechanical ventilation to prevent the accumulation of hydrogen gas, which is explosive and can be released during the charging process. Hydrogen gas monitoring may need to be installed, together with suitable interlocks, to automatically isolate the charging devices in the event of gas accumulation beyond safe limits. Advice should be obtained from a specialist ventilation contractor.

Diesel Powered Appliances

- Storage of diesel should be in drums or tanks. In most cases, these will be above ground tanks located in the open. External fuel or oil tanks should be provided with secondary containment to contain any leaks or spillages, preventing running liquid fires from causing a rapid spread of fire.

- For storage drums suitable drip trays could be used for secondary containment. However, where there are multiple drums, it is recommended that these are stored within, either a suitable proprietary bunded cabinet or within a built up ‘pit’. The bund pit should be impervious to the contents of the tank and have a capacity of 25% of the total volume of all drums or 110% of the largest drum’s capacity.

- Diesel oil tanks should either be double skinned or should be placed above a bund pit. The pit should have a capacity of 110% of the tank's capacity.

- All refuelling operations should be carried out in the open air and appliances should be switched off during the filling operation. To limit the possibility of spillages, filling can be undertaken with the use of an electric or hand operated dispenser pump, as opposed to pouring the fuel directly from drums.

- Particular care should be taken to ensure that the exhaust system, the engine bay and other potentially hot surfaces do not come into contact with combustible materials. This includes loose waste material, which may be drawn into the engine compartment. Where the environment requires it, a spark arrestor should be fitted to the exhaust outlet.

LPG Powered Appliances

- If LPG powered fork-lifts are exposed to high temperatures there is a risk of the gas cylinder exploding. For this reason it is recommended that LPG powered fork-lifts are not used in proximity to ovens, furnaces or any other machinery that has the potential to give out extremes of heat.

- The valve of the LPG cylinder that is attached to the fork-lift truck should be manually closed when the appliance is not in operation.

- Particular care should be taken over the storage and use of cylinders to ensure that fire safety is not compromised. Bulk storage of LPG cylinders should be stored separately from any oxygen gas cylinders within a suitable cage, outside the building. For further information on safe storage of industrial gas cylinders, see Zurich's guidance document entitled: *Fire Safety – LPG and Industrial Gasses*.

- Where the LPG supply is in the form of a bulk tank for the refilling of cylinders, additional fire precautions need to be put in place as follows:

    - Locate the tank away from vehicle routes where possible. Where a tank is located close to a vehicle route, ensure that suitable impact protection is provided around the tank.
    - Ensure that any pipework is also protected from impact damage and is well supported.
    - Site the tank away from any drains or low lying areas as LPG is heavier than air and any leak could accumulate and present an explosion risk.
    - Provide adequate separation from buildings.
    - Consider potential ignition sources. Make the area no smoking and keep the tanks clear of any fires, vehicles and electrical equipment.
    - To aid ventilation, keep the tank clear of any rubbish, combustible materials or overgrown grass/weeds. If using weedkillers, do not use chlorate based products as these present a fire hazard.

  More specialist advice concerning the tank installation should be obtained. Some further useful references for tank installations are noted at the end of this document.

- Cylinder refilling should only be carried out by trained personnel who are fully aware of the fire hazards involved and the precautions to be taken.

- Care should be taken to ensure that the exhaust system, the engine bay and other potentially hot surfaces do not come into contact with combustible materials. This includes loose waste material, which may be drawn into the engine compartment. Where the environment requires it, a spark arrestor should be fitted to the exhaust outlet.

Potentially Explosive Environments

- Fork-lift trucks present a number of potential ignition sources when used within a potentially explosive environment. Battery powered vehicles can produce electrical sparks and diesel powered appliances can emit sparks from exhaust systems. For these reasons, specially modified flameproof vehicles should be considered for potentially explosive atmospheres, as these ensure that all potential ignition sources are suitably contained.

- In the United Kingdom, the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) apply to all workplaces where a hazardous atmosphere may be present. To determine the level of protection that is required, a risk assessment can be undertaken by a competent person. The hazardous 'zone' will be assessed as being one of three potential classifications (zone 0, 1 or 2 for gasses, vapours and mists and 20, 21 or 22 for explosive dusts), depending on the frequency and duration that flammable vapours or explosible dusts are present in the atmosphere. Only when the zone classification has been decided can you confirm what type of fork-lift is required.

- Any machinery used within hazardous atmospheres should be designed to ATEX standards.

- Flameproof (also known as explosion proof) fork-lift trucks should be inspected, serviced, maintained and repaired by properly trained engineers, in accordance with the manufacturer's recommendations. Flameproof trucks will be supplied with a certificate indicating what type of zone they are suitable for. When these types of appliances are serviced or repaired, the engineer should confirm that the truck meets the certification criteria before the truck is used.

Summary

Fork-lift trucks are a valuable piece of equipment for many companies but do present additional risks in the workplace. The vast majority of incidents and accidents involving fork-lifts comprise some form of impact damage, either to the fabric of the building, storage racking or stock and contents. While fires and explosions arising from the use of fork-lifts are rare, these types of incident are more likely to result in larger losses.

As with any piece of machinery, ensuring that the equipment is designed correctly and that it is regularly maintained are perhaps the most important measures with regards to safety. By incorporating both the general recommendations and the specific guidance in this document into your workplace safety practices, the risks of fire, explosion and impact damage can be greatly reduced.

Useful References

1. Lifting Operations and Lifting Equipment Regulations 1998.
2. Provision and Use of Work Equipment Regulations 1998.
3. Control of Pollution (Oil Storage) (England) Regulations 2001.
4. The Water Environment (Oil Storage) (Scotland) Regulations 2006.
5. Dangerous Substances and Explosive Atmosphere Regulations 2002.
6. ATEX 95 or ATEX – European Directive 94/9/EC.
7. LP Gas Association – Code of Practice 1. Bulk LPG Storage at Fixed Installations: Design, Installation and Operation of Vessels Located Above Ground (January 2009).
8. LP Gas Association – Code of Practice 1. Bulk LPG Storage at Fixed Installations: Examination and Inspection (September 2006).

9. LP Gas Association – Code of Practice 1. Bulk LPG Storage at Fixed Installations: Buried/Mounded LPG Storage Vessels (February 2008).

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