

# Insight: Industrial Powered Lift Truck Fire Risks

## Recognizing the Risk

Lift trucks are industrial vehicles used to transport (i.e. move, load, or lift) goods and materials in areas such as loading docks, production facility floors or warehouses. These have various names based on industry and use such forklift, clamp truck, pallet truck, scissor lift, walkie truck, tractor, platform lift, and hand truck. Some are designed for very specialized use. While some are not motorized, powered lift trucks utilizing electric motors or engines have inherent fire risks that must be properly managed. Some of the most common issues that result in fire losses, and many times are not recognized by owners and operators, include:

- **Mechanical or electrical malfunction**- often tied to improper repair and/or poor maintenance.
- **Oil and fuel leaks**- ignited by the hot equipment itself, frictional heat, or static sparks.
- **Improper operation**- utilizing standard forklifts in areas with ignitable dust or vapors or, outside of design.
- **Improper fueling**- creating vapors or liquid spills with ignition from sources such as static discharge or improper smoking.
- **Improper charging**- done in areas with inadequate ventilation to disperse hydrogen gas generated from batteries under charge and/or near combustible materials.

Lift trucks with lithium-ion batteries can also introduce added risks and thus more specialized risk management programs (including modified firefighting and emergency response) may be needed. And facilities with hazardous environments such those with potentially ignitable dust or vapors as noted above can amplify the loss potential thus requiring special trucks, protective equipment (such as exhaust outlet spark arrestor) and, increased required risk management.

## Controlling the Hazard

Controlling risks associated with the use of lift trucks can not only help create a safe working environment but also protect site physical assets and ensure continued operations. NFPA 505 (and other international equivalents) provide detailed guidance specific to lift truck types regarding area use restrictions, safe charging and fueling arrangements and operations, proper maintenance and operation. Several other NFPA documents, referenced in NFPA 505, provide added guidance for specific engine-driven alternative-fuel powered lift truck types as well.

Having comprehensive and integrated lift truck risk management programs can go a long way to reduce the risk of fire. This is especially true given many related losses were proven to have been preventable had such programs been properly developed and implemented. This includes routine fire risk assessment and safety checklists specific to the type of lift truck being used. Reducing and preventing lift truck fires starts with good loss prevention management programs that includes the following routine documented actions where applicable:

- **Routine Maintenance:** Regular maintenance with special focus on the condition of batteries, battery cables, fuel line integrity, manifold blowouts, and both vehicle and area housekeeping. Depending on the level of risk present (determined by vehicle use and location assessment), this may be a daily or shift-based check. Maintenance also extends to charging and/or fueling areas too.
- **Operating Area Hazard Reviews:** Good housekeeping to minimize dust and debris that can get sucked into lift truck engines and clog airflow or cause ignition.
- **Operator Training:** Routine operator training on safe operation practices especially regarding handling flammable goods, minimizing sprinkler and structure contact, and proper fueling and/or charging. This should include basic safety such as turning of engine-driven vehicles during refilling.
- **Vehicle Hazard Reviews:** Regular vehicle hazard reviews, especially when in conjunction with any process changes, to ensure the vehicle types used are compatible for specific hazardous areas such as those with combustible vapors or dust potential. For example, in areas where flammable liquids are present, location hazard classification is determined

per NFPA 70 or international equivalents and then the vehicle type is selected based on NFPA 505 from the NFPA 70 area classification.

- **Charging/Refueling Station Reviews:** Regular fueling and charging area reviews should be made to ensure detached from combustibles with compliant ventilation for interior charging areas and acceptable exterior locations for exterior gas refueling stations. This review should include a review to minimize ignition sources such as enforcing no smoking and hot work.
- **Operating Area Damage Inspections:** Routine site evaluation for lift truck caused damage to make repairs where damage has occurred (such as to fire doors), adding physical protection (such as around fire doors where damage has occurred), and identifying increased training opportunities.

Controlling lift truck hazards can be complex and involve various approaches- many based on the type used, how it is powered, and how it is used. Charging and fueling areas should be in areas outside of main buildings, located in detached dedicated buildings or, separated from main building operations by rated fire barriers or significant detachment. Good housekeeping is critical to limit all combustibles in these areas and no smoking policies must be strictly enforced. Hot work must be forbidden in all areas without extraordinary measures taken.

For electric charging areas, equipment should be installed on concrete floors or securely mounted on non-combustible wall structures - never affixed too or place atop composite panel walls having combustible cores. For fueled lift trucks, appropriate fuel storage arrangements are important. including keeping drums or tanks located in properly protected open areas clear of buildings and banded to contain liquid leaks or spillages. NFPA 30 or international equivalents should be followed. For LPG gas fueled lift trucks, valves on the LPG cylinder should be closed when forklifts are idle. Refueling activities should be conducted externally at designated areas only using only approved dispensing equipment. Personnel involved in cylinder filling operations should be appropriately trained and fully aware of the fire hazards involved and precautions necessary.

And special precautions are required when lift trucks are used in hazardous atmospheres or environments. Only explosion-proof forklifts are appropriate for use in areas where potentially explosive atmospheres may occur. Specially rated forklifts should be regularly inspected, serviced, and maintained per manufacturer's recommendations.

Lift truck operator training is also critical in the areas they operate to prevent damage to building structures or equipment and, maintain fire protection systems are in service. For example, care must be taken not to damage fire doors or storage rack legs and keep required flue spaces clear when pallets are placed in warehouse storage racks. Training must also include safe operation e.g., no dragging lift truck forks along floors because of the frictional heat created and careful attention when moving aerosols because of the potential for "rocketing" and ignition if a can become punctured. Training must include a program for notification of and repair of damaged equipment.

## References & Resources

NFPA 30: Flammable and Combustible Liquids Code

NFPA 70: National Electrical Code

NFPA 505: Fire Safety Standard for Powered Industrial Trucks

NFPA Forklift Fact Sheet: <https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Fact-sheets/forkliftfactsheet.ashx?la=en>

Insight: Storage Fires (COM-CG-04-0004)

Idle Pallet Storage (COM-CG-04-0008)

\*While NFPA documents are the global standard used by AIG, international equivalents may be acceptable.

For more information, contact your local AIG Risk Engineer.

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