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Occupational Safety and Health Administration
Directorate of Technical Support and Emergency Management
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Standup Forklift Under-ride Hazards

Safety and Health Information Bulletin

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Preface

Forklift truck operators must look in the direction of travel and keep the forklift under control at all times. One of the potential hazards faced by standup forklift operators is the crushing hazard that can arise when traveling, with the forks trailing, in a warehouse near a storage rack or similar obstruction. The risk is that a horizontal rack beam (crossbar) or similar obstruction might enter the operator's compartment in a situation referred to as "under-ride." This Safety and Health Information Bulletin (SHIB) discusses ways to reduce the crushing hazard to the operator associated with under-ride. Awareness of the precautions and safety measures highlighted in this SHIB can help prevent serious injuries and fatalities related to warehouse operations.

This Safety and Health Information Bulletin (SHIB) is not a standard or a regulation, and it creates no new legal obligations. It contains recommendations as well as descriptions of mandatory safety and health standards. The recommendations are advisory in nature, informational in content, and are intended to assist employers in providing a safe and healthful workplace. The Occupational Safety and Health Act requires employers to comply with safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state Plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

Purpose

The purpose of this SHIB is to:

- Alert standup forklift operators and employers to the crushing hazard to the operator associated with under-ride;
- Identify standup forklift features that are available on new equipment or that can be installed on standup forklifts to address the hazard (ANSI/ITSDF B56.1-2005, para. 4.5.3, 7.30, 7.36.);
- Identify arrangements or modifications of storage racks that might reduce the risk of under-ride;
- Recommend work practices that can be implemented by the employer to eliminate the under-ride hazard;
- Stress the importance of training employees on the safe operation of standup forklifts; and
- Ensure that employees follow safe operating procedures.

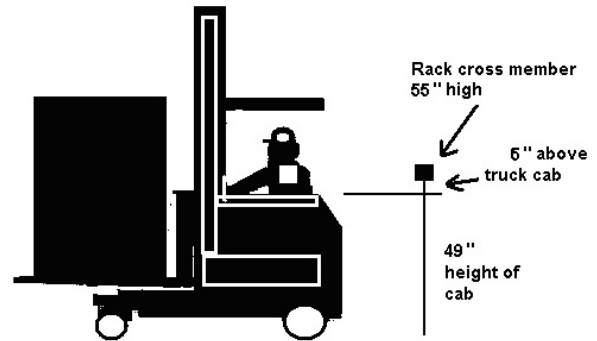
Background

A forklift “under-ride” hazard arises when the forklift operator travels with the forks trailing and backs up toward the storage rack. If the operator drives the forklift too far, so that the forklift passes beneath the horizontal crossbar (i.e., the operator creates an “under-ride”), the crossbar can enter the operator’s compartment and crush the operator inside the compartment.

The Occupational Safety and Health Administration’s (OSHA) Integrated Management Information System data for the period of 1993 through 2008 indicate that at least nine employees have been killed and three employees sustained severe crushing injuries when operating a standup forklift in reverse. These forklifts did not have a protective rear guard or corner post to prevent under-ride from occurring.

Accident Description

The OSHA Cleveland Area Office investigated a fatality at a warehouse where a standup forklift operator was found pinned between the lower horizontal crossbar of a storage-rack shelving system and the interior of the operator’s compartment. The horizontal crossbar of the shelving system was 55 inches (140 centimeters) above the floor, while the top surface of the operator’s compartment was only 49 inches (124 centimeters) above the floor. This left a space of 6 inches (15 centimeters) between the crossbar and the top surface of the operator’s compartment. Although the forklift had an overhead guard, the shelving rack was not positioned at the same level as the guard to prevent the under-ride from occurring. When the operator traveled with the forks trailing, the forklift passed under the crossbar, which struck the operator above the waist and pinned his torso against a part of the operator’s compartment. The operator died of asphyxiation injuries.



Drawing is not to scale. The small square on the body of the driver represents the approximate position of the rack cross-member after the accident.



This photograph depicts a forklift under a storage rack after an under-ride accident. The crossbar is protruding above the operator’s cab. Forklift manufacturers have various features available to assist in preventing such under-rides.

OSHA's Standard Requirements

Proper training is essential to the safe operation of powered industrial trucks. Paragraph (l) of OSHA's Powered Industrial Trucks Standard, 29 CFR 1910.178, contains training and certification requirements for the use of forklifts that are specific to the workplace. The standard requires employers to develop and implement a training program for all operators based on the general principles of safe truck operation; the types of vehicles being used in the workplace, including the instructions, warnings, and precautions found in the operator's manual; the hazards of the workplace created by the use of the vehicle; and the general safety requirements of the OSHA standard.

Additionally, 29 CFR 1910.178(n)(1) and (n)(6) require operators to keep the forklift under control at all times and to look in the direction of travel.

Recommendations

The following recommendations will reduce the risk of under-ride hazards associated with operating standup forklifts.

Employers should evaluate their worksite to determine if an under-ride hazard exists. If there are rack crossbars or similar obstructions in the facility, the employer should take one or more of the following actions:

1. If possible, make modifications to the shelving system.
 - Adjust the shelf heights so that the body of the forklift below the operator's compartment will strike the rack in the event of contact, preventing under-ride from occurring.
 - Adjust the shelf heights so that the forklift's overhead guard will strike the rack in the event

of contact, preventing under-ride from occurring.

2. Install a barrier, even with the outer edge of the storage rack (such as a curb or floor level shelf), so that the bottom of the forklift will strike the curb or shelf in the event of contact, preventing an under-ride from occurring.
3. Purchase, where appropriate, standup forklifts that have corner posts, extended backrests, rear post guards, or other features to prevent an under-ride from occurring. (Specific guards or other means that enhance safe operations would be determined through cooperation between the user and manufacturer (see ANSI /ITSDF B56.1-2005, para.4.5.3, 7.30, and 7.36).)
4. Contact the manufacturer to discuss installing rear post guards or other equivalent protections that address the under-ride hazard on existing standup forklifts. These posts may be available from the forklift manufacturer. (Note that modifications and additions which affect safe operation shall not be performed by the customer or user without the manufacturer's prior written approval. 29 CFR 1910.178 (a)(4).)
5. Evaluate control methods to assure that guards do not limit visibility, present pinch-point hazards, or add any additional hazard to forklift operators or other employees on the site.
6. Train employees to operate forklifts safely as required by paragraph (l) of 29 CFR 1910.178, including recognizing the hazards of the workplace created by the use of the vehicles.
7. Refer to the [Powered Industrial Trucks \(Forklift\) eTool](#) as a resource for information to keep employees who operate forklifts safe on the job. The eTool provides a review of potential hazards and a summary of key OSHA

requirements and industry-recommended practices for forklift operations.

Note: It is a violation of Federal law for anyone UNDER 18 years of age to operate a forklift in non-agricultural employment. (See OSHA Safety and Health Bulletin 03-09-30, Protecting Young Workers: Prohibition Against Young Workers Operating Forklifts.)

Conclusion

Minimizing the potential for serious or fatal injuries to standup forklift operators is the primary concern of this SHIB. Following the safe work practices recommended in this SHIB, and training employees as required in OSHA regulations, will help accomplish this goal.



Upper rack is positioned at the same level as the overhead guard, preventing the possibility of an under-ride. The forklift shown in this photograph has an overhead guard and an extended backrest. Kits with additional posts are other safety features that are available on many forklifts.

Photo Courtesy of Momentive Performance Materials.

References

1. OSHA Integrated Management Information System (IMIS), 1993-2005.
2. American National Standard ANSI/ITSDF B56.1-2005, Safety Standard for Low Lift and High Lift Trucks, Industrial Truck Standards Development Foundation.
3. Powered Industrial Trucks (Forklift) eTool at <http://www.osha.gov/dcsp/products/etools/pit/index.html>
4. Safety and Health Information Bulletin, 03-09-30, Protecting Young Workers: Prohibition Against Young Workers Operating Forklifts.